ASSEMBLY ENVIRONMENT & PUBLIC RESOURCES COMMITTEE MEETING

MINUTES

DATE: Friday, March 7, 1975

MEMBERS PRESENT: Chairman Bremner, Messrs Coulter, Jacobsen, Weise, Banner, Jeffrey, Heaney and Price;

MEMBERS ABSENT: None

MEMBER EXCUSED: Mr. Chaney

The meeting was called to order at 2:40 p.m. in Room 214 by Chairman Bremner. He read the the summary of AJR 15 to be discussed today. He called upon Mahlon E. Gates, of the Nevada Operations Office of the Energy Research and Development Administration (ERDA) for testimony.

Mr. Gates informed the Committee that ERDA has taken the place of the Atomic Energy Commission (AEC) in operations and it includes representatives from the EPA, Department of the Interior and the National Science Foundation as well as six presidential appointments. ERDA presently falls under the jurisdiction of the Assistant Administrator for Environment and Safety. Under a survey taken and report made in September known as WASH 1539, "Management of Commercial High Level and Transuranium Contaminated Radioactive Wastes", much public concern has been caused. The report is twofold: 1) One part consists of using technology which is readily available now to provide fully retrievable storage at some central place and 2) During the time made available by the retrievable storage, several of the most promising geological formations will be evaluated and a pilot program will be put into effect to put high-level waste into a geological formation. If this pilot program is successful on a specific site, that site would become the permanent disposal site. All the high-level waste stored retrievable up to that time would be transferred to the permanent disposal site. This facility would be active for approximately 100 years.

Regarding site selections, Mr. Gates stated that 100 sites had been studied by the AEC; three sites were tentatively identified as warranting further study. These were: Idaho Falls, Idaho; Richland, Washington, and the Nevada Test Site, Nevada. Regarding the economic impact effecting the site finally designated, Mr. Gates stated that the totel program over the next 30 to 40 years would be $1.5 billion; that construction costs would approximate $100 million over the same period and that costs of the project would be levied by the Government to the energy producers.

Mr. Gates showed the following 13 slides: Usage of nuclear energy from 1953 of 7% to 25% in the year 2010; 2) Nuclear Fuel Cycle - why the waste storage problem; 3) Typical Cannister explaining the reduction of waste to a glass-like substance 10' x 12" with ten reactors per year in one cannister; 4) Growth in the Number of Cannisters since 1880 from a few to a projected figure of 75,000 in 2010; 5) slide of a typical spent fuel cask mounted on a railroad car with 12 cannisters on one cask; 6) a cutaway view of a retrievable surface storage facility, (There are two types of storage - air or water); 7) Water Basin Storage Heat Removal System in its native form; 8) *Air Cooled Vault Concept - no mechanics involved - 3/8" thick; 9) Sealed storage cask concept where the waste is sealed in a cylinder and surrounded by a 2" thick additional cannister; 10) slide showing the three sites presently under consideration, Idaho Falls, Richland, Washington and Nevada Test Site, Nevada; 11) slide showing a map of the Nevada Test Site; 12) slide showing EMAD facilities at the NTS. (Mr. Gates stated that their program up to now is completed at the NTS); 13) slide showing the interior of a "hot bay" in the EMAD Building, cask carrying canisters.

Mr. Gates continued and informed the committee that he recently conducted a survey routing a railroad through Southern Nevada by-passing Las Vegas which will be submitted to his office in Washington. This by-passing of Las Vegas was one of the requirements stated by the Governor for consideration of the NTS as a storage area. He stated that two days ago he spoke to two men in Washington responsible for this program and he was told it appears a review of the EPA impact study would be required and that there would be a possible delay of one year or more on the project; that it looks doubtful that it would be in the 1977 budget.

Mr. Coulter asked Mr. Gates if the Federal Government could insist that the storage area be established in Nevada if Nevada does not approve. Mr. Gates stated that the Federal Government is mindful of public opinion and that he has considerable weight on their decisions. Mr. Jeffrey asked Mr. Gates if he had any figures as to how much research and development would be necessary in Nevada if this storage area were brought to Nevada. Mr. Gates stated that in addition to the present testing, he did not know.

Mr. Jeffrey asked Mr. Gates if he had any figures on the numbers of maintenance and support people to be employed if the waste disposal was located in Nevada. Mr. Gates stated that there are presently 4,000 employees at the test site and that operation after construction the numbers would be in the hundreds.

* Cool air goes out the bottom; hot air out the top.

Regarding the Solar Energy Research and Development aspect of the bill, Mr. Coulter asked Mr. Gates if he felt this was one of the prices we pay if we pass AJR 15. Mr. Gates stated that he doesn't know if this is a "quid pro quo", something given or received for something else but that "I think it would be an advantage if a solar plant were constructed in Nevada because the weather is not'touch and go' as it is in other areas". Mr. Weise stated that he wasn't aware the Federal Government was aware of public opinion to which Mr. Gates replied that he could not discuss the relative merits of the bill as it is before the Assembly; that there is no relationship between solar energy and the waste program. He stated: "I'm a proponent of utilizing existing facilities; it just makes good sense".

Mr. Weise asked Mr. Gates how Nevada stood in relation to selection as a site as compared to the other two areas. Mr. Gates stated that each of the three tentative sites selected were equal in priority; that public reaction is a consideration in the ultimate decision.

Mr. Heany asked Mr. Gates if he felt there was any greater danger in the transportation of waste masterials just in handling from one point in the country or another. Mr. Gates stated that he is not an expert but that the unloading of cannisters is less hazardous an operation than their loading. Mr. Heaney asked if there was explosive danger or just where the potential danger lies. Mr. Gates stated that there was no explosive danger; that that is why the waste will be reduced to a glass substance so that it will not blow away and cannot dissolve in water.

Mr. Coulter asked Mr.Gates the effect if all three states being considered were to refuse this proposed construction. Mr. Gates said that this would present quite a problem and that they would have to look elsewhere. Mr. Jeffrey asked Mr. Gates if he had seen the amendment to AJR 15 proposing conditions by the Governor to allay public fears. Mr. Gates stated that he had not seen them; that the Governor had generally accepted the recommendations made to him; that he would favor continued consideration of Nevada under four conditions: 1) that their construction effect only the storage area being considered; 2) any railroad constructed would by-pass Las Vegas; 3) assurances made for the safety in the transporting and handling of the waste material; and that 4) the State and local entities would be involved with the Federal Government when the point arrives for the ultimate study of a site.

Mr. Price asked if experts in transporting the waste to Nevada would be used or if it would be handled by local representatives. Mr. Gates stated that the transportation specifications are subject to the Department of Transportation and that they are not in compliance with them. (DOT)

Mr. Price stated his opinion that of the three sites under consideration in the west, Nevada offers the most ideal location hydrologically and that there is already considerable radio-activity in Nevada from past testing.

Assembly Mann stated that he was concerned about Nevada's economy; that he had no fears of the safety effecting the State. "What's important to us is the dollars spent in the next forty years and that this may help us diversify the activities in the State; that we'll see a railroad by-passing Las Vegas, warehouses, etc.; that we have waste products in Nevada already buried 5,000 feet underground; that if all sites are turned down, the Federal Government will be forced to choose one or the other or it(the waste) would be dumped in the ocean".

Mr. Weise questioned Mr. Mann about the other nuclear reactors which the Federal Government approved which are now shut down. Mr. Mann stated that this does credit to the Federal Government. He continued that this would provide a new source of energy and that the Federal Government has a good safety program.

Mr. Weise stated that he has received many letters from people all favoring the solar plant development. Mr. Heaney asked Mr. Mann if he has any in-put from Southern Nevada. Mr. Mann stated that the bill is favor by the Chamber of Commerce, the County Commission of Clark County; many business groups and that they all want the Governor's safety standards met. He continued that 14%of his constituents are employed at the test site and that 2,000 of them have been laid off in the past five years and that someone is going to pick up those dollars. Mr. Heaney asked Mr. Mann what was being done on the solar energy plan. Mr. Mann stated that the University is asking for funds to start this program; that there is much available land around Southern Nevada and that "our economy will be much better off by accepting 'this'"

Mr. Heaney asked Mr. Mann if he would favor this bill even if there is no solar research. Mr. Mann stated that he would because of the economy factor. Mr. Coulter suggested that the solar energy plan be a pre-requisite to the passage of the measure. Mr. Mann stated that he would be willing to go along with the judgment of the committee. "I want that $1-1/2 billion for Southern Nevada," he stated.

Mr. William Flangas, mining engineer and chairman of the Nevada Public Works Board, said that the existence of wastes are already a reality and the test site is the most logical of the three sites prepared to store them. ...."There is risk in all progress". For Mr. Flangas' complete remarks, see Exhibit "A" attached hereto.

Miss Susan Orr of the Foresta Institute, in opposition to AJR 15, stated that the ERDA "readily admit that they don't know how to permanently store this persistently toxic debris..... that incredibly potent materials whose safe and secure handling has to be fail-proof for longer than humanity itself has existed". She also pointed out that people would think twice about making a capital investment in a place known as a garbage dump. (Miss Orr's complete remarks are attached as Exhibit "B" hereto.)

Mr. Heaney stated that though he is an environmentalist and member of the Sierra Club, the waste is already here; that perhaps our national policy on nuclear development should be reviewed and examined looking toward alternative energy sources. Mr. Price felt that there is great risk involved in interim storage, the reason the Federal Government is taking a second look at this. Mr. Banner stated that if we don't take some risks, we'll never do anything. Mr. Jacobsen stated that he felt the situation was nationwide and that "we should try to find solutions, (to problems) not by-pass them." We feels we demand services that we don't want to pay for and that public information is lacking in this area. Mr. Jeffrey stated that in Clark County the feeling toward AJR 15 is much different than it is in Northern Nevada; that "we've lived with it since 1951 where thousands of people are employed"; that educational programs in Clark County have allayed many fears and that everyone is aware of the safety hazards and lives with them.

Mike Bell of Reno stated that among other things the unanswered questions and concerns people have about radiation "could have a depressant effect upon the growth of the Southern Nevada community. Mr. Bell's testimony is attached hereto as Exhibit "C".

Mr. Richard Wyman, associate professor at UNLV, stated that before his position with the University, he worked at the test site and supports the resolution, that it is good for the State; that the original criteria used to set up the test site is still valid today. He continued that every precautionary facility exists at the test site. He felt that human life was jeopardized in heavily populated areas if storage areas were established in the East and that opposition by the public was because the AEC was too secretive in the past. He felt the construction involved in the project would benefit the economy and that the NTS should be the permanent site for storage. He felt that in Nevada, contrary to Washington state, contamination would not effect ground water because it would be in glass form. He felt that the Government would not reduce its budget and cut back on security because this is of national importance.

Mr. Jacobsen stated that at a seminar he attended recently, it was learned that all atomic waste could be contained in an area the size of a football field and 15 feet deep.

Mr. Heaney asked if there is any possible sabotage danger from any use of this material insofar as making bombs or is there real explosive danger. Mr. Wyman stated that this material would have to be re-processed somewhere; that the isotypes are benign and would require a re-manufacturing process.

Daisy Talvitie, representing the Legislative Action Committee of the Clark County Democrat Central Committee, stated that her organization felt that complete, unqualified endorsement of storage of nuclear wastes in Nevada is premature for a number of reasons. Her reasons are specified in Exhibit "D" attached. She also presented a letter from Governor O'Callaghan directed to the AEC dated October 28, 1974, and a copy of the report of the Nevada Radioactive Materials Storage Advisory Committee, all attached as Exhibit "E".

Referring to a statement presented by Mrs. Talvitie from the League of Women Voters of Nevada, she stated that this organization recommends the Legislature to strongly question the wisdom of approving AJR 15 as it stands. Their statement is attached hereto as Exhibit "F".

Dr. L. Douglas DeNike, Technical Consultant for People for Proof, stated the dangers of storage of nuclear wastes, the interests of all states, not just Nevada, especially those directly downwind in the construction of a retrievable surface storage facility. He did not feel this was a matter to be decided in just one afternoon or to be swayed by a momentary need to increase employment. He submitted several bulletins and opinions, all of which are attached as Exhibit "G".

Mr. Heaney thanked Dr. DeNike for appearing and coming all the way from Los Angeles and asked Dr.DeNike what is to prevent an atomic attack anywhere else in the United States and what is the relevance of an atomic attack in Nevada. Dr. DeNike stated that larger quantities of nuclear waste would be in Nevada from all over the country and also from foreign countries and that the geological location of the storage area in Nevada from radioactivity would effect all the eastern seaboard. He suggested the committee request studies from ERDA regarding the effects that would be placed on the states east of Nevada.

To Mr. Heaney's question regarding the term "WASH-1539", Dr. DeNike explained that this was an AEC statement on contamination effects of waste; that it was very deficient and that WASH-1535 was a "breeder" reaction statement. He felt that one of the Aleutian Islands was a more appropriate location for this waste storage in that it was very remote and there was less wind danger.

Mr. Price engaged Dr. DeNike in a conversation regarding guerilla attack at the NTS as contrasted to an urban area and the psychological effects on a bomb being dropped in a large city. Dr. DeNike told of the so-called "saviors of humanity" just stealing nuclear material for this purpose.

Mr. Lou Paley of the AFL-CIO spoke in favor of AJR 15, stating that it would help the present unemployment factor in Nevada which is more than 10% and in the building trades is more than 20%. He stated that Workmen's Compensation has always been "kept up" insofar as radio activity is concerned and that there is no time limit on compensation for injuries of this kind. He feels we're one of the leading powers of the world; that this waste has to go someone and we have to do something about it.

Mr. Jim Arnold, business agent of the Southern Nevada Building Trades union, stated that the people in labor are not fearful of nuclear waste; that they respect it. They (the union) have sent many letter for the waste storage to be developed in Nevada to the Federal government and others. Mr. Shelly Kent, Sr., business agent for the carpenters in Southern Nevada stated that he has worked at the test site for 11 years; that it is very safe; that the present underground tests are far more dangerous than anything proposed in AJR 15.

**Ann Zorn representing the League of Women Voters, stated that her organization felt that complete, unqualified endorsement of storage of nuclear wastes in Nevada is premature for a number of reasons. Her reasons are specified in Exhibit "F" attached.

Reverend Zorn from San Francisco stated that plans must be developed, not wonder if people can sustain a direct hit on any storage facility. He felt the location should be remote. He feels that surface storage should be out of the question and until the AEC (ERDA) comes up with a proposal along these lines, this resolution should be held aside.

To Mr. Weise's question regarding existing underground caverns, Mr. Flangas pointed out that that 4 to 6 miles underground caverns exist from previous testing and would allow waste to boil, then cool and stay underground. Mr. Flangas continued to explain the detonating effects of an underground test and that permanent geologic disposal would do the same thing.

Chairman Bremner read the names of people he would hear further testimony from on Monday and adjourned the meeting at 5:25.

Respectfully submitted, Phyllis Berkson

** correction from page 6, paragraph 2 as to person testifying.

Exhibit H - Barbara Mindling

ASSEMBLY

47

AGENDA FOR COMMITTEE ON Environment and Public Resources

P.M.

Date March 7, 1975 Time Adjournment Room 214

| Bills or Resolutions to be considered | Subject | Counsel requested* |
|---|---|---|
| AJR 15 | Urges the Energy Research and Development Administration to choose the Nevada Test Site for disposal of nuclear wastes and for solar energy research under the Solar Energy Research, Development and Demonstration Act of 1974. | |

*Please do not ask for counsel unless necessary.

7421

ASSEMBLY ENVIRONMENT & PUBLIC RESOURCES COMMITTEE MEETING

FRIDAY, MARCH 7, 1975

GUEST LIST

| Name | Representing |
|---|---|
| Katharine Gardiner Hale | myself and future Nevadans |
| Susan Orr | Foresta Institute |
| Bonnie Brown | People for Informed Choice |
| L. Douglas DeNike | People for Proof |
| Cashion Callaway | Silver City Volunteer Fire Dept |
| Christopher Brown | myself and my children |
| Mahlon E. Gates | Nev. Operations Office, ERDA |
| Richard V. Wyman | U of Nev, Dept of Engineering |
| Shelly C. Camp, Sr. | Carpenters Local 1780 |
| James M. Arnold | Building Trades, Las Vegas |
| Glen Griffith | Dept of Fish and Game |
| Fred E. Wright | Dept of Fish and Game |
| John Miller | himself and others |
| Daisy Talvitie | Leg. Action Comm, Clark Co. Dem |
| Ann Zorn | League of Women Voters |
| Mike Bell | himself |
| Lloyd Mann | Assemblyman, sponsor of bill |
| W. G. Flangas | self and LV Chamber of Commerce |
| Lou Paley | Nevada State AFL-CIO |
| Jim Arnold | Building Trades Council |
| John White | himself |
| Dr. Sandorf | |
| Ms. Sill | |
| Rev. Adam Round | |
| Zel Lowman | Assemblyman |

Ex. A

1-56

March 7, 1975

Mr. Roger Bremner, Chairman
Environment & Public Resources
Committee
Nevada Assembly
Carson City NV 89701

Dear Mr. Bremner:

Enclosed you will find the following:

1. A copy of my remarks delivered at the federal hearing in Salt Lake City, December 12, 1974.

2. Valley Times editorial dated December 12, 1974.

3. Las Vegas Sun editorials dated December 12 and 13, 1974.

4. Resolutions:

   1) Clark County Board of County Commissioners

   2) Board of City Commissioners, City of Las Vegas

   3) Nye County Board of Commissioners

   4) Lincoln County Board of Commissioners

   5) Greater Las Vegas Chamber of Commerce

If further information is required, please advise.

Very truly yours,

W. G. Flangas

W. G. Flangas
4209 El Cederal
Las Vegas NV 89102

WGF:rvb

Ex. A

STORING AND MANAGING NUCLEAR WASTES AT THE NEVADA TEST SITE

L 57

December 9, 1974

My name is William G. Flangas and I am appearing today in my capacity as a native Nevadan, and a Mining Engineer experienced in underground nuclear testing activities. I am a graduate of the Mackay School of Mines of the University of Nevada at Reno, and am currently serving as the chairman of the Nevada State Public Works Board. I am familiar with the hazards of radioactive materials and operating in novel radioactive environments. In 1958/59 I supervised reentry into the tunnel at the first wholly contained underground nuclear detonation. I have repeatedly supervised similar operations. I am also here on behalf of the Greater Las Vegas Chamber of Commerce.

My purpose in appearing today is to comment on the suitability and advantages of storing and managing nuclear wastes at the Nevada Test Site in Mercury, Nevada. In my opinion, there are six key reasons why the Nevada Test Site should be selected as a national repository for these wastes. They are as follows:

1. Availability of professional and craft skills
2. Appropriate geography, topography and climate
3. Possibilities for permanent geologic storage
4. Geological and hydrological suitability
5. Availability of facilities
6. Public acceptance

1. Availability of Professional and Craft Skills

The Nevada Test Site at Mercury has prominently served the nation as an outdoor laboratory for weapons testing and Plowshare tests dating back to 1951. During this period, a great number of nuclear events have been

detonated, both in the atmosphere and underground, and we have a highly skilled cadre of professional, technical and craft personnel who are thoroughly schooled in the business and have the ability to cope with the inherent hazards. This capability also includes a highly sophisticated and extensive meteorological and radiological protection network, and personnel available both on and offsite.

The Nevada Test Site has compiled an enviable safety record in all facets of testing activities. Heavy construction, drilling and underground mining operations are very dangerous occupations that entail considerable risks and account for many accidents in the country. Some of the best, if not the best safety records in the field have been compiled by the people working at the Nevada Test Site. Nevada Test Site personnel are highly skilled in all aspects of safety, both onsite for employees and offsite for the public. This safety program involves, in addition to the Atomic Energy Commission itself, such agencies as the U. S. Environmental Protection Agency, the U. S. Air Resources Laboratory, the U. S. Geological Survey, the U. S. Bureau of Mines, and many others. Over a period of years of testing at the Nevada Test Site, good communication has been established with the surrounding communities in relation to Test Site activities that enable the best possible effort to be made toward maintaining public safety.

2. Appropriate Geography, Topography and Climate

The Nevada Test Site is located in a sparsely populated area some 65 miles northwest of Las Vegas, and amounts to some 1350 square miles located on three sides within the boundaries of the Nellis Air Force Range. Nevada Test Site is remote; it has a large area for testing purposes; it is already dedicated to nuclear purposes and has no population or agricultural encroachment.

It has no river systems, or fast moving underground aquifers, or public highways running through the area. Surrounded by mountain ranges, it has a built-in natural security that can be and has been easily maintained. Its dry climate permits year round activities with little or no weather delays.

3. Possibilities for Permanent Geologic Storage

While NTS is well suited for retrievable surface storage, it also has strong possibilities for permanent geologic disposal. As a mining engineer, I can tell you that we can tunnel into hard, dry, competent rock and store the wastes there, no matter what form the wastes are in, for geologic periods of time. For those wastes to be disturbed would take a geologic upheaval so catastrophic that the escape of any of those wastes would be of little consequence by comparison to other damages. We also have the capability, unique in the world, to drill large diameter holes (up to 120 inches in diameter) several thousands of feet deep into rock and geologic formations that would be acceptable for geologic storage.

There also has been proposed by the Lawrence Livermore Laboratory an in situ permanent disposal method that contemplates injecting liquid commercial power reactor wastes into deep underground cavities in silicate rock. The wastes are allowed to self-boil and the steam recycled in a closed system. When no further wastes are added, the cavity is allowed to boil dry, the heat melts the surrounding rock, the rock cools and solidifies, trapping the radioactive materials in an essentially insoluble rock matrix deep underground. This is essentially what happens with underground nuclear detonations: the rock, melted by the detonation, resolidifies and traps the radioactivity deep underground. There already are at NTS more than 350 pockets of this rock-trapped radioactivity from underground nuclear tests.

What I am saying is this: NTS is already committed to the storage of radioactive wastes safely deep underground. If the retrievable storage facility were located at NTS, I'm certain further study would show NTS suitable for deep underground disposal, thus eliminating the need to move the stored wastes except within the boundaries of NTS.

4. Geological and Hydrological Suitability

Because of the numerous underground testing and drilling projects conducted at the Nevada Test Site over the years, its geological and hydrological suitability has been firmly established and there is no doubt the Nevada Test Site is one of the most highly studied and geologically mapped areas that exist any place in the world.

The unique surface and ground water conditions at NTS provide excellent protection against contamination of ground aquifers. There are locations where the surface water drains into topographically closed basins, such as Yucca Flat and Frenchman Flat on site. Areas which drain into Frenchman Flat would not interfere with nuclear testing. Here, the surface water must filter down through several hundreds of feet of alluvial fill, and then through some thousands of feet of volcanic tuff, including zeolitized and clay zones and finally into underlying carbonate rocks before the water migrates offsite.

Measurements of flow rates in the tuff by USGS indicate that tens of thousands of years to one million years are required for water to pass through this volcanic tuff, and radioactive fission products in solution decay to harmless levels by then.

We don't believe that any spills would occur which would contaminate NTS ground water. If ground water were contaminated in the worst possible

case, other safety factors besides radioactive decay during the long exit time from NTS would apply. To the best of my knowledge, no other area under consideration offers this. The zeolitized tuff is Mother Nature's water softener which removes fission products and fissionable metals from water by ion exchange. Based on scientific evidence, not theory, we have seen no radioactivity from nuclear testing in the water of NTS wells, even though one of the wells in Yucca Flat is in very close proximity (within six thousand feet) of a nuclear test ground zero. We have sampled and analyzed water from all operating NTS wells (up to 15 of them) in a routine, continuous, monthly basis for the past 12 years.

Another safety factor is dilution of NTS water as it migrates offsite. Analysis of Yucca Flat's and Frenchman Flat's ground water recharge versus discharge of NTS and additional underflowing water at the Ash Meadows spring line, about forty miles to the southwest, indicates that this water is highly diluted as it slowly migrates offsite. These safety factors make Yucca Flat and Frenchman Flat and surrounding areas ideal for near-surface storage of radioactive waste.

At the north end of the Test Site are two granite stocks that are about 93 million years old and have withstood 20 million years of vulcanism and seven million years of earthquakes and faulting. Fault locations have been controlled by the stocks and forced to go around or die out at the edges. The stocks are between one and two miles in diameter at the surface, and increase in diameter with depth. They are known to be at least 15 thousand feet deep and probably extend several more miles in depth. The small amount of water in the stocks is virtually isolated from Yucca Flat.

In short, much of the Nevada Test Site is unique closed basins and massive geologic structures which geologically and hydrologically inhibit water migration from the Test Site.

5. Availability of Facilities

We have a considerable capital investment in available buildings that can be modified for use at minimum cost. The Nuclear Rocket Development Station, now a part of NTS, presently has facilities available which could readily be modified to serve as receiving and handling facilities for encapsulated radioactive waste. The principal facility that could readily be adapted is the E-MAD building at Jackass Flats. The E-MAD (which stands for Engine Maintenance, Assembly and Disassembly building) is 80 feet high, enclosed in a fenced area of 36 acres, and contains 100 thousand square feet of floor space. It is heated, ventilated and cooled by eleven separate systems, comprising a total of 30 supply and exhaust air fans. There are 600 kilowatts of interior and exterior lighting, a 75 thousand-gallon water storage tank, 31 large power operated shielding doors, 40 lead glass shielded windows, a 12-channel closed circuit television system, and a 21-channel internal communication network that ties together all the working areas. Two 300 horsepower boilers and an 800-ton 2-stage centrifugal refrigeration system provide the facility with temperature and humidity control.

Included in the special remote handling facility are an overhead bridge crane of 40 tons capacity, with a 10-ton auxiliary hook, two unique sidewall manipulators capable of handling loads up to 600 pounds at the end of a 35-foot arm, a 35-foot diameter turntable of 80-ton turning capacity, three scanning and photographic periscopes and ten master-slave manipulators.

The E-MAD complex comprises eight different functional areas; receiving and storage, cold assembly, hot disassembly, hot cells, shops, office, facility

circuit systems, and the remote-controlled railroad system. Construction was completed and activation of systems started in 1965. The overall cost of the E-MAD complex, including circuit facility, railroad systems and facility equipment, exceeded fifty million dollars.

We believe the E-MAD facility, since it was designed to handle highly radioactive materials remotely, would, with modification, be ideally suited as a receiving facility for handling commercial radioactive waste.

6. Public Acceptance

Thousands of NTS workers and their families live in Las Vegas and have developed a high degree of confidence in the AEC and the safety of Test Site activities. The outstanding job safety record at NTS and the safe conduct of nuclear testing have both contributed to this confidence. Both local population and tourists scarcely nodded when nuclear weapons were being detonated above the surface, not too many years ago.

On a coldly scientific and technical basis - NTS is the most logical of the three sites being proposed. However, in addition, the continued economic benefits to be realized from locating the RSSF in Southern Nevada are well recognized by hardheaded business and community leaders. Nevertheless, these community leaders would not take risks with their families or their businesses for these economic benefits. They, too, are convinced that NTS can be used safely for radioactive waste storage. Several prominent labor leaders in our community also have endorsed the location of this facility at NTS. They, too, are cognizant of the many ramifications of the nuclear business and are very proud of their contributions toward our preeminence at NTS in this field.

Storage of high level contaminated radioactive waste at NTS is compatible with underground nuclear weapons testing which has already essentially stored

radioactive wastes in some surface areas and numerous underground areas without hazard to the public. Radioactive waste storage and management is a natural follow-on to serve as a future mission for NTS.

I have reviewed the data concerning shipment of high level nuclear wastes and particularly noted the provisions made for shipping the high level nuclear wastes. I am completely satisfied that the hundreds of tests that have been conducted on the shielded shipping casks are going to provide us with highly reliable containers. The design that includes such items as the ability to withstand a free fall from a height of 30 feet onto an unyielding surface, a free fall from a height of four feet on a six-inch diameter steel rod, heat input from exposure of 30 minutes to a fire having a temperature of at least 1475° Fahrenheit, and total immersion in water for eight hours is reassuring.

Much has been said in recent years on developing alternate sources of energy, such as solar power, harnessing the winds and tides, geothermal energy, etc. I approve of continuing our efforts to develop these. I also realistically recognize that breakthroughs here are many years away. Nuclear energy is a now proposition and in my opinion is our best approach to meeting our energy needs, for several decades.

An abundant and reliable source of energy reflects the strength and vitality of our nation. I get deeply concerned over the negativism that has surfaced again and again in recent years in relation to anything technical, particularly in regard to power generation. I have been intimately acquainted with nuclear weapons development for the past 16 years. I readily admit that I don't know everything there is to know about this business, but the one thing I know for certain, I don't ever want to be in second place. I don't

Valley Times

1-66

# As We See It

# Let's be nuclear waste storage site

The question of whether Southern Nevada should become the site of a massive center for the storing and managing of nuclear wastes could be one of the most important decisions to confront the state in many years.

The Nevada Test Site at Mercury apparently is one of three sites under consideration by Atomic Energy officials. The others are in Idaho and the state of Washington.

WE CONFESS that our initial reaction to this possibility was somewhat negative. Why Nevada? What good would it do the state? What about the safety? What will the environmental impact be? What effect could it have on the state many years from now?

These were but a few of the questions that raised serious doubt for us, and, we are sure, many Nevadans.

But more extensive examination of the various factors involved now leads us to believe that Southern Nevada is the logical choice for the waste disposal site, and should welcome the decision if we are selected.

IT SEEMS OBVIOUS that this area is ideal from a geographic standpoint. We are not a high density population center. The Nevada Test site itself is a full 65 miles away and covers a massive 1,350 square miles. There is a good deal of scientific evidence that this remote site is geologically ideal as well.

Beyond that, Southern Nevada has a reservoir of talent, knowledgability and experience in nuclear matters. The Test Site itself already is known as the major site for nuclear testing in this nation, and Southern Nevadans have never shown any great apprehension about this and the possible dangers from fallout or radiation leakage.

THOSE WHO OBJECT to locating the waste site here fail to realize that for many long years, since underground nuclear testing first began, substantial radioactive wastes have been locked away deep underground at the Nevada Test Site.

Over the years we have developed a great deal of confidence in the AEC's ability to cope with nuclear testing and radioactive waste management in a safe manner. There is always the danger of something happening, but the safety track record at the Nevada Test Site is so unbelievably good that we chart our own safety fears at zero.

FOR YEARS NOW, our statesmen and scientists and leading writers have been telling us that we are living in the nuclear age. This is true. But it is equally true that we have, even as the nation that led the way in nuclear development, failed to make use of its full potential as a peaceful energy source.

In reality, this nation may only now be on the threshold of the real nuclear era. Nevada should be at the center of it. Our selection as a site for nuclear waste storage and management will give us added credentials in this new nuclear era. We cannot afford to turn our backs on it. We must be a part of it.

Ex. F

1-67

# SUN Editorial



*Today's Editorial*

# Atomic Energy Offers Best Source For Fuel Supply

An easy way to develop a case of nerves these days is to listen to some of the "scenarios" for disaster put forth by people who want to scare us into a major reversal of national policy regarding peaceful application of atomic energy.

A freakish combination of failures in the safety systems at a nuclear power plant could disperse radioactivity for miles around and possibly "melt a hole in the earth all the way to China." Terrorists might invade an atomic power plant and threaten to blow it up. Nuclear materials might be stolen to make a primitive atomic bomb that could be used to blackmail an entire nation or the world. An accident in the transportation of plutonium could wipe out vast numbers of people.

What makes these conjectures so worrisome is that not even the most ardent supporter of atomic energy can argue that it is absolutely impossible for them to happen. Highly improbable to be sure, but not impossible. The only nightmare ruled out flatly is that a nuclear power plant could explode like an atomic bomb. The laws of physics simply would not permit that.

## Stated Risks

We are left, then, with an assumption of certain risks as we push on with development of nuclear power. There is a tendency, especially among environmentalists trying to block construction of new atomic power plants, to overstate risks. The fact is, the risks they recite in their scenarios are on a par with the risk we all run of being hit on the head by a meteorite every time we step outdoors.

A two-year study of accident probabilities recently completed by Dr. Norman C. Rasmussen of the Massachusetts Institute of Technology shows that the frequency of a "core melt" accident with any measurable effects would be once in 1,700 years if there are 100 power reactors in operation, as there are hoped to be by 1980. Stated another way, the odds would be 300 million to 1 that a person living within 20 miles of a nuclear power plant might be killed by such an accident in any one year.

Statistically, that same person now runs a 4,000 to 1 risk of being killed in an auto accident or a 100,000 to 1 risk of being killed in an aircraft accident. We have lived with those risks since the car and airplane were invented, and our response has been to try to build safer cars and planes and learn to use them safely.

## Safety Measures

That is the answer to the scare-stories about nuclear power. We must calculate our risks — accurately and in the context of all the risks surrounding us in the world — and see that they are minimized. This is being done in the minute examination of the safety features designed into reactor facilities, and in the general tightening-up that is now occurring in the handling and transportation of nuclear materials. The penalties for carelessness or dishonesty by anyone responsible for these materials must be severe.

Atomic energy is our one best hope for overcoming the limitations on the world's supply of fossil fuels. What threatens us is not so much the tremendous power it represents, but the danger that fear will prevent us from harnessing it in time.

SUN Editorial

38 LAS VEGAS SUN Friday, Dec. 13, 1974

68

*Today's Editorial*

# Nuclear Waste Storage Plan Deserves Study

Whether wastes from nuclear-powered generating plants will eventually be stored at the Nevada Test Site is a matter of current debate and the decision should be based upon fact, not emotion.

Opponents of the plan have already raised questions of possible contamination of air and water, loss of tourism and possible sabotage by fanatical groups.

Gov. Mike O'Callaghan has asked that the state continue to be considered as a possible storage site, providing certain conditions are met. These include:

## Minimize Dangers

The governor, among other conditions, has said he will insist that the waste be cooled by air to minimize danger on contamination of ground water and that a rail spur to transport the nuclear waste be constructed away from population centers.

There should be concern about safety and security in the handling and storage of radioactive materials, but fears about possible accidents should not blind us to the fact that the Test Site is uniquely fitted for the mission because of two major factors:

The most important is the presence of a work force highly skilled in all aspects of handling radioactive material.

The second is the natural terrain which, geographically and geologically seems to be ideal for the type of project the government has in mind.

## Skilled Personnel

These factors were stressed by Las Vegas Mining Engineer William G. Flangas, who has worked at the Nevada Test Site for many years in connection with underground testing activities, in a recent appearance before the Las Vegas City Commission seeking public support for the storage project.

He said because of experiences with the nuclear testing program, there exists locally a highly skilled cadre of professional, technical and craft personnel thoroughly schooled in handling radioactive material and with the "ability to cope with the inherent hazards."

He also noted that the test site is one of the most "highly studied and geologically mapped areas" of the world which has established its suitability as a storage site.

## 'Natural Security'

Flangas also noted there is no population or agricultural encroachment upon the test site, thus reducing water contamination threats that a major river system is lacking and surrounding mountain ranges "Built-in natural security" which has been and can easily be maintained.

The test site is the most logical storage facility of three sites proposed, Flangas also asserts because it already is the repository of pockets of high radioactivity as the result of more than 350 underground nuclear tests. The safety record compiled by government agencies and private contractors during the testing program resulted in wide public acceptance of the program and its possible danger, he noted.

Flangas emphasized further that existing facilities at the Nuclear Rocket Development Station could be modified at minimum costs to serve as receiving and handling facilities for the radioactive waste. Original investment in one complex available for use was about $50 million, Flangas notes, and it is ideally suited for the proposed storage project.

**Further Study**

Flangas views storage of radioactive active wastes as a logical development for the site in view of human and physical factors which uniquely qualify this area for the mission.

There's no question about the economic benefits to the area, although these cannot be allowed to override safety considerations. If further studies show the dangers to be minimal and that adequate safeguards are being taken to protect public safety, the storage project for Nevada should be encouraged.

RESOLUTION

WHEREAS, the Atomic Energy Commission of the United States has developed a Draft Environmental Impact Statement on Management of Commercial High Level and Transuranic Radioactive Waste; and,

WHEREAS, the Atomic Energy Commission is considering three sites for storage of such wastes, namely: the Idaho National Engineering Laboratory, the Nevada Test Site, and the Hanford Reservation in Washington; and,

WHEREAS, the Atomic Energy Commission had previously allowed public comment to the Draft Environmental Impact Statement from September 12, 1974 to October 28, 1974; and,

WHEREAS, the Governor of the State of Nevada has requested that all Nevada citizens be given every opportunity to comment on the Draft Environmental Impact Statement; and,

WHEREAS, the Atomic Energy Commission has agreed to extend the comment period to December 12, 1974, by conducting a public hearing on December 12, 1974, at 10:00 A.M. in the Ramada Inn, 999 S. Main Street in Salt Lake City, Utah.

NOW, THEREFORE, BE IT RESOLVED that the Board of County Commissioners do hereby endorse the request of the Governor of Nevada, and urge the residents of Clark County to review and comment on the Draft Environmental Impact Statement.

EXA

1-70

BE IT FURTHER RESOLVED that the Board support the designation of the Nevada Test Site as the primary storage site for radioactive wastes and participate in the public hearing of December 12, 1974.

PASSED, ADOPTED AND APPROVED this 5th day of December, 1974.

TOM WIESNER, CHAIRMAN
BOARD OF COUNTY COMMISSIONERS

ATTEST:

Loretta Bowman, County Clerk

1-71

RESOLUTION

WHEREAS, the Atomic Energy Commission of the United States has developed a Draft Environmental Impact Statement on Management of Commercial High Level and Transuranic Radioactive Waste; and

WHEREAS, the Atomic Energy Commission is considering three sites for storage of such wastes, namely: The Idaho National Engineering Laboratory, the Nevada Test Site, and the Hanford Reservation in Washington; and

WHEREAS, the Atomic Energy Commission has previously allowed public comment to the Draft Environmental Impact Statement from September 12, 1974 to October 28, 1974; and

WHEREAS, the Governor of the State of Nevada has requested that all Nevada citizens be given every opportunity to comment on the Draft Environmental Impact Statement; and

WHEREAS, the Atomic Energy Commission has agreed to extend the comment period to December 12, 1974, by conducting a public hearing on December 12, 1974, at 10:00 A.M. in the Ramada Inn, 999 South Main Street in Salt Lake City, Utah.

NOW, THEREFORE, BE IT RESOLVED that the Board of City Commissioners of the City of Las Vegas do hereby endorse the request of the Governor of Nevada, and urge the residents of the City of Las Vegas to review and comment on the Draft Environmental Impact Statement.

BE IT FURTHER RESOLVED that the Board support the designation of the Nevada Test Site as the primary storage site for radioactive wastes and participate in the public hearing of December 12, 1974.

PASSED, ADOPTED AND APPROVED this 11th day of December, 1974.

Oran K. Gragson
ORAN K. GRAGSON, MAYOR

CITY OF LAS VEGAS

ATTEST:

Edwina M. Cole
Edwina M. Cole, City Clerk

CITY OF LAS VEGAS

ALEXANDRIA N. METSCHER
COUNTY CLERK
AND EX-OFFICIO CLERK OF
THE BOARD

ANDREW M. EASON
ROBERT H. CORNELL
ROBERT H. RUUD

# Board of County Commissioners

# Nye County

STATE OF NEVADA
PHONE 482-2330 P. O. BOX 1031
TONOPAH, 89049

1- 73

November 5, 1974

United States Atomic Energy Commission
Washington, D. C. 20545

Attention: Assistant General Manager for
Biomedical and Environmental
Research and Safety Programs

Dear Sir:

In response to the recent notice allowing the public to comment on the Draft Environmental Impact Statement on the Management of Commercial High Level and Transuranic Radioactive Waste, please be advised that the Board of County Commissioners of the County of Nye, State of Nevada, at a regular meeting held on this date, unanimously adopted a resolution supporting the location of the nuclear waste storage facility on the U. S. Atomic Energy Commission's Nevada Test Site, which is situated in this county.

In addition, the Board adopts, as a respresentative attitude of the residents of the County of Nye, the letter of William P. Beko, a copy of which is attached hereto.

Very truly yours,

BOARD OF NYE COUNTY COMMISSIONERS

By: Andrew M. Eason
Andrew M. Eason, Chairman

Copy
M. Gate
D. Jackson
D. Miller
R. Kiehn

AME:dc

Enclosure

DISTRICT ATTORNEY
PETER L. KNIGHT
ASSISTANT DISTRICT ATTORNEY

POST OFFICE BOX 593
TELEPHONE (702) 482-0666

OFFICE OF
DISTRICT ATTORNEY NYE COUNTY
COURTHOUSE
TONOPAH, NEVADA 89049

/- 74

November 5, 1974

United States Atomic Energy Commission
Washington, D. C. 20545

Attention: Assistant General Manager for Biomedical and Environmental Research and Safety Programs

Re: Draft Environmental Impact Statement on the Management of Commercial High Level and Transuranic Radioactive Waste

Dear Sir:

I wish to avail myself of the opportunity to submit written comments concerning the proposal to locate a nuclear waste storage facility at the U. S. Atomic Energy Commission's Nevada Test Site, situated within Nye County, Nevada.

I have served as District Attorney of Nye County, Nevada, for twenty years, commencing in January, 1955. The Nevada Test Site lies largely within the concurrent jurisdiction of my office and the office of the United States Attorney for Nevada. By reason of the official duties of my office, I have had occasion to make many visitations to the Nevada Test Site for atmospheric tests, underground detonations of nuclear devices, labor strikes, attempts by organizations to interrupt or interfere with scientific experiments being conducted at the Site, and in connection with criminal offenses alleged to have been committed within the Site. At the invitation of the Atomic Energy Commission, I have attended various briefings, conferences and demonstrations having as their purpose an explanation of the safety measures employed by the Atomic Enerby Commission to safeguard the environment and the public during the course of the various tests that have occurred.

I am appalled by the inaccuracy of some of the statements and concern voiced by persons and organizations which heretofore have enjoyed a reputation of credibility

DISTRICT ATTORNEY
PETER L. KNIGHT
ASSISTANT DISTRICT ATTORNEY

POST OFFICE BOX 593
TELEPHONE (702) 482-0666

OFFICE OF
DISTRICT ATTORNEY NYE COUNTY
COURTHOUSE
TONOPAH, NEVADA 89049

/- 74

November 5, 1974

United States Atomic Energy Commission
Washington, D. C. 20545

Attention: Assistant General Manager for
Biomedical and Environmental
Research and Safety Programs

Re: Draft Environmental Impact
Statement on the Management of
Commercial High Level and
Transuranic Radioactive Waste

Dear Sir:

I wish to avail myself of the opportunity to submit written comments concerning the proposal to locate a nuclear waste storage facility at the U. S. Atomic Energy Commission's Nevada Test Site, situated within Nye County, Nevada.

I have served as District Attorney of Nye County, Nevada, for twenty years, commencing in January, 1955. The Nevada Test Site lies largely within the concurrent jurisdiction of my office and the office of the United States Attorney for Nevada. By reason of the official duties of my office, I have had occasion to make many visitations to the Nevada Test Site for atmospheric tests, underground detonations of nuclear devices, labor strikes, attempts by organizations to interrupt or interfere with scientific experiments being conducted at the Site, and in connection with criminal offenses alleged to have been committed within the Site. At the invitation of the Atomic Energy Commission, I have attended various briefings, conferences and demonstrations having as their purpose an explanation of the safety measures employed by the Atomic Enerby Commission to safeguard the environment and the public during the course of the various tests that have occurred.

I am appalled by the inaccuracy of some of the statements and concern voiced by persons and organizations which heretofore have enjoyed a reputation of credibility

## RESOLUTION

WHEREAS, the Atomic Energy Commission of the United States has developed a Draft Environmental Impact Statement on Management of Commercial High Level and Transuranic Radioactive Waste; and,

WHEREAS, the Atomic Energy Comission is considering three sites for storage of such wastes, namely: the Idaho National Engineering Laboratory, the Nevada Test Site, and the Hanford Reservation in Washington; and,

WHEREAS, the Atomic Energy Commission had previously allowed public comment to the Draft Environmental Impact Statement from September 12, 1974 to October 28, 1974; and,

WHEREAS, the Governor of the State of Nevada has requested that all Nevada citizens be given every opportunity to comment on the Draft Environmental Impact Statement; and,

WHEREAS, the Atomic Energy Comission has agreed to extend the comment period to December 12, 1974, by conducting a public hearing on December 12, 1974, at 10:00 A.M. in the Ramada Inn, 999 S. Main Street in Salt Lake City, Utah.

NOW, THEREFORE, BE IT RESOLVED that the Board of County Commissioners do hereby endorse the request of the Governor of Nevada and urge the residents of Lincoln County to review and comment on the Draft Environmental Impact Statement.

concerning the proposal to establish this waste storage site in Nevada. In some instances, these critics practically accuse the Atomic Energy Commission and its staff of conspiring to destroy the human race and its environment on earth. These assertions are, of course, completely false.

I can only conclude from the falsity of these accusations that the critics have never availed themselves of the invitation extended periodically by the Atomic Energy Commission to the public to inspect the site and receive the benefit of the information made available regarding safeguards imposed by the Atomic Energy Commission during and following each test. They completely ignore a perfect record of more than twenty years of experimental testing, involving explosions of terrific force and magnitude, without a single fatal accident attributable to the tests or the failure to properly protect the environment following such tests. Their experience proves that the Atomic Energy Commission has the expertise with which to provide the necessary protection, and that every precaution has been taken for such protection. There is absolutely no reason to believe or expect that less precaution will be provided in the future.

It is common knowledge that a substantial amount of land area within the Nevada Test Site will require exclusion of the public for many years to come, as a result of contamination caused previous tests. This will necessitate a work force to maintain security. It seems completely illogical to consider any site other than the Nevada Test Site, for the future storage of nuclear wastes when we have a location, already contaminated, already capably staffed and protected, in an area previously determined to be best adapted for such purposes.

For the foregoing reasons, I respectfully urge the favorable consideration of the Nevada Test Site as the location of the permanent nuclear storage site, and in doing so, commend the staff of the Atomic Energy Commission for the excellence in their performance and safety record achieved to date.

Respectfully submitted,

William P. Beko

WPB:dc

KEN O'CONNELL
*Executive Vice President*

December 3, 1974

WHEREAS, the Nevada Test Site has over the years been noted for its history-making achievements in the programs and projects of the Atomic Energy Commission, and

WHEREAS, we believe the Nevada Test Site meets the total requirements of the AEC Radioactive Waste Management Program, and

WHEREAS, the Greater Las Vegas Chamber of Commerce and several of its business members have communicated with the Atomic Energy Commission in Washington, D. C. to state approval for the selection of the Nevada Test Site, now therefore

BE IT RESOLVED, that Bill Flangas represent the Greater Las Vegas Chamber of Commerce at said hearing in Salt Lake City, Utah with Chamber supported formal statement advocating the AEC Nuclear Waste Storage Program at the Nevada Test Site,

BE IT FURTHER RESOLVED, the Greater Las Vegas Chamber of Commerce contact the Nevada Development Authority, the City of Las Vegas and the County of Clark seeking their endorsement of the Nevada Test Site location and that as many Directors as possible (of the Greater Las Vegas Chamber of Commerce) be present at the December 12th AEC Hearing.

FOR THE BOARD OF DIRECTORS:

Herb Stout
President
KO:HS:el

GREATER LAS VEGAS CHAMBER OF COMMERCE
2301 EAST SAHARA AVENUE / TELEPHONE (702) 457-4664 / LAS VEGAS, NEVADA 89104

western union Mailgram

NGMLSVB LSV
2-017606E336002 12/02/74
ICS IPMRNCZ CSP
1 7024574664 MGM TDRN LAS VEGAS NV 12-02 0124P EST
ZIP 89105

79

GREATER LAS VEGAS CHAMBER OF COMMERCE EL
2301 EAST SAHARA AVE
LAS VEGAS NV 89105

THIS MAILGRAM IS A CONFIRMATION COPY OF THE FOLLOWING MESSAGE:

7024574664 TDRN LAS VEGAS NV 53 12-02 0124P EST
PMS SECRETARY OF THE COMMISSION, CARE ATOMIC ENERGY COMMISSION,
TWX 7108280475
WASHINGTON DC 20545

THE LAS VEGAS PARTY DESIRES TO PARTICIPATE IN THE AEC HEARINGS DECEMBER 12 IN SALT LAKE CITY. WE WILL HAVE A FORMAL STATEMENT SUPPORTING THE AEC NUCLEAR WASTE STORAGE PROGRAM FOR THE NEVADA TEST SITE. OUR OFFICIAL SPOKESMAN WILL BE W G FLANGAS MANAGER FIELD OPERATION FOR REYNOLDS ELECTRIC AND ENGINEERING COMPANY.

HERB STOUT PRESIDENT GREATER LAS VEGAS CHAMBER OF COMMERCE

1326 EST

NGMLSVB LSV

CHAMBER OF COMMERCE

KEN O'CONNELL
Executive Vice President

80

November 20, 1974

Honorable Mike O'Callaghan
Governor - State of Nevada
State Capitol Building, Governor's Office
Carson City, Nevada 89701

Dear Governor Mike:

Attached are telegrams which were sent to the AEC in Washington by our Greater Las Vegas Chamber of Commerce, the James Cashman Company, Milne Truck Lines, as well as Penneys, Sears, Woolco, K-Mart, Skaggs, Nevada Development Authority and Safeway Stores.

We plan to have a group representing the Greater Las Vegas Chamber of Commerce at the AEC hearing in Salt Lake on December 12th. Our spokesman will be W. G. Flangas Manager, Field Operations for Reynolds Electric and Engineering Company.

At a meeting of our Board of Directors held yesterday the Board was unanimously in favor of pursuing this matter to obtain the AEC Radioactive Waste Management Program for the Test Site.

Cordially,

Ken O'Connell
Executive Vice President
KO:el
cc: Local office
Encl.

GREATER LAS VEGAS CHAMBER OF COMMERCE
3301 EAST SAHARA AVENUE / TELEPHONE (702) 457-4664 / LAS VEGAS, NEVADA 89109

MGMLSVB LSV
2-024416E315002 11/11/74
ICS IPMRNCZ CSP
1 7024574664 MGM TDRN LAS VEGAS NV 11-11 0358P EST
ZIP 89105

western union Mailgram

UNITED STATES POSTAL SERVICE

81

/-

▶CHAMBER OF COMMERCE EL
2301 EAST SAHARA AVE
LAS VEGAS NV 89105

THIS MAILGRAM IS A CONFIRMATION COPY OF THE FOLLOWING MESSAGE:

7024574664 TDRN LAS VEGAS NV 23 11-11 0358P EST
PMS US ATOMIC ENERGY COMMISSION,ATTN DOCTOR FRANK PITTMAN, TLX
WASHINGTON DC 20545

URGE THAT NEVADA BE SELECTED AS A SITE FOR AEC RADIO ACTIVE
WASTE MANAGEMENT PROGRAM. WE BELIEVE NEVADA TEST SITE MEETS
ALL CRITERIA
JAMES CASHMAN CASHMAN ENTERPRISES PO BOX 2080 LAS VEGAS NV
89101

1601 EST

MGMLSVB LSV

MGMLSVB LSV
2-013280E31.S002 11/12 4
ICS IPMRNCZ CSP
1 7027367061 MGM TDRN LAS VEGAS NV 11-12 1155A EST
ZIP 89102

western union Mailgram

82

MILNY TRUCKLINE RM
4751 POLARIS AVE
LAS VEGAS NV 89102

THIS MAILGRAM IS A CONFIRMATION COPY OF THE FOLLOWING MESSAGE:

7027367061 TDRN LAS VEGAS NV 32 11-12 1155A EST
PMS DR FRANK PITTMAN, US ATOMIC ENERGY COMMISSION
WASHINGTON DC 20545

MILNY TRUCKLINE WISHES TO SOLICITE YOUR SUPPORT TO GIVE NEVADA TOP PRIORTY FOR LOCATION OF A RADIOACTIVE MATERIAL DUMP. THE NEVADA TEST SITE FACILITIES MEET ALL REQUIREMENTS FOR OPERATION OF THIS TYPE
ROBERT MCNEIL TERMINAL MANAGER

1158 EST

MGMLSVB LSV

MGMLSVB LSV
2-024777E315002 11/11 .4
ICS IPMRNCZ CSP
1 7024574664 MGM TDRN LAS VEGAS NV 11-11 0404P EST
ZIP 89105

western union Mailgram

83

CHAMBER OF COMMERCE EL
2301 EAST SAHARA AVE
LAS VEGAS NV 89105

THIS MAILGRAM IS A CONFIRMATION COPY OF THE FOLLOWING MESSAGE:

7024574664 TDRN LAS VEGAS NV 46 11-11 0404P EST
PMS US ATOMIC ENERGY COMMISSION,ATTN DOCTOR FRANK PITTMAN, TLX
WASHINGTON DC 20545

THE GREATER LAS VEGAS CHAMBER OF COMMERCE URGES THAT NEVADA
BE GIVEN PRIORTY CONSIDERATION FOR AEC RADIO ACTIVE WASTE MANAGEMENT
PROGRAM. WE BELIEVE NEVADA TEST SITE MEETS TOTAL REQUIREMENTS
URGE NEVADA GOVERNOR MIKE CALLAHAN RECOMMENDATIONS BE CONSIDERED

HERB STOUT PRESIDENT GREATER LAS VEGAS CHAMBER OF COMMERCE
2301 EAST SAHARA AVE LAS VEGAS NV 89105

1609 EST

MGMLSVB LSV

Ex. B

FORESTA INSTITUTE FOR OCEAN AND MOUNTAIN STUDIES

6205 FRANKTOWN ROAD, CARSON CITY, NEVADA 89701

TEL: (702) 882-6361 OR 882-1728

84

7 March 1975

Good afternoon. I'm Susan Orr, Program Coordinator for Foresta Institute, an environmental research, education and advocacy center that has been working in Washoe Valley for 15 years on issues of local and global concern. The aim of Foresta's work is to broaden people's awareness of the need to recognize and live within the resources and tolerances of the biosphere...a concept defined as that part of the world in which life can exist; living beings together with their environment." The resolution you are considering today, which asks for both nuclear waste storage and solar research development to be located at the Nevada Test Site, raises many questions about how together we will continue to be with our environment. I am most appretiative of your invitation to present testimony.

Foresta has been involved in the radioactive waste storage issue since late October when the Governor's Advisory Committee held public hearings. We testified then, we testified in Germantown, Maryland, we testified in Salt Lake City. We went on a tour of the Nevada Test Site. We have been amassing great quantities of materials and correspondence and contact lists that document the growing concern of citizens and the scientific community with industry and the government's plans for nuclear power production and radioactive waste storage. Our concern has been to study and promote environmentally considerate alternative energy resources as a challenge to the current pressures for reliance on nuclear power, whose wastes will threaten all life for 250,000 years. Our concern has also been to demand that the governmental decision-making process on nuclear matters be accessible and accountable to the public. Einstein himself said, "Our representatives depend ultimately on decisions made in the village square...To the village square we must carry the facts of atomic energy. From there must come America's voice". It bothers me tremendously to have seen the repeated instances of hasty and inadequate notice of public meetings on this issue, and the lack of public education. Government and technology are meant to serve, not subjugate, the people. Do you really feel adequately informed about radioactive waste storage to shape my children's future so irretrievably? You can pass a bottle bill and then decide it doesn't work and repeal it, but you can't subsidize the expansion of the nuclear power industry to taking its wastes off its hands and then, after an unforseen chain of events release massive lethal doses of plutonium into the atmosphere, say "oops, folks, sorry". The question of radioactive nuclear waste storage demands careful, rational, reasoned consideration, not a two-week political judgment. The AEC, now ERDA, has been considering the issue for 15 years and they still don't know what to do. How can you?

I hope to provide, today, some serious concern on your part for the gravity of the "interim" radioactive waste storage proposal, for the incredible responsibility you are taking, through this simple resolution, for the future of humanity, of all life. I do not, myself, have great technical expertise. Several experts have paid their way to come here today to share their knowledge with you, because of the gravity of your actions. Beyond that I do have access to a wealth of expertise that is not backed by a profit motive -- the Atomic Industrial Forum is planning to spend $1.2 million this year promoting the expansion of nuclear power production -- or backed by a need to rationalize the government's overbalanced commitment to atomic energy. Many of the opponents to the continuing pursuit of nuclear power have actually come to their position from the industry or government: David Brower, Carl Hocevar, Henry Kendall, Alvin Weinberg. We have shelves of materials at Foresta that document the controversial nature of all areas of nuclear technology. They are open to you. If I can't answer your questions today I will go back and find answers. If you do nothing else you should talk with Dr. Terry Lash of the Natural Resources Defense Council in California ...he has done the most meticulous critique of the unanswered technical questions in the AEC's Draft Environmental Impact Statement on the Management of Commercial High-Level and Transuranium-Contaminated Radioactive Waste. I called him for advice on my testimony today and he wanted to come himself, but is meeting in Washington with Dr. Seamans, the new Director of ERDA, to discuss the agency's growing recognition of their need to question the validity of any investment in "interim" storage development.

A key point you must recognize is that there are no answers yet developed to many aspects of nuclear power production and radioactive waste storage. The AEC and now ERDA readily admit they don't know how to permanently store this persistently toxic debris. Dave Jackson, Public Information Officer of the Las Vegas ERDA Operation on our tour of the Nevada Test Site said, "People just don't know everything about radiation." Researching solar energy is a beautiful idea. But don't you feel somewhat presumptuous in so boldly inviting into the state vast quantities of unnatural, incredibly potent materials whose safe and secure handling has to be fail-proof for longer than humanity itself has existed, thirty times longer. Wouldn't you feel better if you had more company, like an educated Nevada citizenry, making this decision with you? Even the Governor was reluctant to take such awesome power in his hands -- insisting to the AEC that we have more substantial information and that Nevadans

around the state have access to the decision-making process on this issue. Yet this resolution, the recommendation to ERDA, will impede further citizen participation, if it passes. I want to impress on you how little you know what you are asking for, how premature this action is in the light of the status of ERDS's own readiness to make a decision on waste storage. The Draft Environmental Impact Statement on high-level and transuranium-contaminated waste management was almost unanimously acclaimed -- by nuclear power proponents and opponents alike -- as being too narrow and inadequate a document. At the Salt Lake City hearing, even Mr. Flangas, when pressed, admitted there were unresolved technical questions in the waste storage proposals. A more thorough version of the impact statement is not yet complete. In fact, as I mentioned, several people in the agency are now reconsidering the validity of working on interim storage at all. Dr. William Rowe, Director of EPA's Office of Radiation Programs, is quoted recently as saying, "We're dead set against interim storage" because it is too costly and because it would delay development of permanent strategies, thereby creating a great risk that the wastes would be left in interim storage longer than desirable. That means either Nevada looks foolish for asking for something that the "experts" in government decide is a bad idea, or, Nevada is left with interim storage at great risk, because the technology for permanent storage isn't advanced in time. You choose --- I think you lose both ways.

What are the aspects of the "interim" waste storage proposal I think you should be concerned with? First and foremost, the pernicious nature of plutonium. ERDA tends to gloss over it. But it is the most carcinogenic agent known, and it is man made. The California Bureau of Radiological Health claims there is "no threshold for safe levels of radiation exposure." One one-millionth of an ounce of plutonium has caused cancer in dogs. A small amount of plutonium, about the size of a grapefruit, compressed rapidly, creates an atomic explosion. A pound of plutonium, if it were efficiently spread around the country, would be more than enough to give lung cancer to everyone. This means you must be vitally concerned about sabotage, about transportation of plutonium across the state from many directions, about having 75,000 cannisters representing 60,000,000 gallons of plutonium, solidified, on deposit at the NTS. An upcoming Science magazine report claims that there is a 50% higher than statistical average cancer death rate in the Hanford, Washington tri-city area...that should be a warning? Think about accidents, planned and otherwise. The short history of experience with waste storage technology is full of horror stories and surprises. I've attached a short list for your information. Think of the faith we must have that

there will be no human error, none, no faulty design, no moment of frustration or distraction that could cause faulty construction of any single small part of this operation...is there any precendent for fail-proof technology? There is simply a question of AEC-now-ERDA credibility. The cumulative and long-term affects of radiation exposure are simply unknown.

Testing done on animals whose life span is no more than 20 years, if that, has got to be vulnerable to question. I did, in fact, ask the Nevada Operations office, and the response I got was non-specific to my specific question. There is a telling experience with AEC reassurances that have fallen through: After "substantial" investigation, the AEC in 1971 decided to begin a demonstration project at the Lyons, Kansas mine. It was claimed before the Joint Committee on Atomic Energy that all the necessary studies for confirming the mine's suitability had been completed. Subsequent to the Congressional budget hearings, the final environmental statement on the proposed demonstration project bodly asserted:

"By establishing this facility, radioactive wastes of the type previously described (including high-level wastes) will be permanently isolated from man's biosphere, thus providing a direct and lasting benefit to the environment. No significant impact on the environment resulting from the construction or operation of the proposed repository is anticipated." After further study, however it was found that there were several technical problems, great quantities of water were found to have disappeared from the salt mine, and the project was abandoned. In the history of this development citizen, scientist and private organizations and state officials in Kansas argued against the adequacy of the AEC studies. "It is questionable whether or not the AEC would have appreciated the potential hazards involved with the Lyons site if they had not spoken out." (Terry Lash, NRDC)

It is questionable whether or not the AEC would have admitted to the radioactive spill in Nevada, either, had not an outside agency spoken out. The same goes for the many incidences at Hanford. How can we trust their judgment or their openness in recognizing a problem and making it publicly known?

Now suppose none of these things concerns you. Let me try one more. There are 1.7 million tons of radioactive tailings still at the site of the now decomissioned Vitro Chemical Mill in Utah. The facility is protected only by a chain link fense with warning signs posted "haphazardly" along its length --

its ineffectiveness evidenced by the graffitte on the concrete structure. Utah's citizens and politicians have spent years trying to get the AEC to clean up the site area. BUT THE FEDERAL GOVERNMENT HASN'T GIVEN THEM ADEQUATE FUNDS TO DO IT. The same problem occurs in Hanford, site of massive and recurrent radioactive leakage. The government has allocated such a limited budget that when leakage occurs, the only spare tanks that are available are used ones that have been determined to be unsafe. Now how can you expect ERDA to be able to guarantee adequate funding for the life of Nevada's storage facility? And when funds get cut, corners get cut, and even highly safe technology is jeopardized.

Several years ago the National Academy of Sciences National Research Council's Committee on the Geological Aspects of Radioactive Waste Disposal put out a ten year report which said that while they were impressed with the dedication of the staff they observed, they were fearful that too often "considerations of long range safety are in some instances subordinated to regard for economy of operation." Political institutions are fragile, so are budgets: what faith you must have!

I understand the incentive for this resolution: "Whereas: The unemployment rate in Clark County, Nevada, is 20.7 percent higher than the disturbing high national unemployment rate"

People need jobs. Now. But do they need jobs that will threaten their health? and their children's health? and my childrens? and yours? That's a narrow and short-term view. Why not get all the jobs through the solar research program? The long-term view is detrimental to the state economy, I think. Won't industry be afraid of capital investment in a state where radioactive wastes are being stored, above ground? Won't new industry stay away and that 85% tourist supported economy be threatened? People may have enjoyed watching nuclear blasts, and the underground blasts are out of sight and out of mind, but a "dump?" "radioactive garbage?" That's quite another thing. Since the days when the test site was an attraction, people have become far more aware of the dangers of radiation exposure. I think you do the Las Vegas economy a great dis-service by putting this hazardous facility so close to home.

Why should Nevada be the nuclear industry's "dump"? The latest GAO report says that the technology for short-term storage has been well developed. The wastes have to stay at the reprocessing plant for five to ten years anyway, they should be left there until a permanent method of storing

them is adequately developed. Industry should not be allowed to shunt the wastes out west where they don't have to feel responsible for them. What is the rationality of continuing the generation of these lethal materials if they can't be handled at the source of production?

This leads to a consideration of alternative sources of energy and the second part of your resolution, though I can only think the coupling of the one poisonous idea of the other life-supporting idea is a political move, so very blatant, it should embarrass you more than anything else.

If you recognize the value of developing solar energy, why the first part of the bill at all, let's just go...There can be money and employment in solar research and program development, and it would bring people to the state instead of scaring them away. It would change the image of the state from a nuclear wasteland, free for abuse and exploitation to subsidize others' energy needs, to an image of a pioneer in solar development that could serve Nevada's own needs and others' as well, for just as long as plutonium would pose its threat.

Thank you for your time. I hope I have raised some concerns and can, in the next few days before you vote, help answer them.

Ex C

1 — 90

I wish to speak against Assembly Joint Resolution 15 today. I do not wish to relate nuclear horror stories or speak of state sovereignty. What I am concerned about is the tendency to allow the questionable economic benefit that might occur if Nevada is chosen as the waste dump site to have equal weight with the entire concept of waste dumping.

The primary question is why must there be nuclear waste to be disposed? Is it possible, technologically, to use that waste right at the location where it is created--or at least to dispose of it in some manner right on location?

Then there is the entire realm of questions related to handling, shipping, security, job safety, containerizing, recontainerizing(if the containers indeed do not last as long as the radioactive material), to list a few areas of concern.

And these do not even speak to the question of long-term commitment by federal, state, and local government entities to this program--nor of public acceptance at each of these levels to the disposal program. For instance, does this entire program, if it is accepted and initiated, depend upon federal government favor for its continuity? What if a change in administration or national political mood causes curtailment of this program? Will security and safety continue?

Another point is that the commitment at the state and local levels is well-neigh irreversible. If the federal government becomes neglectful, the localities can ill afford to do the same.

And all these questions speak to the economic picture. Can we in Nevada and especially in southern Nevada assume the continuity of the jobs created by this project? And in what numbers are these jobs? What services need to be extended to handle this influx? Will this project actually make inroads on the unemployment level in southern Nevada? Or will it bring people into Nevada from other areas and have less than the substantial beneficial effect we would like to suppose?

What of the problems created if federal commitment dwindles? Isn't it the case right now that unemployment in southern Nevada is in some manner a result of rapid development and growth with little underlying, long-term growth stability?

Likewise, what of development and growth? What we don't know about radioactivity is as, or more, important than what we do know. And these unanswered questions could have a depressant effect upon the growth of the southern Nevada community. New communities may have nothing to fear from their proximity to the dump area--but don't deny that the unknown effect of the site will inhibit development in the area.

Only by insisting upon open forums in which questions and answers can be traded can we guarantee that the right questions will be asked. There are almost undoubtedly areas which the general public should question but may never even come to consider without well-publicized, open discussion.

This resolution pre-empts such discussion. It is clearly the cart before the horse. That is why I urge you to defeat this resolution. 91

Thank you for your consideration.

EXD

1- 92

STATEMENT OF THE LEGISLATIVE ACTION COMMITTEE OF THE CLARK COUNTY DEMOCRATIC CENTRAL COMMITTEE ON A.J.R. 15, MARCH 7, 1975

I am Daisy Talvitie of Las Vegas. Oam speaking as the representative of the Legislative Action Committee. A letter has beenn sent to each of the sponsors of A.J.R. 15 sdating the Committee position but I was asked to appear here to state the posiyion more fully with the background information leading to the statement of the position . The Committee suggests that complete, unqualified endorsement of storage of nuclear wastes in Nevada is premature for a number of reasons.

The draft environmental statement by A.E.C., Sept., 1974, which proposes interim at three sites, one of which is Nevada, has been described by the Western Interstate Nuclear Board--ampng whose members is Mr. Frank Young as Nevada's representative. "The statement itself is representative of a public information document but is not an environmental impact statement for use by State agencies to make decisions or to make recommendations to their governors." This opinion has been re-iterated by the U.S. E.P.A., the NRDC, the Idaho's Governor's Committee, the spokesman for the state of Texas, a number of industries such as General Electric and Westinghouse, nuclear scientists, etc. In fact, Dr. Pitman himself, in meeting with the Nevada's Gvoernor's Committee and also in the public hearings in Germantown, Maryland, stated that the Impact Statement was intennded merely to present options on disposal of the wastes and that detailed studies and statements on spceific sites will have to be prepared before any final decisions can be reached.

EXD



Less than two weeks ago at a public meeting in ~~Las~~Vegas Las Vegas a representative of A.E.C.-or E.R.D.A. as it is now called, stated that no in depth study had yet been made of the Nevada Test Siteto determine its suitability of the full environmental effects. Because of this lack of final, complete information, it is essential that the State of Nevada retain a veto power over the proposal until all information is in and until we can be satisfied that certain conditions are met that you will fined outlined in the Governor's Advisory Committee's Report and re-iterated in the Governor's letter to A.E.C.

We must remember that we are national citizens as well as citizens of Nevada. Some very basic national policy decisions are ~~involuws~~- involved in the total proposal for ~~interim~~- interim storage in Nevada. It is not a purely local question. For example, one step in the proposed plan may be the reprocessing of spent fuel for plutonium recovery--Plutonium, present in the spent fuel, is probably the most toxic substance known to man. It is also the fuel for operation of nuclear plants. The Impact Statement assumes that repocessing will be done, the plutonium removed and stored separately for future use. This, as one of the initial steps in the proposal, has been questioned by many experts and industry representatives reviewing the impact statement. Reprocessing may be economically infeasible from the standpoint of cost and questions relating to use for the end prd product. There are also questions of increased environmental hazards and the protection of the public from the danger of the plutonium falling into the hands of terrorists, etc.

Determination of the viability of this step in the proposal should be made before making final decisions on an interim storage facility since it is directly related to questions of location and design of storage facilities. Other questions needing further examination relate to other alternatives which have have not been adequately explored..For instance, General Electric and Westinghouse both testified at the Maryland hearings that interim storage facilities could be operated by industry at the individual sites of origin of the wastes. Another major and most significant alternative lies in the development of permanent storage. E.P.A. and others have expressed concern that interim storage facilities may become permanent storage sites while not haveing been designed forthat purpose. To quote the Western Interstae Nuclear Board, it is essential that AEC "provide to the State selected for the interim storage site that it is only a temporary storage site and that work will proceed in a timely and well funded fashion on the problem of final disposal. This might be done by formal action by the AEC Commissioners and by a resolution expressing the intent of Congress to proceed in this fashion." This need is particularly significant since (]) the site in New Mexico which AEC indicates in the Environmantal Statement as most promising for final disposal has not been closed to petroleum exploration which may very well mean that its use for nuclear waste disposal could be destroyed and (2) "Within the past year--perhaps to shift resources to the near-surface storage facilities concept or to allow development of mearby fossil fuel deposits--AEC's work at Carlsbad has been brought to a virtual halt." (NRDC, jpage 5)

Other questions needing to be resolved before complete endorsement of the A.E.C. proposal relate to transportation. According to the A.E.C. statement, page 9.]-6, A.E.C. "would take title to and responsibility for the waste upon receipt at the site." This means the commercial operator would be responsible for the loading and transportation to the site. This, of course, would be subject to D.O.T. regulations. Questions relating to the adequacy of regulations and degree of enforcement must be resolved as well as the role to be played by Nevada and other States. It is significant, that at present--according to a representative of D.O.T. speaking in Las Vegas, regulations are presently being violated about 75% of the time. HIs explanation was that regulations are so difficult to interpret that many shippers simply tdo not understand them and the other reason is the inadequacy of enforcemt personnel in terms o fi numbers.

We also do not presently know what responsibilities will fall on the State in terms of monitoring for leakage, clean-up and responsibility in case of accident, etc. It is essential that agreements on these questions be reached before a final decision is made.

For these and other reasons, the Legislative Action Committee Of Clark County Democratic Central Committee makes these recommendation

(]) That the Legislature consider and include in any resolution Governor's O'Callaghan's letter to the AEC and the report of his Radioactive Materials Storage Advisory Committee.

(2) That the solar research proposal, which we endorse, be presented in a separate resolution.

To that I would also add a recommendatin that the Legislature adopt a resolution memorializing Congress to express its intent to proceed immediately in a timely and well-funded fashion on the problem of final disposal of nuclear waste.

THE STATE OF NEVADA
EXECUTIVE CHAMBER
CARSON CITY, NEVADA 89701

EXE

MIKE O'CALLAGHAN
GOVERNOR

October 28, 1974

1-37

United States Atomic
Energy Commission
Washington, D.C. 20545

Gentlemen:

I herewith transmit to you a copy of the report made to me by a panel of Nevadans following four weeks of study of the draft environmental impact statement on storage of high level radiation waste.

I endorse the findings of this committee, particularly as re-stated here in expanded form from Section V of the report: That Nevada should continue to be considered as a site for the waste storage if:

a. Air cooling is utilized;

b. Rail transportation avoiding the metropolitan Las Vegas area is established to the site;

c. State and local entities can cooperate in and contribute to the development of the AEC's site-specific environmental impact statement;

d. It can be demonstrated that adequate radiation safeguards for storage and transportation can be developed and will be implemented.

I believe the Governor of Nevada must be afforded the power to veto location of the facility, in the event he has strong objection to the use of a specific site; and that the AEC should recognize the right of the State to terminate further consideration of Nevada as a specific site if such action appears to the State to be reasonable.

Also enclosed with this letter and report are items of correspondence received by my office in the time following submission to me of the committee report, as well as individual comments from each of the committee members. If there is one common thought to most of these letters from Nevadans, it is that the public must have far more information and understanding of the questions involved before any decision can be made. I heartily agree with their concern.

Should continued discussion of Nevada as a specific site occur, I feel it is imperative that the AEC undertake public hearings in many of the major population centers of Nevada. I would include at least the following cities: Las Vegas, Caliente, Beatty, Tonopah, Ely, Elko, Winnemucca, Fallon, Hawthorne and Reno.

Should Nevada be selected for final consideration, it is vital that the State of Nevada and the AEC draft and adopt a formal written agreement on the relationship of those entities as they are jointly involved in the proposed facility.

A program of off-site monitoring should be provided by an independent agency, to insure data is available to the State at all times regarding effectiveness of radiation controls at the site.

The committee did not address itself to some of the broader questions which the AEC must itself decide in cooperation with the American people. These include the question of nuclear generation of electric power in the first place, and the method of storage of nuclear waste if this generation is to take place. (The committee did, however, state that it does not feel Nevada is a suitable site for other than air cooling of waste.)

The Nevada Radioactive Materials Storage Advisory Committee has done a commendable job of reviewing a difficult subject in a protracted period of time. I am pleased to forward to you their findings and wish on behalf of the committee to express my thanks to AEC employees for assistance given to the committee during their review.

Sincerely,

Mike O'Callaghan
Governor of Nevada

Enclosure

STATE OF NEVADA
EXECUTIVE CHAMBER

EXE

1- 99

October 18, 1974

The Honorable Mike O'Callaghan
Governor of Nevada
State Capitol
Carson City, Nevada 89701

Dear Governor O'Callaghan:

The report of the Nevada Radioactive Materials Storage Advisory Committee is enclosed and is respectfully submitted to you on behalf of the Committee.

The Committee instructed me also to inform you that each member of the Committee has reviewed and evaluated the AEC environmental impact statement regarding the storage of commercial high level and transuranium-contaminated radioactive waste, and their personal comments are included in the addendum to the report. The Committee also noted that it was recognized that there were many alternatives which should have been more fully discussed in the final impact statement; however, in view of the short period of time available for review and evaluation, neither the Committee nor its individual members could deal with all of these alternatives.

The Committee thanks you for this opportunity to be of service to the State. Unless further directed by you, we assume that we have completed the assignment you gave us and that we are, therefore, discharged.

Cordially,

Neil D. Humphrey

Neil D. Humphrey
Chairman

NDH:bjs
Enclosure

# REPORT OF NEVADA RADIOACTIVE MATERIALS STORAGE ADVISORY COMMITTEE



## Section I - Committee's Charge

The Nevada Radioactive Materials Storage Advisory Committee was appointed by Governor Mike O'Callaghan on September 20, 1974.

The Governor's Executive Order cited the Committee's purpose and responsibilities as follows:

1. To review and evaluate the Atomic Energy Commission's Environmental Impact Statement[1] regarding the storage of high-level radioactive materials.
2. To ensure that the Atomic Energy Commission adequately advises the public of its proposal and disseminates relevant information pertaining thereto.
3. To elicit and encourage maximum public comment on the proposal.
4. To request any and all additional information from the Atomic Energy Commission pertaining to the environmental consequences of storing high-level radioactive waste material in the manner and location proposed.
5. To appear at and participate in hearings, conferences and meetings conducted by the Atomic Energy Commission or other agencies, institutions or entities investigating the environmental consequences of storing

---

[1] U.S., Atomic Energy Commission, Management of Commercial High Level and Transuranium-Contaminated Radioactive Waste, Draft Environmental Statement, No. WASH-1539 ([Washington]: n.n., September, 1974).

radioactive material.

6. To conduct those public meetings necessary to properly evaluate the environmental ramifications of using the Nevada Test Site as a repository for high-level radioactive material.

7. To prepare a summary of the Committee's findings, conclusions and recommendations relating to the aforesaid project and submit that summary to the Governor no later than October 21, 1974.

Section II - Organization

The Committee is composed of the following members:

Dr. Neil D. Humphrey, Chairman
Chancellor
University of Nevada System
405 Marsh Avenue
Reno, Nevada 89502

Mr. Norman Glaser, Vice Chairman
State Environmental Commission
Box 1
Halleck, Nevada 89824

---

Senator Richard Blakemore
P. O. Box 672
Tonopah, Nevada 89049

Dr. H. E. Grier
Senior Vice President
EG&G, Inc.
P. O. Box 15090
Las Vegas, Nevada 89114

Mr. Harley E. Harmon
P. O. Box 990
Las Vegas, Nevada 89101

Mr. Hank Tester
KLVX-TV
5700 Mountain Vista
Las Vegas, Nevada 89120

Mrs. Daisy Talvitie
1421 Dorothy Avenue, #2
Las Vegas, Nevada 89109

Dr. James Deacon
Biology Professor
University of Nevada, Las Vegas
Las Vegas, Nevada 89109

Dr. Alan Ryall
Seismologist
Mackay School of Mines
University of Nevada, Reno
Reno, Nevada 89507

Dr. George B. Maxey
Director
Center for Water Resources Research
Desert Research Institute
Reno, Nevada 89507

Mr. Harry Wald
Caesar's Palace
3570 Las Vegas Boulevard South
Las Vegas, Nevada 89109

Dr. A. T. Whatley
Executive Director
Western Interstate Nuclear Board
P. O. Box 15038
Lakewood, Colorado 80215

Mr. Jack Parvin
District Engineer
Nevada Highway Department
P. O. Box 170
Las Vegas, Nevada 89101

Mr. Dick Thomas
Teamsters Local No. 995
P. O. Box 1870
Las Vegas, Nevada 89101

Mr. H. M. Byars
Byars Construction Company
P. O. Box 748
Reno, Nevada 89504

Mr. Norman Hall, Assistant Director
Department of Conservation and
Natural Resources, Room 213
201 South Fall Street
Carson City, Nevada 89701

Mr. Roger Trounday, Director
State Department of Human Resources
308 North Curry, Room 203
Carson City, Nevada 89701

Mr. Noel Clark, Chairman
Public Service Commission
222 East Washington Street
Carson City, Nevada 89701

Section III - Committee's Activities

1. A meeting was held October 1, 1974, in Las Vegas, which all members attended. Dr. Frank Pittman, Director of the Division of Waste Management and Transportation, Atomic Energy Commission, Washington, D. C., reviewed with the use of slides the environmental impact statement entitled Management of Commercial High Level and Transuranium-Contaminated Radioactive Waste (WASH-1539).

Following an extensive discussion, Chairman Humphrey appointed a subcommittee to prepare a preliminary draft of a report, and urged all members of the Committee to submit their statements to the subcommittee to be incorporated in the preliminary draft. This subcommittee was composed of Norman Hall, Chairman, Dr. James Deacon, Dr. H. E. Grier, and Dr. George B. Maxey.

2. The subcommittee met on October 7, 1974, in Las Vegas, with all members present.

3. On October 8, 1974, the Committee toured the proposed area at the Nevada Test Site.

4. Public hearings were held in both Las Vegas and Reno, conducted by a hearing officer and court reporter to receive comments from the public, during the hours of 4:00 to 8:00 p.m. on October 11.

5. The Committee met October 17, 1974, in Las Vegas.

6. The media were notified of all meetings of the Committee.

Section IV - Summary of Opinions of Committee Members

The comments of Committee members who wished to present individual statements are attached hereto, and while there is a healthy diversity of opinion, several salient points emerged.

1. The Committee members feel the present conceptual impact statement presents insufficient data to recommend positively either against or for the acceptance of the project in Nevada before the site-specific draft environmental statement is prepared, debated, and understood by the general public. However, the feeling is that we should encourage the Atomic Energy Commission to continue to consider Nevada as a possible storage site in their deliberations.

There is a strong feeling that an agreement between the State and Federal governments outlining the exact responsibilities of each should be negotiated if the Nevada Test Site

is chosen and that the State should do sufficient investigation and monitoring to ensure that over the long period of time envisioned, the necessary safeguards are implemented and continue, both as to storage and transportation. It is believed that the Governor of Nevada should have veto power over the location of a storage site and that the Atomic Energy Commission should agree that if further evaluation of the proposed site shows it to be unacceptable to the State of Nevada the AEC will not seek to use it for storage purposes.

2. The Committee feels that if the water-shield concept is to be used, Nevada should not be considered. The commitment of the State's precious water resources to a project where equivalent air-cooled alternatives exist is not warranted.

3. From the presentations made to the Committee, the consensus is that the simplicity and apparent safety of the sealed-cask system is to be preferred since the Site has more than adequate land for this type of installation.

4. The limited transportation network in Nevada makes it imperative that secure and safe transportation be a prime consideration from the beginning of the project, and the provision for a railroad should be implemented before waste operations start.

5. While there is general public acceptance of the AEC's activities at the Nevada Test Site that present radiation problems, the further use of the Site as a storage area must

be undertaken only after an extensive and timely series of public disclosures and meetings, concurrent with the development of the final environmental impact statement.

6. If the AEC tentatively selects the Nevada site, the Committee strongly recommends that the Governor take advantage of Dr. Pittman's suggestion that a technical committee be appointed and funded to work with the AEC in development of the site-specific draft environmental impact statement, and to carry out the long-term commitments expressed in the Governor's commission to the present ad hoc Committee. For example, this technical committee should see to it that all of the regulations and handling of waste be accomplished according to the agreement, standards and descriptions as presented in the Atomic Energy Commission's environmental impact statement; that certain specific physical requirements be mutually agreed upon which are not now clearly stated in the draft environmental impact statement, such as that the storage site should be in an enclosed topographic and geologic basin; that specific possible biological effects be carefully studied, especially the possibility of concentration of radioactive materials in the plant-animal chain; that a seismic hazards study be made; and, in general, that the risk to the health and safety of the public be reduced to the smallest satisfactory amount.

Section V - Recommendations to the Governor

1. Nevada should continue to be considered as a site for

the waste storage project if

a. air cooling is utilized;

b. rail transportation to the site is established;

c. State and local entities can cooperate in and contribute to the development of the AEC's site-specific environmental impact statement;

d. it can be demonstrated that adequate radiation safeguards for storage and transportation can be developed and implemented.

2. The Governor should establish a funded technical advisory committee, the committee to include at least two members of the general public, to provide Nevada's input to and evaluation of the Atomic Energy Commission's site-specific environmental impact statement.

Respectfully submitted,

Neil D. Humphrey

Neil D. Humphrey
Committee Chairman

EX E

Addendum

/- 107

A. Statements of Committee members

1. Dr. H. E. Grier
2. Mr. Hank Tester
3. Mrs. Daisy Talvitie
4. Dr. James Deacon
5. Dr. Alan Ryall
6. Dr. George B. Maxey
7. Dr. A. T. Whatley
8. Mr. Jack Parvin
9. Mr. H. M. Byars
10. Mr. Norman Hall
11. Mr. Roger Trounday

B. Statements of the public

1. Transcript of public hearing held October 11, 1974, in Las Vegas.

2. Transcript of public hearing held October 11, 1974, in Reno.

3. Letter from Neil B. Jensen, County Clerk, on behalf of the Board of County Commissioners, White Pine County.

4. Letter from Mr. Nick Orphan, City Clerk, on behalf of the City Council of Ely.

5. Letter from Dr. Joseph A. Warburton, Chairman, Radiological Safety Board, University of Nevada System.

6. Letter from Dr. Richard H. Brooks, Department of Anthropology, University of Nevada, Las Vegas.

Exc

7. Letter from Dr. Andrew C. Tuttle, Department of Political Science, University of Nevada, Las Vegas. 1-108

8. Letter from Mr. Lewis Scott, Instructor in Radiologic Technology, Western Nevada Community College.

9. Letter from Mr. Larry Franks, Radiological Safety Officer, University of Nevada System.

10. Letter from Dr. David L. Conroy, Department of Philosophy, University of Nevada, Reno.

11. Letter from Mrs. Jeanne Hewitt.

12. Letter from Mr. Andrew V. Anderson.

13. Letter from Mr. Bill Fiero.

14. Letter from Dr. Thomas P. O'Farrell, Laboratory of Desert Biology, Desert Research Institute.

15. Letter from Dr. David Dickinson, Electrical Engineering Department, University of Nevada, Reno.

16. Letter from Mrs. Charles H. Pearson.

17. Letter from Mr. Paul R. Duckworth.

18. Letter from Dr. Terry Lash and Mr. John E. Bryson of the Natural Resources Defense Council.

19. Letter from Mr. J. E. Washum.

20. Letter from Mr. Jerry Chernik.

21. Letter from Amy Bargiel.

22. Comments of Frank Young, Interstate Nuclear Board.

23. Letter from Mrs. Elizabeth A. Riseden.

24. Letter from Mrs. Karen Ernst.

Ex E
109

25. Letter from Mrs. Vivian Graham.

26. Letter from Mr. and Mrs. Clarence Johnson.

27. Letter from Patricia van Betten, with enclosures.

# League of Women Voters of Nevada

STATEMENT OF THE LEAGUE OF WOMEN VOTERS OF NEVADA
CONCERNING A.J.R. 15, March 7, 1975

The League of Women Voters of Nevada thinks the Legislature should strongly question the wisdom of approving A.J.R. 15 as it stands.

There are basically two distinctively different proposals in the resolution. We heartily endorse the effort to bring solar research investment and facilities to Nevada. Our climate and locale are ideal for such activities and the merits of this proposal deserve to be presented in a separate resolution.

We have a number of questions, however, as to the advisability of flatly endorsing the use of the Nevada Test Site for nuclear waste disposal. As presently worded, A.J.R. 15 includes none of the stipulations to make the proposal acceptable to Nevada which Governor O'Callaghan enumerated in his letter of comment to the Atomic Energy Commission. Some of our concerns coincide with those of the Governor's Radioactive Materials Storage Advisory Committee:

The risks involved in transportation of nuclear wastes is a problem of national rather than just local proportions. No matter where the waste storage sites are located, the spent fuel and processed wastes will be vulnerable in transit. This fact is compounded by the number of shipments which will be moving at any given time -- coming from all parts of the country with each reactor requiring from 10 to 60 shipments per year. Over the first ten years of operation cannister arrivals at the site would move rapidly from 16 per year to well over 1300 per year. Department of Transportation studies which indicate a low statistical probability of accidents neither considered nor resolved the issue of deliberate intervention -

sabotage, hijacking, terrorism. In Nevada, rail facilities would have to be constructed between Las Vegas and the Test Site. Presently the switching points in Clark County would be in North Las Vegas and downtown Las Vegas where transfer and switching of radioactive materials could place large segments of urban population in jeopardy. The Governor wisely stipulated that all such operations must be located outside of the metropolitan Las Vegas area.

We also share that Committee's opposition to the use of any water-basin concept of storage for Nevada and support the need for design criteria to withstand maximum earthquake movements.

Certainly the people of Nevada must have an opportunity to share fully in the decision to place the waste disposal site in the state. This means public informational meetings and hearings throughout the state to be certain citizens understand the proposal and actively participate in the decision making process. The federal government's presentation of the Environmental Impact Statement last fall was the horrible example of how not to accomplish citizen input -- a short time span to read and react to the proposal, little initial publicity, and a hearing held 3,000 miles away in Germantown, Maryland.

The League does endorse the Governor's request for an agreement between the State and the A.E.C. (now the Energy Research and Development Agency) prior to the establishment of a storage facility which would spell out the responsibilities of each party. Such an agreement could deal with many of the questions regarding monitoring, necessary safeguards for storage and transfer, etc.. It would also provide veto power for the Governor over a specific site or over the location of the project in Nevada at all, if that is warranted.

Ex F

1 - 112

To these concerns, the Nevada League would add the following caveats:

We believe it is unfair to hold out the development of a waste storage site in Nevada as a solution to the State's unemployment problems. Indeed, it could conceivably encourage an influx of unemployed persons from other areas (particularly those in construction work). Although there will be construction jobs in the initial phases, the operating staff will number only about a hundred who will be primarily technical people.

It is important that we know the extent of "Interim" storage --in other words, how soon will the final disposal site be available and can Nevada be assured that progress is being made in this direction. Each transfer from reactor to interim to final disposal (and throw in possible replacement of containers) adds to the risks of exposure and accident. The Environmental Protection Agency, in commenting upon the Interim Storage proposal insisted that permanent storage should have the highest priority, yet there are neither plans nor evidence of strong continuing research in this direction. Many knowledgeable and concerned scientists and businessmen feel that the question of permanent disposal should be settled as rapidly ~~as rapidly~~ as possible, and, to quote a recent Business Week editorial, "if it is not feasible, the public has a right to know before committing itself to a technology that will be a perpetual threat to mankind."

The question of long lived nuclear wastes is of national urgency and not just in Nevada or Washington or Idaho. These materials require a committment from society which we are in no way certain we can sustain. It is not simply a technical problem. These wastes will remain lethal up to 250,000 years -- plutonium alone has a half-life of 24,400 years. They must be rendered safe from accidental or intentional release for a period of time exceeding our historical experience. To guarantee the

integrity of the disposal site during that period (250,000 yrs), there are things that absolutely must not happen -- no sabotage, no natural disasters, no fanatics, no stupid people, and no geological changes. Certainly our experience over the past thirty years on this score has been less than perfect as can be documented with the unmonitored leakage of 430,000 gallons of high level radioactive material at Hanford, Washington, the unaccounted for plutonium losses at plants in New York and Oklahoma, the uranium tailings pile left in the middle of Salt Lake City, and the tritium discovered in a Colorado water supply. Can we with certainty say the storage facilities will not be subject to mechanical failure and human error, will totally escape plane crashes, earthquakes, and sabotage?

In conclusion, we ask that you consider seeking the development of solar energy research in Nevada through a separate resolution. We also urge you to examine further the ramifications of nuclear waste storage and at the least to include in the resolution the stipulations made by the Governor in his comments to the A.E.C. in October, 1974.

Eddie Albert, actor
Hannes Alfven, Nobel laureate in Physics
David Brower, President, Friends of the Earth
Ramsey Clark, former U.S. Attorney General
Barry Commoner, well-known environmental author
Alvin Dustin, San Francisco businessman and environmentalist
Paul Ehrlich, author of "The Population Bomb"
Daniel F. Ford, Harvard economist
John W. Gofman and Arthur R. Tamplin, former heads, Medical Physics Program, AEC Lawrence Livermore Laboratory
Senator Mike Gravel of Alaska
David R. Inglis, physicist, University of Massachusetts
Henry W. Kendall, physicist, Massachusetts Institute of Technology
Jack Lemmon, actor
Sam Love, Editor, Environmental Action
Ian McHarg, planner, author of "Design with Nature"
Dennis Meadows, director of the MIT "Limits to Growth" project
Bob Moretti, Speaker of the Assembly
Lewis Mumford, author of "The Myth of the Machine"
Ralph Nader, consumer advocate
Sheldon Novick, Editor, Environment
Richard S. Lewis, Editor, Bulletin of the Atomic Scientists
Linus Pauling, Nobel Chemistry Prize; Nobel Peace Prize
Ernest Sternglass, radiation biologist, University of Pittsburgh
Theodore Taylor, former Los Alamos nuclear weapons designer
Edward Teller, physicist, who believes all A-plants should be constructed deep underground
George Wald, Nobel laureate in biology
Assemblyman Charles Warren
Kenneth Watt, system analyst, University of California, Davis

Southern California Organizations (as of March 1, 1974 - partial)

Another Mother for Peace
California Citizen Action Group
Ecology Center of Southern California
Environmental Alert Group
Foundation for Alternative Energy
People's Action Research
People's Lobby
Sierra Club
Valley Peace Center
Women For
Women Strike for Peace
Zero Population Growth

EvG

Information for speaker introductions and advance publicity

DR. L. DOUGLAS DeNIKE ((rhymes with spike)) received his bachelor's degree magna cum laude at Harvard in 1959, and his Ph.D. in clinical psychology from Duke University in 1964.

He served three years on the faculty of the USC Department of Psychology, and six years with the Department of Psychiatry of USC Medical School. His research has been on verbal learning and laboratory analogs of psychotherapeutic processes.

Dr. DeNike has served as President and Vice-President of the Los Angeles Chapter of Zero Population Growth, and as Chairperson of the Nominating Committee for ZPG's national Board of Directors. In his work for Zero Population Growth, he is best known for his efforts to encourage city planners to consider the adverse effects of further population growth.

Dr. DeNike's concerns about nuclear power stem from his belief that the criminal misuse of radioactive materials could bring massive disruption to society. He has written an article on this subject entitled, "Radioactive Malevolence," which appears in the February 1974 issue of the Bulletin of the Atomic Scientists.

((Home address and phone))

2677 Ellendale Place
Los Angeles, Calif. 90007
733-9307

Statement of Dr. L. Douglas DeNike, Technical Consultant, People for Proof
(The California Committee for Nuclear Safeguards)

I am deeply honored to address this distinguished body on a question of potentially the highest importance to the safety and well-being of the United States. Indeed, the importance of the matter before you is such that I feel a burden of responsibility greater than I have felt at any previous time. The burden results from my firm conviction that a retrievable surface storage facility built anywhere in the United States would constitute an unconscionable compromise to our national defense posture. The danger from nuclear weapons is, by the federal government's own calculations, such that "a one-megaton weapon detonated within $2\frac{1}{2}$ miles of a reactor would be capable of breaching the reactor containment and damaging the primary cooling system" (Proposed Final Draft, WASH-1535, USAEC, December 1974, p. 7.4-13). It is clear that a near-miss or direct hit with a 10 to 20-megaton nuclear weapon upon the proposed RSSF, with a radioactive inventory of several billions of curies of long-lived fission products, could release fallout sufficient to raise one-fifth of the contiguous area of the United States to levels requiring semi-permanent evacuation. But the danger is not limited to multi-megaton thermonuclear bombs. The news media daily remind us that we are entering a unique period of human history, in which any nation or extremist group with the ability to divert 18 pounds of plutonium is capable of constructing a weapon equal in destructive power to 1000 tons of high explosive. Such a weapon, crude by the standards of those who design the devices with whose seismic effects you are personally familiar, could nonetheless be delivered close enough to the proposed RSSF to disperse its contents. Nor is the danger limited to nuclear explosives. The three designs proposed in the draft WASH-1539 document would all be susceptible to entry and time-bomb demolition by determined terrorists or criminal blackmailers. Indeed, it is quite conceivable that rocket and mortar attack from upwind of the facility could wreak damage sufficient to make later containment and management of the released material

Ex.G

/ 116

impossible, for essentially all future time.

I submit that, in advocating a surface facility in which to house the high-level waste from the nuclear industries of many nations, the government is without justification claiming that no such attacks as I have described are credible. This is tantamount to saying that the Energy Research and Development Administration is capable of predicting and guaranteeing civil and international tranquillity for the next 130 years, and possibly the next quarter-million years, if for quite understandable budgetary reasons the "temporary" RSSF becomes permanent through default. It is tantamount to saying that all motivational states of all persons capable of obtaining access to major weapons can be divined for time periods exceeding the administrative responsibilities of any government. In advocating such a surface repository, its promoters have, in my considered judgment as a social scientist, exceeded the boundaries of reason and prudence to which we must hold them accountable.

These hearings are conducted at a time when state-level action to curb and reverse the nation's dependence on nuclear fission power is manifestly on the increase. Governor Hugh Carey of New York has decreed that no new nuclear power plants will be sited in his state until he has been convinced that the industry can be operated safely. Governor Edmund G. Brown, Jr. of California has said that he is "extremely reluctant" to support the building of new nuclear plants until it is "clearly demonstrated that they are safe and provide no risk to public safety." Stronger stands against nuclear expansion have been taken by governors Robert Straub of Oregon, Philip Noel of Rhode Island, and Jimmy Carter of Georgia, who intervened in hearings on the Barnwell nuclear fuel reprocessing plant under construction in South Carolina. The Tennessee Attorney General has filed to block a four-reactor TVA nuclear complex at Hartsville, saying that the plant "will adversely affect the operation of the state government and the health, safety, welfare and economic well-being of the citizens of Tennessee." The Attorney General of the state of Texas has promised to intervene in all proposed nuclear

power plants in that state. As you are aware, the state of Idaho decisively rejected the construction of the RSSF on its soil. At the level of citizen action, 47% of the voters in the First Senatorial District of Massachusetts voted against the construction of two large nuclear power plants on November 5, 1974. In California, the organization which I represent has already gathered enough signatures to qualify an initiative for the 1976 ballot, which will cause the California Legislature to study all phases of nuclear power safety in depth, and to bring final judgment of its adequacy to a two-thirds vote of each house.

In this climate of nationwide citizen concern, it would appear that deliberation on the construction of a retrievable surface storage facility ought to proceed in a manner which permits the most thorough and searching scrutiny. Not only the state or states receptive to siting, but all other states, especially those directly downwind, have a stake in the outcome. What were the concerns, and the technical findings, which led the people of Kansas decisively to reject the siting of a supposedly permanent nuclear waste repository in the salt beds at Lyons? This distinguished body should become conversant with the history of that unpretty episode, in which the federal government's early assurances of storage safety proved unfounded. It will become clear that decisions which may reach farther into the future than any other decisions made by government are to be made only when all the facts are in, and when those facts unequivocally support a certain course of action.

If the draft WASH-1539 can be taken as indicative of the federal government's level of thinking regarding safety against malevolent radioactive dispersals at the proposed RSSF, we are a long way from complete and unequivocal findings. The draft WASH-1539 contains no analysis whatever of the vulnerability of RSSF design choices to acts of terrorism or war. Only very sketchy consideration is given to the possibility of sabotage; fuller exposition on sabotage is promised in the final draft. Impacts by aircraft or "massive missile" (e.g., meteorite) are cavalierly judged to be "incredible", and thus unworthy of analysis, despite

Ex. 6

1-118

the fact that the facility is not designed against aircraft impact, and despite the fact that on November 11, 1972, aircraft hijackers threatened to crash their circling commercial aircraft into the nuclear installations at Oak Ridge, Tennessee.

What of war? Our peace-loving nation has been at war during 16% of the years of its entire history, and 46% of the years since the advent of atomic weapons. Who are we to say that a miscalculating, crazed, or insubordinate military adversary would not target a facility such as we consider here? Who are we to say that a country might not be motivated to see to it that the United States of America would never again become a significant economic and military competitor? These are questions of incredible breadth and depth, yet they are very centrally related to the RSSF decision. The people of Nevada, and all the citizens of these United States, are entitled to the most searching and honest answers on these matters. I would submit that this is not an issue to be determined on the basis of opinions gathered on a Friday afternoon in March, or to be swayed by a momentary need to increase the availability of employment. In closing, I would like to submit for the hearing record several writings of mine which bear directly upon the problem of the malevolent exploitation of radioactive materials. These are: "Radioactive Malevolence," from the February 1974 issue of the Bulletin of the Atomic Scientists, "National Defense Implications of Proposed Radioactive Waste Storage Options" (a critique of the draft WASH-1539), "Radioactive Waste Storage and National Defense" (testimony presented to the U.S. Atomic Energy Commission at its hearing on the draft WASH-1539, November 12, 1974), "Nuclear Terrorism" (a report written for the Environmental Alert Group), and a two-page flyer giving accounts of no less than eleven actual crimes involving radioactive materials or the nuclear power industry. Also, for its central bearing on the questions at issue here, a copy of testimony given by Dr. John W. Gofman, formerly of the AEC's Lawrence Livermore Laboratory, to the Legislature of the state of South Carolina, entitled, "Some Important Unexamined Questions Concerning the Barnwell Nuclear Fuel Reprocessing Plant."

* * *

E46

J 119

*L. DOUGLAS DeNIKE*

# RADIOACTIVE MALEVOLENCE

*"The likely interaction of nuclear technology and the human predisposition to evil have been discussed here. It would seem that unacceptably great misuses of radioactivity cannot be prevented at acceptable cost in a world committed to fission energy. The conclusion generated by available evidence and theory is that we must look elsewhere for primary power sources. For the near future, some will disparage the clear indications that society is too immature to accommodate the nuclear presence. Others will hope for a "moral breakthrough," while a few will conspire to bring dire events down upon us." L. Douglas DeNike, a clinical psychologist, is vice president of Zero Population Growth, Los Angeles.*

The toxicity and persistence of radioactive substances has radically altered the power balance between large and small social units. It is now possible for a few persons to force the evacuation of entire cities through the dispersion of plutonium or high level reactor waste. These materials are rapidly increasing in quantity and availability, coordinate with the growth of nuclear power. Thus it would seem of the highest importance to scrutinize the safety of the nuclear industry from human maleficence.

Ionizing radiation causes tissue damage insensibly, persistently and at a distance. This imbues it with an unsurpassed threat value for criminal misuse. Recent violent crimes and terrorist atrocities suggest very strongly that a few persons will commit the most heinous deeds within their power. Their eventual employment of radioactive materials appears virtually certain.

Many believe that the irradiation perils inherent in the theft, storage or dispersion of radionuclides would automatically deter potential troublemakers. The facts of physics and psychology indicate otherwise. Evildoers will learn that alpha and beta emitters, while deadly in the environment, require only lightweight shielding which would present no problems of bulk to thieves. Even spent reactor fuel and high level waste, which emit gamma rays and require massive shielding, could be seized in pre-packaged and portable form aboard a transport truck. More simply, such a shipment could be destroyed by explosives detonated from a safe distance. On the psychological side, malefactors ignorant of radiation hazard, deliberately misled concerning the nature of their hijacking assignment, or fanatical for their cause could assume risks of radiation exposure inconceivable to an informed person.

In any human organization, the possibility exists for outright criminality or the negligent failure to safeguard against it. In the nuclear energy industry, several incidents have already occurred despite extraordinary precautions:

- In August 1971, an intruder penetrated past guard towers and fences to enter the grounds of the Vermont Yankee nuclear power plant at Vernon, Vermont. He escaped after wounding a night watchman.
- In November 1971, arson caused $5 to $10 million damage at the Indian Point No. 2 plant at Buchanan, N.Y., just prior to its completion. A maintenance employee was accused of the crime.
- In February 1973, the Atomic Energy Commission's former top security officer, William T. Riley, was sentenced to three years' probation. An investigation revealed that Riley had borrowed $239,300 from fellow AEC employees and had failed to repay over $170,000. He used a substantial portion of the money for race track gambling.
- In March 1973, a guerrilla band took temporary possession of a nuclear station in Argentina.
- In August 1973, 21 "extremely harmful" capsules of iodine-131 were stolen from a hospital in Arcadia, California.

A certain irreducible number of such events is bound to occur. As the Riley case illustrates, there are limits to employee testing, screening and surveillance. Moreover, no screening program will obviate the fact that during transient intervals normal people do abnormal things. Persons under pressure may experience dark moods which prompt bizarre or desperate schemes. For example, if a virtuous but unstable employee came to believe that the perils of nuclear energy had to be demonstrated to the public by a dramatic occurrence, he might become motivated to create that occurrence. Disgruntlement or boredom can lead to pointless vandalism or lapses in security precautions, increas-

ing the chance of accident or malfeasance. Those with hidden aberrations may be blackmailed into nefarious complicity by the threat of exposure; even "pure" employees may be subverted with fabricated evidence. Thus, the nuclear energy field will continue to incur sudden unexpected losses due to the vagaries of human behavior.

*Vulnerable Targets*

Nuclear power plants are the most vulnerable military targets in any country that uses nuclear energy. Actions against such installations would be consistent with belligerent aims to inflict casualties, deprive an enemy of electric power and deprive an enemy territory, thereby reducing the need for occupation and retarding postwar recovery. Even if mutually declared non-targetable by the combatants, nuclear power plants might be ruptured adventitiously in wartime by unintentionally incapacitating cooling systems by bombing, say, dams. Hence in the next war involving a nuclear power nation, military actions are likely to cause major releases of radioactivity. Simple abandonment of nuclear power plants in war might lead to eventual catastrophic meltdowns if vital residual cooling systems were no longer attended by knowledgeable personnel.

Naval attacks could destroy coastal or offshore nuclear power stations. In this regard, the peak fission product inventory of a large reactor is sufficient to contaminate tens of thousands of cubic miles of water in excess of permitted AEC tolerance levels.

The greatest concentrations of long-lived radionuclides are stored in near-surface "tank farms" near fuel reprocessing plants. Conventional bombing of such areas would contaminate them sufficiently to preclude human approach and make it impossible to prevent further spread of massive quantities of radioactivity. One motive for such an attack would be to enjoin the enemy from utilizing his radioactive wastes for warfare. The presence of plutonium-239 in stored reprocessing wastes dictates that it be isolated from the environment for about 250,000 years. On the conservative assumption of one, two-year war per century in a given locality, plutonium-bearing wastes will remain military targets during roughly 5,000 years of actual warfare.

Political extremists might be drawn to nuclear sabotage, theft, terrorism and extortion. Because of the international character of subversive movements, lax nuclear precautions in a single nation constitute a threat to all. Even perfectly maintained domestic safeguards do not preclude smuggling: the southern border of the United States, for example, is crossed yearly by roughly 360,000 illegal entrants and daily by aircraft transporting marijuana.

The principal methods of subversive attack on nuclear power stations would involve incendiaries and explosives. Plausible approaches exist so that determined insurgents could destroy a nuclear power plant without even entering it. For example, a logical target would be the cooling system, specifically the intake piping which runs hundreds of feet outside the plant to a large body of water. Saboteurs could drop improvised time-delayed depth charges onto cooling intakes from a small boat. With scuba equipment, underwater demolition activities could be carried out unobserved from the surface. Floating bombs introduced into cooling pipes could travel unimpeded to the screen-well located close to the power plant, where their detonation would send a shock wave through the plant's piping. If the attack succeeded in destroying all of the intake pipes or their pumps, means would be available to remove fission product afterheat for only about one day. During this interval, the AEC claims that adequate emergency measures could be taken to prevent a meltdown disaster.

The most vulnerable radioactive target would be the spent-fuel pool, in which used fuel assemblies age for several months prior to being shipped for reprocessing.

*Aerial Attack*

Assaults from the air might involve dropping incendiary or explosive substances from hijacked or rented aircraft. More desperate agents might load a plane with explosives and power dive into the plant. Attacks by berserk military aircraft are a remote but definite possibility, and these might be equipped with sophisticated munitions.

This brings to mind the large number of citizens who, through military training, possess sabotage skills. A retired Green Beret colonel has given secret testimony to the AEC that he could readily sabotage the San Onofre, California, nuclear power plant located 4,400 yards from the western White House at San Clemente.

*Criminal Activity*

The chief interest of criminals in nuclear power plants would be to gain control over radioactive materials, rather than to destroy the facilities. The private manufacture of atomic explosives is within the capability of many groups once they possess the requisite 11 pounds of plutonium-239. The serious implications of this fact have been discussed elsewhere.[1] Here it suffices to point out that inferior, but still usable for weapons, plutonium is produced in nearly every nuclear reactor. It is shipped from reprocessing plants as nitrate solution in lots exceeding 100 pounds.

Underworld fabrication of atomic bombs is more difficult and less likely than the simple use of stolen plutonium as a contaminant. Plutonium-oxide dispersion could raise lung cancer hazard to unacceptable levels throughout an entire city. The possessor of metallic plutonium need only expose it on the roof of a tall building to release oxide particles into the air by pyrophoric combustion. One pound of the metal thus dispersed could theo-

Objections and rejoinders to the above are as follows:

1. *The limited value of quantitative studies.* To some, the foregoing statements would be valued only as preliminary to detailed quantitative studies of the probability and magnitude of damage to be expected from each type of radioactive maleficence. Precision in such studies is precluded by two basic considerations.

- The number, motivation and capability of nuclear malefactors will vary with economic, social and geopolitical conditions as well as with the "state of the art" of sabotage, hijacking, etc.
- The first instances of radioactive violence and their insuppressible media coverage will inspire imitative attempts that will make obsolete all preexisting calculations of likelihood, as we have seen with aircraft hijackings.

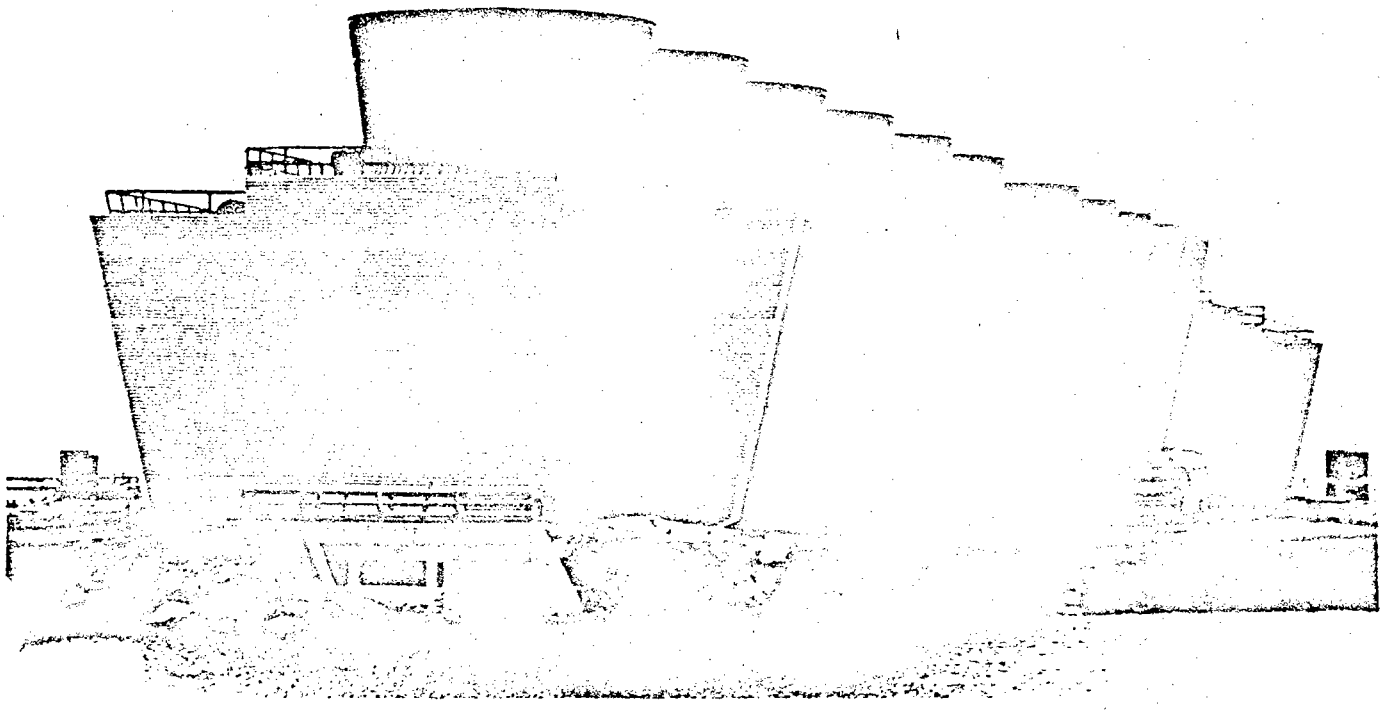
The truly relevant questions for security analysis appear to be: Is each scenario possible, in the United States or abroad, assuming normal precautions versus adversaries undeterred by the possibility of capture, irradiation or even death? If it is possible, can it be rendered essentially impossible at a sustainable cost to industry and society?

The most promising approach to answers appears to be gaming analysis, in which offensive and defensive teams compete in simulation to probe the strengths and weaknesses of security systems and personnel.

2. *The limits of industrial safeguards.* Nuclear power plants' security systems include a superficially impressive array of physical barriers, armed guards, procedural plans and electronic surveillance. Such precautions no doubt go far toward preventing illicit acts by employees or interlopers. However, sophisticated attacks by aircraft could be opposed only by ringing each nuclear installation with surface to air missiles and interdicting overflight. In order to similarly protect cooling intakes, all boats and scuba divers would have to be kept at a safe distance. Even these expensive measures would not protect against military attacks.

The adequate safeguarding of radioactive shipments presents even less wieldy problems. Armed hijackers could in principle overpower armed guards and immobilize the cargo by shooting truck tires or derailing a train. The massive bulk of lead-lined spent fuel casks would not prevent spillage if explosives or thermite were used. The AEC's latest attempt to bolster transportation safeguards is altogether inadequate relative to attacks of paramilitary strength or greater.[4]

3. *The false panacea of undergrounding.* Underground emplacement of nuclear power plants unquestionably would augment their resistance to aerial attack and improve the containment of radiation following a major accident. Because of the shortage of top-quality geologic formations, undergrounding could approximately double construction costs and raise the price of nuclear electricity by 50 percent. Moreover, it would be uneconomic for each power plant to have its own nearby underground reprocessing and fuel fabrication facilities. In their absence, the hazards associated with long-distance transport of spent fuel would remain. If several power reactors were concentrated underground in a single area so as to justify having their own reprocessing plant, such a complex would be a tempting target for attack with nuclear weapons.



Cooling towers, Peach Bottom nuclear power plant in Pennsylvania.

retically bring 110 square miles to worrisome radioactive levels, or 3 square miles to the level used by the AEC in determining an "extraordinary nuclear occurrence."[2] Such deposition could necessitate evacuation, extremely expensive decontamination or the permanent use of face-mask respirators.

Each 1,000 megawatt-electrical nuclear power plant annually produces over 80 million curies of long-lived gamma emitters. One percent of these could theoretically contaminate 500 square miles to levels that would require evacuation.[3] Once known to possess such a deterrent, a criminal gang would be virtually immune from prosecution. Armed with plutonium or high level waste in storage, organized crime might demand federal assurances of non-interference with their operations. Punishment for non-cooperation might be the loss of Washington, D. C., as a habitable center. Nuclear thieves could demand large sums of cash, control over policy or special concessions from national governments. One can imagine the plight of an administration seeking to mediate the demands of several radioactive blackmailers—large or small in number, foreign or domestic, criminal or altruistic.

States and cities could be threatened with radiocontamination of essential public facilities: capitol buildings, city halls, police stations, hospitals, water and sewage treatment plants. Simple disposal of radioactive material down a toilet could create a sanitary emergency by shutting down sewage treatment facilities. Attacks on workplaces would pose the threat of extremely costly contamination of equipment, manufactured goods and foodstuffs. Such losses would not be covered by most property insurance policies, which specifically exclude damage from nuclear radiation.

Any location which attracts the bomber of today will attract the nuclear thief of tomorrow. Places of public assembly such as theaters, stadiums and transportation terminals would be likely targets for nuclear terrorists, blackmailers or hoaxers. In the future, any wealthy, powerful or well-known person could receive real or crank threats from those who claimed possession of radioactive substances. Public officials subject to grudge attacks would feel obliged to use radiation detectors to monitor their homes, autos, offices and mail. Once sizable quantities of nuclear material had been diverted to the underworld, no imaginable precautions would prevent its widespread criminal use.

Thieves of radionuclides could induce or coerce an ignorant person to subdivide them for resale. They could then be purveyed anywhere in the world, to anyone possessed of the asking price. In this regard, the Nixon administration's plan to export nuclear power technology to 19 nations presents grave risks. The foreign sale and subsequent diversion of nuclides potentially presents almost the same danger as the proliferation of nuclear weapons.

The kidnapping of a nuclear scientist is no more difficult than the procurement of special nuclear materials. Even an extremely loyal employee might surrender top secret information were he, she or a family member to be abducted by ruthless criminals. To preclude misleading information, criminals might kidnap two or more experts, whose separately coerced accounts could be checked for consistency. Of course, the possibility of Ellsberg-type leaks or even voluntary collaboration of nuclear personnel with criminals can never be completely ruled out. Thus, the safety of the "atomic age" from criminal domination must be judged in light of the questions: Does security depend on secrecy? How likely is such secrecy to be permanently kept?

Hoodlums, domestic subversives or foreign agents may attempt to incriminate innocent third parties for acts of nuclear violence. By deliberate fabrication of clues, malefactors may hope to escape the blow of retaliation and divert the same onto a rival or suspect group. This possibility suggests special perils in connection with smoldering international conflicts. A small nation or faction might arrange nuclear power plant sabotage in the United States in such a way as to make another nation appear responsible. If the dispersal of several large amounts of radioactive materials of mysterious or misleading origin occurred in a short period of time, the nation might feel impelled to retaliate against its most visible enemy with a missile strike. The risks of error would be high, and the consequences, monumental.

*Psychosocial Aftermath*

One immediate evacuation-related problem, following a large radioactive spill, would be the evacuees' anxiety concerning their degree of radiation exposure. Facilities would be required to deal with hypochondriacal complaints of radiation sickness as well as the medical injuries of actual victims. Some exposed women may request therapeutic abortions. In the wake of the emergency, other issues would arise. A strong public demand, impossible to grant, might be to shut down all nuclear plants at once. Real estate values close to nuclear facilities, especially downwind, might be severely cut. Massive litigation and agitation for indemnification could be expected. Evacuees would have to be maintained, relocated and reemployed. Persistent contamination of substantial areas would necessitate bypass transportation routes, new water supplies and sources of agricultural commodities.

Never before have large inhabited zones suddenly become unusable without visible damage. The administrative problem of keeping people out of such areas might not be solved completely by the fear of radiation. Near the periphery of these areas, persons might attempt to loot and transport materials, some of which might be contaminated. Vagabonds and desperadoes, relatively unimpressed with official warnings, might take up residence within interdicted zones and mount forays therefrom. Thus, these fenced-off areas might pose continuing headaches.

/— 121

# WHY PLUTONIUM HIJACKING IS SO DANGEROUS A POSSIBILITY

By H. Peter Metzger

"More than one airplane, hi-jacked to Cuba, carried in its cargo enough nuclear material to build an atomic bomb . . ." according to the publication *Washington Monthly.*

That news flashed across the country, making headlines back in January. No one doubted the story because for several years now, the AEC (Atomic Energy Commission) has regarded as inevitable the theft of "special nuclear material" (as the AEC calls bombstuff).

How much theft will occur is debated. But that it will occur eventually is considered inescapable -- if it hasn't happened already. The AEC's concern can be measured by the extent of its efforts to prevent nuclear theft: 100 full-time employees and a budget of more than $4 million per year.

Until recently, most shipments of "special nuclear material" have been military, with little risk of hi-jacking. But as nuclear electric generating plants proliferate across the country and the world, nuclear fuel increasingly will be shipped everywhere, just like any other article of commerce. The trouble is that the fuel, which produces controlled nuclear heat slowly in a nuclear power reactor, is the same stuff which can be induced to do the same job -- but far faster -- in a bomb.

Remarkably, industry resistance has so far prevailed against an AEC recommendation that armed guards accompany each shipment. Consequently, "special nuclear materials" would be about as difficult to hi-jack as a truckload of cigarettes.

Those who minimize the dangers of nuclear hijacking point out that an advanced technology is required to turn a shipment of "special nuclear material" into an atomic bomb. They claim it requires a technology far too sophisticated for any place but the giant government laboratories which are presently in such work.

This is true for uranium, and consequently only a fraction of the "special nuclear material" being shipped today can be made into a bomb. But plutonium is another story. Plutonium shipped in increasing quantities will eventually displace uranium entirely as the nuclear fuel for power reactors, as well as bombs.

But, unlike uranium, plutonium does not require the huge purification plants at Oak Ridge to bring it up to weapons-grade bomb fuel. Plutonium can be purified in an ordinary chemical laboratory.

While this technology may be beyond the capabilities of a very bright high school student, it in no way presents a truly difficult task for a few good professionals. The process isn't even secret. Experts agree that a homemade bomb could be made to equal the power of the device which devastated Hiroshima.

But technology is no obstacle for still another reason: it isn't even necessary. Any American city could be brought to chaos by the threats of a terrorist who could prove that he had possession of bomb material alone, even though, because of incorrect form or insufficient quantity, his material could not be exploded. Plutonium is toxic almost beyond human experience. Less than one-thirty-millionth of an ounce will produce cancer. Therefore, simply blowing up a quantity of plutonium with ordinary explosives would render large areas of any city uninhabitable for a very long time.

And so bluff alone has plenty of power -- so long as the terrorist has the sutff. Orlando, Flordia, suffered such a hoax in 1970, but the 14-year-old high school science student did not have any plutonium. All he had was a convincing drawing of an atomic bomb.

The people on the *Washington Monthly* don't have the goods either, but that didn't stop everyone from believing their story that bombstuff had been hi-jacked to Cuba. I have letters from both individuals whom the *Washington Monthly* cited to authenticate their Cuba caper. In those letters, both individuals vigorously deny they said what the *Washington Monthly* reported they said. But the article isn't all untrue. Part of it was lifted from, but not credited to, "The Atomic Establishment," a book I wrote last year.

The reason that the story was widely believed is that it is believable. Quantities of "special nuclear materials" could easily have been aboard an aircraft hijacked to Cuba.

New AEC rules which have just gone into effect limit each shipment to one five-hundredth of the amount needed to produce an atomic explosion. In the best better-late-than-never tradition, the AEC waived the usual 30-day waiting period between the publishing of a rule and its date of effect and said: "The Commission's action on passenger aircraft shipments is being made effective immediately because of the increased number of hijackings during the past year."

Now that leaves only trucks, trains, ships and cargo planes to worry about.

Reprinted by EARS
Environmental Action Reprint Service
University of Colorado at Denver
1100 14th Street
Denver, Colorado 80202
Phone (303) 534-1602

Distributed by:

A major percentage of electrical power might thus be lost in a single strike.

It is doubtful whether undergrounding, at whatever practicable depth, could positively exclude malefactors or prevent the atmospheric release of nuclides following attack or major accident. An underground nuclear power station would have to maintain several connections with the surface. Intruders still might enter, and the volatile 20 percent of fission products still might leave following rupture through elevator shafts, stairwells, air conditioning ducts and sizable freight entrances that are big enough to accommodate spent fuel casks.

The wartime advantage of undergrounding fades with the recognition that nuclear explosives could destroy even a greatly hardened site. A direct atom bomb hit on a surface nuclear power plant would actually result in less onsite contamination, since most of the material would be carried up to the stratosphere by the rising fireball. Once ruptured, any nuclear power plant would be eventually infiltrated by groundwater, whose percolation would carry radiation into the large body of water that supplied the plant's cooling.

4. *The unjustified reliance on human scruples.* Conscience might prevent all but one in a million persons from committing radioactive atrocities. That would still leave 3,800 people in the world who could endanger most of the others. However, circumstances enable normal human beings to rationalize vicious deeds. An attacker either subjectively dehumanizes his victims, invokes the right of vengeance or justifies his behavior as part of a larger noble cause, such as "ending the war."[5]

5. *The false hope of prevention through social science.* It has been suggested that physical or psychological profiles might be constructed to identify potential nuclear criminals. Such profiles have been of some value in screening possible airline hijackers at the ticket counter or boarding gate. However, future atomic felons do not so cooperatively present themselves for advance scrutiny. Thus, any screening instrument would have to sift, at great expense, major segments of the population. Probably even a very large net would not catch all the fish. The validation of the screening procedure would be a major undertaking in itself. In a free society, no prior restraint could be placed on those identified in the screening as high risks.

6. *So far, so good.* Reliance on a good past record ignores the automatic multiplication of malfeasance opportunities as the nuclear industry proliferates. Moreover, new technological innovations may pierce formerly impenetrable barriers. The remote-controlled drone airplane, which could put a crude guided-missile capability in criminal hands, is an example.

7. *The false hope of insurance.* As AEC estimates of possible damage in a radioactive release have risen to $17 billion, utilities' total liability for a single nuclear power plant disaster is limited by the Price-Anderson Act to less than $600 million. Private insurance against radio-contamination is largely nonexistent, and the present annual limit of Small Business Administration disaster loans is $4.3 billion.

8. *The fallacy of comparative risk.* American society accepts the 57,000 fatalities and 2 million disablements that annually result from U.S. highway travel. Are radioactive disasters acceptable by comparison? Auto accidents are not subject to sudden orders-of-magnitude increases; casualties from radiation are.

No other risk presents the prospect of long-term incapacitation of sizable inhabited land areas and watersheds, injecting an element of uncertainty into all planning for land use.

No other hazard poses a distinct threat to the health and genetic integrity of future generations.

No other hazard, save that generated by the international nuclear industry, quietly undermines our entire system of national defense by making the United States vulnerable to anonymous attack from within.

Since 350,000 Americans die annually from cancers, perhaps additional cases of radiation-induced cancer would be inconsequential on a percentage basis. However, since one out of four U.S. citizens is presently destined to contract cancer, we should not be eager to add unpredictably large doses of carcinogens to our environment.

Another comparative-risk argument invokes the threat to industrial civilization in the absence of an inexhaustible energy source, presumably provided only by nuclear fission. Granted that a long-term power source is indispensable, potentially infinite energy may be obtained yet from the varied effects of the solar beam, the Earth's heat, and the fusion of light atoms.

## NOTES

1. Ralph E. Lapp, "The Ultimate Blackmail," *New York Times Magazine,* Feb. 4, 1973; Robert B. Leachman and Phillip Althoff, eds., *Preventing Nuclear Theft: Guidelines for Industry and Government* (New York: Praeger, 1971).

2. This level for transuranic alpha emissions is 0.35 microcuries per square meter, as given in USAEC Rules & Regulations Section 140.3., Nov. 28, 1970.

3. Gamma deposition of 1,400 curies per square mile would deliver a first-year dosage of about 50 rem. This is ten times the annual maximum permitted to atomic workers in restricted areas.

4. U.S. Atomic Energy Commission, Nuclear Fuel Cycle Division, "Fuel Cycle Safeguards," Nov. 6, 1973.

The minimum number of armed guards that must accompany shipments of special nuclear material (SNM) in a railroad car or separate vehicle remains at two. The still-required prominent identification numbers on top of the vehicle enable easy identification by searchers and also enable easy identification and pursuit by aerial attackers.

The general theme of the transportation rules is to withstand small assaults with pistols but not to withstand, let alone repel, significant armed attacks. A single armed guard monitors transfers of SNM.

5. R. Nevitt Sanford and Craig Comstock, eds., *Sanctions for Evil* (San Francisco: Jossey-Bass, 1971).

During the lifetime of the RSSF, based upon the historical record we may expect the United States to undergo at least twenty years in which open warfare involving this country takes place. The sophistication of the weapons which will be utilized in those conflicts may be expected to increase, just as weaponry has been refined in the similar interval from 1845 to the present. The identity, strength, motivations, and rationality of our future adversaries can scarcely be predicted, given that our potential and actual military foes since 1945 were largely unforeseen at the close of World War II.

In light of these relatively obvious considerations, and in view of the obvious military advantages of targeting such an installation, the complete absence of the topic of war and terrorism in the draft ES is more than puzzling. It is baffling and alarming. Hopefully, the comments solicited from the Department of Defense will fill this gap. This hope cannot be stated with assurance, since at present DOD has only an advisory role in the protection of nuclear production and utilization facilities against enemy attack. As for the AEC, its Regulation 50.13 exempts its licensees from protecting against assault or sabotage by "...an enemy of the United States, whether a foreign government or other person." The net effect of the current situation is that no government agency has clear, specific, and active regulatory responsibility to protect civilian nuclear-industry facilities against terrorism or wartime attack, remarkable and unacceptable as that may be.

Recommendations: Studies must be undertaken with regard to each of the three favored site locations, establishing the maximum credible dispersion to the environment of stored contents for each of a variety of possible attacks upon the RSSF and transuranium-waste storage facilities. The following modalities should be considered, with regard both to present-day weapons capabilities and extrapolated improvements in those capabilities:

(A) Megaton-range thermonuclear devices detonated near, above, and on the ground surface of each conceptualized repository.

(B) Fission bombs one-tenth to one kiloton in yield, such as will soon be available to terrorists, exploded near, above, on the ground surface of, and within the structures of the storage facility.

(C) Effects of conventional high-explosive aerial bombing.

(D) Effects of sustained attack by conventional artillery and missiles.

(E) Effects of deliberate crash of the commercial or military aircraft having the largest multiplied weight and top speed in dive, making due allowance for later improvements in aircraft capabilities.

(F) Effects of terrorist attacks utilizing shaped explosive charges at maximally destructive points, assuming successful penetration into the facility.

(G) Effects of sabotage attacks other than those bent upon direct explosive dispersal of stored material; i.e., attempts to damage cooling-system machinery, to introduce corrosives into water-basin coolant, etc.

2. For each maximum credible malevolence-induced dispersion so identified and characterized, a contingency plan should be devised for satisfactorily preventing it and/or cleaning it up. If for any postulated dispersion substantial deposition of radionuclides requiring evacuation of offsite personnel is calculated, such a finding shall constitute an overriding criterion for rejecting the proposed RSSF design or site which gives rise to it.

# NATIONAL-DEFENSE IMPLICATIONS OF PROPOSED RADIOACTIVE WASTE STORAGE OPTIONS

Critique of Management of Commercial High Level and Transuranium-Contaminated Radioactive Waste (Environmental Statement). U.S. Atomic Energy Commission document WASH-1539 (draft), September 1974

Reviewed by L. Douglas DeNike, Ph.D.

CALIFORNIANS FOR NUCLEAR SAFEGUARDS
2315 Westwood Blvd., L.A., CA 90064
Telephone 213-474-3320

This document formally proposes the construction of a retrievable surface storage facility (RSSF) in which to manage all high-level radioactive waste from the commercial nuclear power industry. Methods are also proposed for interim management of wastes contaminated with long-lived alpha-emitting artificial elements such as plutonium.

The RSSF is anticipated to be in service over a period of as long as 130 years, from about the year 1980 until 2110, until such time as a proven permanent radioactive waste disposal method can be implemented. Three main options are presented for the RSSF design: (1) Water basin, in which one-by-ten-foot stainless steel waste canisters, each emitting 1 to 20 kilowatts of heat, will be stored under 20 feet of continuously cooled water 30 feet below ground level. (2) Air-cooled vault, in which waste canisters will be managed just below ground level in reinforced-concrete vaults cooled by passive natural-draft air currents. (3) Sealed cask concept, in which individual canisters jacketed by two inches of steel and 38 inches of concrete will be emplaced in the open air and cooled by natural atmospheric circulation inside the concrete radiation shields. Canister wall thickness is not specified, but does not appear to exceed ½ inch.

The three most likely sites for the RSSF as developed in the draft are the Nevada Test Site, the National Reactor Testing Station in Idaho, and the Hanford Reservation in the state of Washington. The document makes no recommendation among the three locales, nor among the three storage concepts.

The draft WASH-1539 contains no analysis whatsoever of vulnerability of the RSSF choices to acts of terrorism or war. Only sketchy consideration is given to the possibility of sabotage; fuller exposition on sabotage is promised in the final draft. Impacts by aircraft or "massive missile" (e.g., meteorite) are considered to be incredible and thus unworthy of analysis.

The gravity of these omissions becomes evident in consideration of the unique nature of the proposed facility. The prolonged period of service expected of the RSSF, the unparalleled hazard posed by its contents should they be dispersed in the environment, and the inclusion of waste from many foreign countries there will make the RSSF like no other installation in the world. By the year 2010, as many as 6,364.1 megacuries (6.3641 billion curies) of persistent fission products will be stored there. As many as 165 forced-draft cooling towers could be needed to dissipate the heat generated by this material, which could evacuate no less than one-fifth the land area of the 48 continguous states if widely dispersed.

WHETHER NUCLEAR POWER IS PHASED OUT OR NOT,

radioactive waste storage sites will exist throughout your lifetime. You want them to be just as safe as you can possibly get them.

Write to your Senators and Congressman urging consideration for the points raised here. Send a carbon copy to

Dr. Frank K. Pittman, Director
Division of Waste Management and Transportation
U. S. Atomic Energy Commission
Washington, D. C. 20545

An excellent booklet, Citizens' Guide: The National Debate on the Handling of Radioactive Wastes from Nuclear Power Plants, is available from Natural Resources Defense Council, $1.00 per copy, 664 Hamilton Avenue, Palo Alto, Calif. 94301. They won't object if you enclose a contribution when writing for it.

3. For credible dispersions involving radioactivity levels sufficiently high to largely preclude direct human participation in cleanup, plans should be set in motion for the design and construction of remote-controlled or totally robotized machinery capable of performing the necessary tasks. Adoption of a final construction plan for the repository should be contingent upon the successful prototype testing and letting of production contracts for such decontamination and cleanup machinery. Such machinery, together with all provisions for its use and later retirement without human servicing once contaminated, should be stored both at the site and redundantly at some distance from the site, lest attack damage at the repository prevent use of the equipment stored there.

4. In the design and public description of the security system for the facility, due recognition should be given to the fact that secret information about it can "leak out" and become known to public enemies over the course of many decades. Thus, to the fullest extent possible, the security system should be designed to rely minimally on secrecy. It is not advocated that details of security precautions be publicized unnecessarily. However, the system should be so intrinsically sound in its physical design that hypothetically, almost everything about it could be disclosed without significantly lessening the safety of the installation. It is most emphatically predicted that secrecy which momentarily masks the weaknesses of an inherently inadequate security system will only delay the day of its breaching, not prevent it.

5. On-surface or near-surface design options for the interim repository are unacceptable and must be rejected. This conclusion stems directly from recognition of the facility as a credible target for attack by nuclear weapons. This principle makes due allowance for the fact that our present chief adversaries appear to have no interest in attacking such an installation, or would fear retaliation in kind should they do so. As was pointed out above, the identity and strategic planning of enemies of the United States can be expected to change unpredictably over time. The conclusion stands independent of any international agreements which may be adopted which would declare civilian atomic facilities non-targetable in warfare. Treaties, and adherence to treaties, are not of the order of durability which is essential for the repository. The conclusion is unaltered by the fact that direct hits with large nuclear weapons would disperse most of the radioactive debris into the stratosphere, resulting in a fallout pattern that would be too widespread for military value. Attacks on any surface-emplaced atomic facility with nuclear weapons can be calculated so that the burst is sufficiently low in yield, off-target, and meteorologically timed so that devastating fallout effects may be achieved. Considering once again the century-plus period over which the repository must remain intact, advance allowance must be made for future refinement in missile accuracy and in weather information obtainable by an enemy.

6. A hardened deep-underground siting strategy for the interim waste repository appears indispensable if our national defense posture is to remain uncompromised. A working model of such a concept is provided by the North American Aerospace Defense Command headquarters at Cheyenne Mountain, Colorado. Although it is located beneath 1500 feet of granite rock, NORAD headquarters is already recognized as vulnerable to repeated direct hits with thermonuclear weapons. Notwithstanding, it epitomizes the presently attainable degree of protection against war damage. The cost of building, cooling, and maintaining such a deep-underground rock-sited facility would be small compared to the expected cost from a nuclear attack on a surface-built installation. Since the United States will build no more than two such repositories, there is no pressing need to economize. Since retrievability following attack does not inhere in surface-emplaced designs, possible loss of retrieval capability in a deep-underground site does not appear to constitute adequate grounds for rejecting it.

Ex.

Testimony of Dr. L. Douglas DeNike, pertinent to U. S. Atomic Energy Commission draft WASH-1539, Washington, D. C., November 12, 1974 /- 124

## RADIOACTIVE WASTE STORAGE AND NATIONAL DEFENSE

My name is L. Douglas DeNike; I am Vice-President of the Los Angeles Chapter of Zero Population Growth, 2315 Westwood Boulevard, Los Angeles, California 90064. I am a clinical psychologist. In the field of nuclear criticism I am the author of one article and one book review in the Bulletin of the Atomic Scientists ("Radioactive Malevolence," February 1974, and "How Safe Are the Safeguards?", October 1974), and am presently completing a book, Nuclear Nightmare, dealing with the vulnerability of the atomic energy industry to acts of crime, terrorism, and war.

The Commission's recent requests for additional funding for security and safeguards are evidence of increased recognition of the dangers to nuclear facilities from terrorist violence and extortion. This enhanced official awareness is most salutary, and bodes well for a basic reassessment of waste-storage security planning in the final draft of WASH-1539. It appears most clearly that nothing less than a basic reassessment will suffice.

The Commission officially recognizes the danger of terrorism. In the nuclear field, there appears to be no clear line which separates terrorist atrocities from acts which, if perpetrated by a foreign government, would certainly be considered acts of war. We deal here with the distinct possibility of deliberate radioactive contamination of large areas of the United States. Such a threat is intrinsically of a military nature, especially since saboteurs or guerrillas may be operating under the covert direction of a hostile nation. Thus what follows will be addressed to the topic of national defense, a subject very familiar to the Atomic Energy Commission through its activities in the development of nuclear weapons.

It is frequently found, in connection with proposed programs of the federal government, that they would conflict with pre-existent government goals or programs. Similarly, the finding that a suggested government action would not be consistent with national defense aims is far from rare. I must now assert that the framers of the draft WASH-1539 have inadvertently proposed a radioactive waste storage concept which would compromise the national defense profile to an apparently very serious degree.

The very existence of the quantities of radionuclides projected for the "retrievable surface storage facility" (RSSF) in an on-surface or near-surface location in this country would constitute a unique military liability. This agency would not dispute a ground-contamination value of 5000 curies per square mile of hard gamma emitters as a level justifying quasi-permanent evacuation. On the assumption that 50% of the RSSF contents will be high-energy photon emitters, the proposed peak inventory of this facility could bring as many as 600,000 square miles of territory to such an evacuation level. Thus, an attack on the RSSF site with a well-placed nuclear weapon could inactivate one-fifth the land area of the contiguous 48 states. A much smaller release due to para-

## ILLEGAL ACTS BEARING ON POSSIBLE RADIOACTIVE THREATS TO THE PUBLIC — AN INFORMAL COMPILATION 8-15-74

*SCOPE: Actual illegal acts having the potential for damage to the public from nuclear materials.*

April, 1964 through June, 1972. During this interval William T. Riley, top national security officer for the Atomic Energy Commission, borrowed $239,300 from fellow AEC employees and failed to repay over $170,000. A substantial portion of the money was used in racetrack gambling. During this interval Riley had access to the nation's highest atomic secrets, and his gambling activity was unknown to his superiors. Thus he was a possible target for blackmail. He was sentenced to three years' probation in February, 1973. Michael Satchell, "The Riley Affair" (2-4-73) and "Ex-AEC Aide Put On Probation" (2-21-73), *Washington Star-News.*

Oct. 1970. A fourteen-year-old extortionist demanded $1 million from authorities of Orlando, Florida lest he destroy the city with a hydrogen bomb. The teenager's drawing of his nonexistent hydrogen device was sufficiently convincing that an armaments officer at McCoy Air Force Base said "it would probably work." Ralph E. Lapp, "The Ultimate Blackmail," *New York Times Magazine,* February 4, 1973.

August, 1971. An intruder penetrated past guard towers and fences to enter the grounds of the Vermont Yankee nuclear power plant under construction at Vernon, Vermont. He escaped after wounding a night watchman. "Man Penetrates N-Plant Security," *Gloucester* (Mass.) *Daily Times,* September 1, 1971.

November, 1972. Aircraft hijackers circled over Tennessee and threatened to crash their plane into the nuclear installation at Oak Ridge, Tenn. unless a $10 million ransom was paid. In view of the threat, Oak Ridge closed down all of its nuclear reactors and evacuated all but emergency personnel from the compound. "Hijacked Jet Skids to Landing in Cuba," *Los Angeles Times,* 11-12-72.

March, 1973. A guerilla band took temporary possession of a nuclear station nearing completion in Argentina. The guerillas decorated the plant with political slogans and left without doing any damage. *Environment,* June 1973 (Spectrum section), citing *Nuclear Industry,* April 1973.

April, 1974. Parts of two trains in Austra were found contaminated with a radioactive liquid used in medical diagnosis. A man calling himself a "justice guerilla" telephoned a warning that passengers' lives were in danger. Slight traces of radiation were found in (sic, not "on") eight passengers and in a box in the baggage car. "Mystery Radiation Hits Another Train," *Los Angeles Times,* April 20, 1974.

## NOTES OF INTEREST:

### 3,600 Lost Nuclear Jobs in Year, Many to Alcohol, Drugs

WASHINGTON—More than 3,600 persons with access to nuclear weapons were removed from their jobs within a single year because of drug abuse, mental illness, alcoholism or discipline problems, Congress has been told.

The information was provided to Congress last May and June by Carl Walske, former assistant defense secretary for atomic energy matters, in testimony before a subcommittee. It was released Saturday.

—*Los Angeles Times,* January 27, 1974

The recent rash of airport and airline in-flight bombings heightens the dangers inherent in the transportation and storage of radioactive materials used in numerous industries. If the "alphabet bomber" of L.A. International Airport had bombed a freight area where nuclear materials were sequestered for shipment by air, he would have succeeded in dispersing radioactive materials not only throughout the huge facility but, with proper weather conditions, throughout the immediate environs and beyond.

Even if such a bomb 'fizzled' (gave negligible nuclear yield) when detonated, its high-explosive implosion triggering device would still make it a very effective dispersal weapon. Thus the blackmail leverage inherent in plutonium is enormous.

Theft of high-yield atomic weapons from the military presents even more fearsome dangers. Retired Admiral G.R. La Rocque recently testified to Congress that American nuclear bombs stored overseas are poorly guarded, and could easily be captured by terrorist groups. U.S. atomic warheads are kept in many countries including Greece, Turkey, South Korea.

**Demolition of spent fuel.** Used fuel elements are dispatched from nuclear power plants in thick steel-and-lead casks. Once their carrier truck had been stopped, or a train shipment derailed, such casks could be ruptured with bazookas or shaped explosive charges. The resulting dispersion of a million or more curies of penetrating gamma radiation would be extremely difficult, dangerous, and expensive to clean up. If spent fuel were blown up in a city, decontamination and abandonment costs could exceed a billion dollars. What would a local government not bargain away in order to ransom such a cargo?

**Sabotage of nuclear power reactors.** The AEC calculates that a maximum accident at a contemporary nuclear power plant could release radiation offsite sufficient to kill 45,000, injure 100,000, and damage property worth $17 billion in 1965 dollars. Maleficence could yield the same effect, assuming the right wind and weather conditions prevailed. The attackers would be aided in their planning by the schematic diagrams which the operators of nuclear plants distribute for public-relations purposes. Having overcome the few armed guards at a plant, a squad of saboteurs could cripple its regular and emergency cooling systems. The reactor core would then begin to melt down, within hours releasing great quantities of airborne radioactivity. Alternatively, the malefactors could blast their way into the domed containment area, and then explode the core directly with delayed explosives. They could also choose to destroy the storage pool used to age large quantities of spent fuel following refueling. Ominously, recent terrorist assaults have employed a variety of sophisticated weapons, including helicopters and heat seeking missiles. It is far from certain whether a nuclear plant could resist an attack involving such means.[6]

What shall we conclude from these stark possibilities? ***The proliferation of nuclear materials opens wide the door to anarchy and chaos.*** Large regions, or any specific target within them, will be placed at the mercy of anonymous enemy spies, fanatic terrorists, criminal blackmailers, and deranged persons. Thus the ambitions of the nuclear power industry clash with the basic requirements for public safety: law enforcement and national defense.

Perhaps the criminal abuse of radioactive materials could be adequately controlled by widespread regimentation of society. However, nuclear power is unnecessary to meet our present or future energy needs, and thus there is little point in sacrificing our freedoms in exchange for it. A fission-free energy economy can be built on sound and sustainable alternative power sources now being developed.[7] Only in such a society will humankind be spared from the scourge of atomic banditry.

*This report was drafted by Dr. L. Douglas DeNike, a contributor to the Bulletin of the Atomic Scientists, and author of a forthcoming book on radioactive crime and banditry.*

1. The AEC's director of regulation, L. Manning Muntzing, concedes that a band of highly trained, sophisticated terrorists could conceivably take over a nuclear power plant near a major city and destroy it in such a way as to kill thousands — perhaps even millions — of people. —*Los Angeles Times,* Dec. 17, 1973.
2. "The Threat of Nuclear Theft and Sabotage," *Congressional Record,* Apr. 30, 1974, p. S 6621-6630.
3. *Nuclear Theft: Risks and Safeguards,* Ballinger, 1974. See also John McPhee's very readable book, *The Curve of Binding Energy,* Farrar, Straus & Giroux, 1974.
4. An example of vulnerability to blackmail: The AEC's former chief of security, William T. Riley, was dismissed and sentenced to three years' probation in February 1973. An investigation revealed that for the previous eight years, he had been a high-stakes racetrack gambler. He had borrowed $239,300 from fellow AEC employees, and had failed to repay over $170,000. All this was unknown to his superiors during the years when he had access to America's top nuclear secrets.
5. "The widespread use of nuclear energy requires the rapid development of near perfect social and political institutions. This is the unprecedented challenge before us." —*Nuclear Theft: Risks and Safeguards,* p. 173.
6. Perhaps no very exotic means are necessary: "As one trained in special warfare and demolitions, I feel certain that I could pick three to five ex-Underwater Demolition, Marine Reconnaissance or Green Beret men at random and sabotage virtually any nuclear reactor in the country." —Dr. Bruce L. Welch, who served for four years as an officer in the U.S. Navy Underwater Demolition Teams.
7. See the wide range of safe and promising energy options described in our Public Interest Report, "Solutions to the 'Energy Crisis'"; also the book *Energy and the Future,* American Association for the Advancement of Science, 1973.

**This project is produced by *Environmental Education Group* under a grant from *Environmental Alert Group.* Both are non-profit, tax-exempt organizations.**

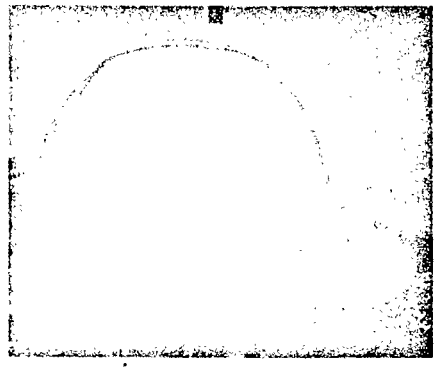
**For additional copies write to:**
***Environmental Alert Group***
**1543 N. Martel Ave.**
**Los Angeles, CA 90046 U.S.A.**

*A joint project of Environmental Alert Group and Environmental Education Group.*

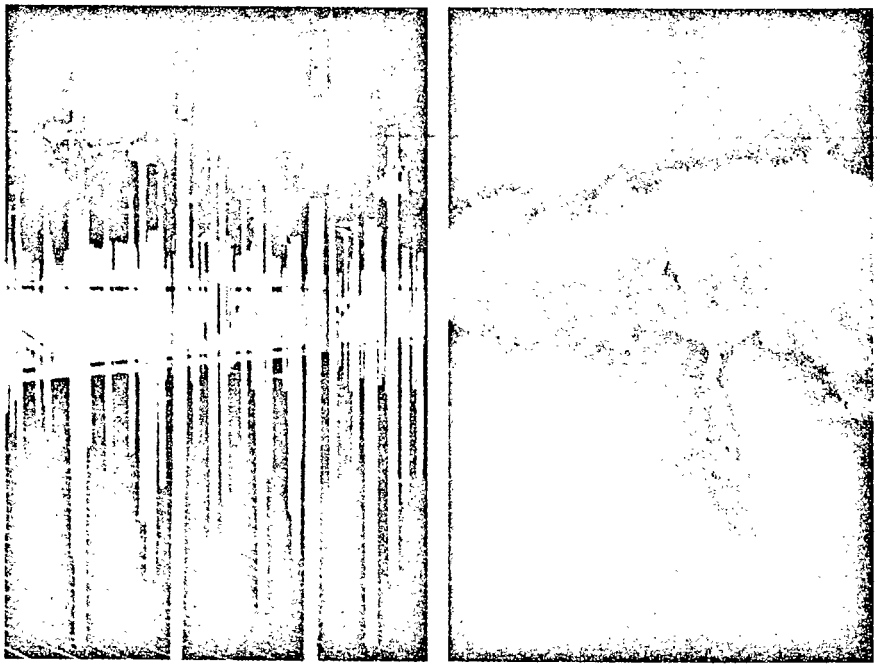
# PUBLIC INTEREST REPORT

## NUCLEAR TERRORISM

Atomic Energy Commission



*One essential step in diverting civilian power plant fuel to military use is the fuel reprocessing plant. Shown here are hangers from which spent nuclear fuel assemblies hang below the grating at the Idaho Chemical Processing Plant. The fuel is awaiting processing which will remove plutonium, potential bomb material*



National Reactor Testing Station

*"... the adaptability of nuclear fuels for use as weapons poses a growing danger to all peoples in these times of increasing reliance on nuclear energy to meet the power demands of industrial societies that are increasingly vulnerable to the disruptive acts of desperate individuals and organizations. The nuclear trigger which threatens the lives of millions, if not the peace of the world, is no longer within the grasp of just a very few. The failure of governments to face this ugly fact constitutes another measure of the increasing danger in which we all live."*

*—Samuel H. Day, Jr., "We Re-Set the Clock," Bulletin of the Atomic Scientists, Sept. 1974*

*"Fission energy is safe only if a number of critical devices work as they should, if a number of people in key positions follow all their instructions, if there is no sabotage, no hijacking of the transports, if no reactor fuel processing plant or reprocessing plant or repository anywhere in the world is situated in a region of riots or guerrilla activity, and no revolution or war — even a 'conventional one' — takes place in these regions. The enormous quantities of extremely dangerous material must not get into the hands of ignorant people or desperados. No acts of God can be permitted."*

—from Dr. Hannes Alfven, Nobel Laureat in Physics, writing in May, 1972 BULLETIN OF THE ATOMIC SCIENTISTS

Unprecedented tragedy looms in the form of terrorism and blackmail involving ***privately built atomic bombs*** and ***the deliberate dispersion of radioactivity.*** These mounting threats stem from the worldwide proliferation of nuclear power plants. As India showed recently, "peaceful" reactors can be used to manufacture atomic explosive materials such as plutonium. Moreover, staggering concentrations of lethal radioactive wastes accumulate in nuclear power plants. The cost of crimes involving these substances could sum to billions of dollars annually, which would make atomic fission the most expensive possible way to generate electricity. The key facts are these:

—Each large nuclear power reactor contains enough radioactive wastes to force evacuation of over 10,000 square miles should they be dispersed by sabotage.[1] Also, embedded in the spent fuel which a single plant discharges each year is enough plutonium to make 30 "crude" atomic bombs. Each bomb would be at least powerful enough to demolish a skyscraper, the U.S. Capitol Building, or — a nuclear power plant. These deadly materials must therefore ***never*** be permitted to come under the control of outlaws. Yet there are no plans to guard shipments of high-level waste or spent fuel. As for plutonium and other fissionable A-bomb ingredients, a group of Atomic Energy Commission consultants recently urged that immediate steps be taken to greatly strengthen their protection from theft.[2]

—Atomic bombs and radiation-dispersal weapons are fairly easy to build. Two eminent nuclear scholars, Mason Willrich and Theodore Taylor, believe that a small group of persons could do so within several weeks, utilizing only open unclassified information available to anyone.[3] Such persons would then be in a position to blackmail whole cities, or even entire governments through threats against national capitals. Via smuggling, nuclear materials stolen anywhere in the world could be used against the United States.

—Already in the U.S., several thefts of highly radioactive gamma-ray sources have occurred, and several nuclear blackmail threats have been received. Incidents of intrusion, arson, and small-scale sabotage have occurred during the construction of nuclear plants in Vermont, New York, and Colorado respectively. Atomic secrets may be obtained by the underworld by bribery or extortion directed against vulnerable employees.[4]

American nuclear power capacity is expected to triple by 1980. Foreign capacity will go up ***eightfold*** by then, involving 30 nations. Despite these ominous trends, only feeble attempts are being made to develop safeguards adequate to protect the anticipated massive flows of ultra-dangerous materials through commercial channels. Many who have studied the outlook say that no imaginable safeguards could work well enough. The awesome consequences which could follow from even a single breach of the safeguards demand nothing less than perfection in the system.[5] An international black market in the means of mass destruction appears inevitable unless nuclear fission power industries are shut down everywhere.

**Hijacking of plutonium.** Purified plutonium is stored near nuclear fuel reprocessing plants. When it is later shipped for fuel fabrication or military weapons production, it is accompanied by no more than three armed guards. Sealed in strong containers, its low-penetration alpha ray emission would present no danger to thieves. Yet finely powdered plutonium in the environment represents an appalling lung-cancer hazard. One 140,000,000th of a pound of inhaled plutonium has caused lung cancer in animals. Its dispersal by wind from a high building could evacuate one to three square miles per pound released.

A privately built fission bomb would require no more than 18 pounds of plutonium metal, or 22 pounds of the oxide, $PuO_2$.

military action could disperse radioactive material sufficient to render the facility unapproachable for cleanup or necessary maintenance. In other words, a relatively minor malevolent force could create an uncontrollable continuing source of radioactive contamination which could render a substantial and gradually enlarging land territory and associated watershed useless indefinitely.

The threatening character of the proposed storage modality may be illustrated by size comparisons with other recognized radiological hazards requiring federal regulation. Suppose that thoroughly reputable researchers were to seek licensure for a large long-term radiation-forest project. They apply, let us say, for the use of two million curies of cesium-137. Such a proposal would of course require thorough safeguards and security stipulations. The mere existence of that much gamma-emitting material, even in a relatively remote and secured area, would evoke the exercise of regulatory control. In the RSSF concept we expect not two million curies, but eventually 1500 times that quantity of gamma-photon emitters. It is evident that, unless the RSSF is conclusively proven insusceptible to acts of terrorism and war, up to and including attacks with nuclear weapons, that national security would be undermined to a qualitatively and quantitatively unprecedented extent by its very presence.

Proportionate to the quantity of radioactivity anticipated to be stored there is the long period of service expected for the RSSF. Suppose that our hypothetical forest-irradiation scientists wished to emplace their field gamma sources for a like interval, 130 years. In ruling on their petition for the requisite permission, prudence would dictate the government's considering the possibility of many improvements in the means of sabotage and theft over such an extended period. During that interval of one and one-third centuries, regulatory responsibility might become weakened or divided. If such considerations would be raised in connection with two million curies of radiocesium, it will be seen that the 130-year time dimension of the RSSF concept imposes unique regulatory responsibilities not associated with any other nuclear facility save those concerned with the storage of high-level and transuranium-bearing waste.

Those who make a regulatory decision are presumed to be willing and able to live with the intended and unintended consequences of that decision. Suppose now that midway in the construction of an RSSF, a despondent private pilot were to crash his Cessna, loaded with dynamite, straight onto one of the near-surface high-level waste tanks at Hanford, Savannah River, or West Valley. Should this occur, is this regulatory body prepared to defend the completion of the RSSF on or near the surface of United States soil? Is this authority ready to deal both with the objective effects of such an event, including the possibility of repetitions, and the resultant outcry against the nuclear industry as a whole? Will those who are making today's short-sighted, penny-wise, pound-foolish radioactive waste storage decisions be held thereafter in disgrace and contempt?

I submit that, in today's world, it is unconscionable to store high-level waste or transuranics for extended periods on or near the surface of the earth. Rather, it is mandatory that all past and future high-level radioactive residues, and actinides, be maintained in retrievable form in a very deep underground site. The costs of constructing and cooling such a site, including provision for its maintenance and repair by remote-controlled machinery, would be minuscule in comparison to the costs--economic, political, and societal--of even a single military or paramilitary breach of a surface or near-surface storage facility.

PEOPLE FOR PROOF asks, "How much proof do you need??"

2315 Westwood Blvd., L.A. 90064
(213) 474-3320

LAT 12-30-74

# Much Uranium Missing From Plants, Paper Says

NEW YORK (AP)—The New York Times reported Sunday that the federal government was unable to account for thousands of pounds of uranium and plutonium that could be used to manufacture nuclear bombs.

The newspaper, in a story from Washington, said the nuclear materials were unaccounted for at 15 commercial plants in the United States regulated by the Atomic Energy Commission.

Frank Ingram, an AEC spokesman in Washington, said commission officials would have no comment on the story until they had read it.

Experts in the industry and in universities and unnamed AEC officials were cited by the newspaper as the sources from which the account of the missing elements had been constructed.

At one unidentified plant, the newspaper said, about 9,000 pounds of highly enriched uranium is unaccounted for.

Small amounts of the two nuclear elements can be combined to fashion a crude nuclear weapon capable of killing thousands of persons, the newspaper said.

# FBI Fears Rise of A-Threats

1-4-75 LAT

WASHINGTON (AP)—The FBI has expressed concern about a possible increase in the number of extortionists threatening to explode nuclear weapons in American cities.

FBI officials said Friday they believed the threats might increase because of publicity about the possibility that radioactive material might be stolen from nuclear plants and used by terrorists and extortionists to fashion crude bombs.

Two FBI officials familiar with the situation said the agency had investigated seven such threats during the last year, more than in any previous years.

But, they said, there have been no cases of actual theft of nuclear materials and no cases in which an individual actually has built a nuclear bomb.

WTOP News Radio - Washington, DC - 10/25/74

"From Rome, Group W correspondent Don Larrimore reports that the old adage about not drinking the water in Europe may have to be dusted off."

"It sounds like something out of a fantastic paperback thriller but the government says this plot really did take place and Italy is aghast. Defense Minister Giulio Andreotti has told Parliament that right-wing terrorists planned to poison Italy's water supply this fall with radioactive uranium stolen from a nuclear center and placed in various aqueducts. Eight people have been arrested, twelve others are being sought and fifty-five more have been told they may face legal action. According to press reports, under huge headlines, the scheme also involved a plan to assassinate the Prime Minister, the Communist Party leader, and other top officials in the hope that large scale panic would ensue forcing the army to intervene and opening the way for a rightist government takeover. Andreotti, reporting on four years of neo-fascist subversion, also confirmed that, in December, 1970, rightists actually got into the Interior Ministry and stole weapons from the armory before that abortive coup fizzled. The former head of the Intelligence Service, General Vincenzo Miceli, has been officially warned he is under suspicion of favoring the coup by witholding information. This is Don Larrimore for Group W News, Rome."

**April, 1964 through June, 1972.** During this interval William T. Riley, top national security officer for the Atomic Energy Commission, borrowed $239,300 from fellow AEC employees and failed to repay over $170,000. A substantial portion of the money was used in racetrack gambling. During this interval Riley had access to the nation's highest atomic secrets, and his gambling activity was unknown to his superiors. Thus he was a possible target for blackmail. He was sentenced to three years' probation in February, 1973. Michael Satchell, "The Riley Affair" (2-4-73) and "Ex-AEC Aide Put On Probation" (2-21-73), *Washington Star-News.*

**March, 1973.** A guerilla band took temporary possession of a nuclear station nearing completion in Argentina. The guerillas decorated the plant with political slogans and left without doing any damage. *Environment,* June 1973 (Spectrum section), citing *Nuclear Industry,* April 1973.

**April, 1974.** Parts of two trains in Austria were found contaminated with a radioactive liquid used in medical diagnosis. A man calling himself a "justice guerilla" telephoned a warning that passengers' lives were in danger. Slight traces of radiation were found in (sic, not "on") eight passengers and in a box in the baggage car. "Mystery Radiation Hits Another Train," *Los Angeles Times,* April 20, 1974.

PEOPLE FOR PROOF asks, "How much proof do you need??"

2315 Westwood Blvd., L.A. 90064
(213) 474-3320

LAT 12-30-74

# Much Uranium Missing From Plants, Paper Says

NEW YORK (AP)—The New York Times reported Sunday that the federal government was unable to account for thousands of pounds of uranium and plutonium that could be used to manufacture nuclear bombs.

The newspaper, in a story from Washington, said the nuclear materials were unaccounted for at 15 commercial plants in the United States regulated by the Atomic Energy Commission.

Frank Ingram, an AEC spokesman in Washington, said commission officials would have no comment on the story until they had read it.

Experts in the industry and in universities and unnamed AEC officials were cited by the newspaper as the sources from which the account of the missing elements had been constructed.

At one unidentified plant, the newspaper said, about 9,000 pounds of highly enriched uranium is unaccounted for.

Small amounts of the two nuclear elements can be combined to fashion a crude nuclear weapon capable of killing thousands of persons, the newspaper said.

# FBI Fears Rise of A-Threats

1-4-75 LAT

WASHINGTON (AP)—The FBI has expressed concern about a possible increase in the number of extortionists threatening to explode nuclear weapons in American cities.

FBI officials said Friday they believed the threats might increase because of publicity about the possibility that radioactive material might be stolen from nuclear plants and used by terrorists and extortionists to fashion crude bombs.

Two FBI officials familiar with the situation said the agency had investigated seven such threats during the last year, more than in any previous years.

But, they said, there have been no cases of actual theft of nuclear materials and no cases in which an individual actually has built a nuclear bomb.

WTOP News Radio - Washington, DC - 10/25/74

"From Rome, Group W correspondent Don Larrimore reports that the old adage about not drinking the water in Europe may have to be dusted off."

"It sounds like something out of a fantastic paperback thriller but the government says this plot really did take place and Italy is aghast. Defense Minister Giulio Andreotti has told Parliament that right-wing terrorists planned to poison Italy's water supply this fall with radioactive uranium stolen from a nuclear center and placed in various aqueducts. Eight people have been arrested, twelve others are being sought and fifty-five more have been told they may face legal action. According to press reports, under huge headlines, the scheme also involved a plan to assassinate the Prime Minister, the Communist Party leader, and other top officials in the hope that large scale panic would ensue forcing the army to intervene and opening the way for a rightist government takeover. Andreotti, reporting on four years of neo-fascist subversion, also confirmed that, in December, 1970, rightists actually got into the Interior Ministry and stole weapons from the armory before that abortive coup fizzled. The former head of the Intelligence Service, General Vincenzo Miceli, has been officially warned he is under suspicion of favoring the coup by witholding information. This is Don Larrimore for Group W News, Rome."

April, 1964 through June, 1972. During this interval William T. Riley, top national security officer for the Atomic Energy Commission, borrowed $239,300 from fellow AEC employees and failed to repay over $170,000. A substantial portion of the money was used in racetrack gambling. During this interval Riley had access to the nation's highest atomic secrets, and his gambling activity was unknown to his superiors. Thus he was a possible target for blackmail. He was sentenced to three years' probation in February, 1973. Michael Satchell, "The Riley Affair" (2-4-73) and "Ex-AEC Aide Put On Probation" (2-21-73), *Washington Star-News*.

March, 1973. A guerilla band took temporary possession of a nuclear station nearing completion in Argentina. The guerillas decorated the plant with political slogans and left without doing any damage. *Environment*, June 1973 (Spectrum section), citing *Nuclear Industry*, April 1973.

April, 1974. Parts of two trains in Austria were found contaminated with a radioactive liquid used in medical diagnosis. A man calling himself a "justice guerilla" telephoned a warning that passengers' lives were in danger. Slight traces of radiation were found in (sic, not "on") eight passengers and in a box in the baggage car. "Mystery Radiation Hits Another Train," *Los Angeles Times*, April 20, 1974.

# SOME IMPORTANT UNEXAMINED QUESTIONS CONCERNING THE BARNWELL NUCLEAR FUEL REPROCESSING PLANT

John W. Gofman, M.D., Ph.D.

Division of Medical Physics

University of California

Berkeley, California

TESTIMONY BEFORE THE

NUCLEAR STUDY COMMITTEE

THE LEGISLATURE OF THE STATE OF SOUTH CAROLINA

COLUMBIA, SOUTH CAROLINA

January 7, 1972

Some of you may have heard that I am a "nuclear critic". Let me assure you that this is absolutely correct. I am a critic because I have found through my long period of association with and research in nuclear energy that some extremely serious questions concerning nuclear power generation have not been adequately examined, while the industry moves forward at a rapid rate. But while critical questions are being raised, let me assure you that I have no interest in doomsday predictions, no interest in alarmism.

We in America all must share in the task of insuring a good quality of life for Americans, and that means due attention to providing energy, including electric energy, for our industry and our home uses, to sustaining a healthy economy (and here I am particularly cognizant of South Carolina's needs for industry and jobs), and above all, to insuring that we provide such energy consistent with the good health and safety of Americans. You of the South Carolina Legislature surely share these views, and I am certain that the Allied Chemical Corporation and Gulf Oil Corporation both share these views completely.

It is precisely because of the enthusiasm all of us share about "getting on with the job", that we must pause to examine whether we may not have overlooked some very disturbing possibilities associated with nuclear fuel reprocessing plants such as the Barnwell Facility. While it may seem that a facility ultimately employing only some 300 employees (1000 during construction) is a small industry, other associated factors make this industry and its development one of the most far-reaching, significant industrial developments of all time. Neither the South Carolina Legislature nor the Board of Directors of both Allied Chemical and Gulf Oil can afford to leave questions of all-time importance unanswered. I hardly think the

EXC

## Introduction

I consider it a privilege to discuss with you some crucial questions concerning the siting and operation of the proposed Barnwell Nuclear Fuel Reprocessing Plant of Allied-Gulf Nuclear Services. And I wish to express my appreciation to Mr. H. J. Larson, President, and Mr. R. I. Newman, Vice President of the Allied-Gulf Nuclear Services Company. They have both been gracious and totally cooperative in making available to me for study the full Environmental Report on the proposed Barnwell Plant. More than that, they have both expressed their sincere desire to have my comments and suggestions.

Allied Chemical and Gulf Oil Corporations are two of our foremost U.S. industrial corporations. I accept completely the statement of Mr. R. I. Newman in a recent letter to me that:

"It has been, is and will continue to be our prime goal to insure the safety of the public as well as our workers, and to insure that our operations have a negligible, if any, impact on the environment."

Therefore, the issues I shall raise here are addressed to these two great American corporations, as well as to the South Carolina Legislature. As we get into the discussions more deeply, I hope it will become clear that the Barnwell facility raises questions requiring that the necessary participants are far beyond Allied-Gulf and South Carolina - indeed, we must truly consider the interests of everyone living on the Eastern Seaboard of the United States, as well as those of more inland States. Some of the considerations will demonstrate that because of potential risk of requiring evacuation of Washington, D.C., the entire National interest is definitely involved in our considerations.

Ex

/- 130

stockholders of these two great corporations would appreciate a venture that might ultimately destroy these Corporations. Nor would the people of South Carolina appreciate the overlooking, by this Legislature, of questions that deal with the possible evacuation of a large part of the State of South Carolina.

It will be necessary for us, mutually, to examine two major areas:

(a) The question of financial liability and how it relates to critical examination of the dangers of the Barnwell Facility.

(b) The technical question of possible accidents at Barnwell and their local and national consequences.

Financial Liability and Critical Evaluation of Risks

Every great corporation must necessarily consider financial liability for its ventures and the implications of such liability for the Corporation's future.

Unfortunately, through the existence of the so-called Price-Anderson Act, liability for the consequences of a serious accident at Barnwell is limited to 560-Million Dollars. But I propose to discuss with you accidents that could easily lead to damages in the neighborhood of 10-Billion Dollars or more, to say nothing of the most massive civilian dislocations and suffering in peacetime history. The existence of the Price-Anderson Act means that no one carries the financial liability for about 95% of the damages that could accrue - no one at all.

I happen to regard the Price-Anderson Act as unconstitutional. There is a bill in the U.S. Senate, introduced by Senator Gravel, to repeal this Act. So the Act may be repealed, or there may in time be a Supreme Court test of its constitutionality. If this Act is repealed or declared unconstitutional, are the Allied Chemical Corporation and the Gulf Oil

Corporation prepared to risk their assets, even though large, on a $10-Billion liability?

Even if the Price-Anderson Act is not repealed, the situation for these two corporations is hardly better. There can be no doubt that if an accident involving $10-Billion in uncompensable damages occurs, the reputation of both corporations will suffer irreparably, and the revulsion in the public may, in effect, destroy both corporations and much of the value of their securities in the marketplace.

It is neither my intent nor my ability to estimate the probability of such an accident occurring. But I am frankly amazed that both the South Carolina Legislature and the Boards of Directors of both great corporations involved have not insisted upon a fully independent engineering assessment of such probabilities, including especially the possible effects of internal or external sabotage. We live in perilous times, and to neglect such possibilities as sabotage is simply to bury our heads in the sand in the fashion of ostriches.

I have a high regard for the detailed efforts of Allied-Gulf Nuclear Services and their consultants who prepared the Environmental Report on Barnwell. But simple, hard-headed business sense tells us that this must necessarily be the last source one would go to for a critical, independent assessment of the probability of a serious accident. What is required is assignment of responsibility to an independent group of engineers to figure out all the ways it is possible for such an accident to occur, and to try to assess the probability of its occurring. Such assessment would not be very costly. I believe the South Carolina Legislature and the Boards of Directors of both major corporations can accept no less. I have seen no such independent assessment. Under no circumstances should reviews either

Ex



by the Atomic Energy Commission or any of its Licensing or Advisory Boards be misconstrued as an acceptable assessment.

Once such an independent assessment is made, the evidence on both sides deserves debate and presentation in a full open public forum. Nothing less will allay public concern, a concern that will grow.

If everything goes as planned and as considered in the AGNS Environmental Report, there is probably no problem of health, safety, or environmental damage. I would hardly wish to quibble over minor questions I have about that report, especially when viewed against the vastly more important questions that must be answered, and which are not described in that Report.

There are two very simple questions I propose to discuss with you:

(1) What are the consequences of 1% (that is, one-hundredth) of the radioactive inventory of Barnwell at full operation being released to the environment?

(2) What are the consequences of 0.01% (that is, one-ten thousandth) of the radioactive inventory being released?

To do this we must turn our attention to some simple technical realities of Barnwell at full operation.

The Radioactivity Inventory at Barnwell at Full Operation

The Barnwell facility proposes to process 5 metric tons of spent nuclear fuel per day, or 1500 metric tons per year. The long-lived radioactive waste, after processing, will remain at Barnwell between 5 and 10 years, assuming optimistically that some Federal repository can be developed, which is very much in doubt. Let us minimize the problem, and assume that the radioactive waste is at Barnwell for only 5 years even though it may remain in South Carolina indefinitely.

The processing of 5 metric tons per day of spent uranium fuel means the servicing of about the equivalent of 50 large nuclear power plants, each, say, of 1000 megawatts electrical [MW(e)] generating capacity. Since each plant discharges 1/3 of its fuel each year, the Barnwell receipts will be of fuel elements each having spent an average of 2 years in the power plant. The equivalent delivery to Barnwell is 2/3 of the yearly long-lived radioactivity produced in the 50 plants, which is equivalent to the output of 35 such 1000 MW(e) plants.

Each 1000 MW plant produces, in one year, the long-lived radioactivity of 22 megatons of atomic fission bombs. So, 35 x 22 = 770 megatons of bombs. And for a five-year storage period, this means 5 x 770, or 3850 megatons. Note, nothing of this should be misconstrued to mean any explosive power of this radioactive waste. It is simply necessary to give you an idea of the astronomical quantity of radioactive waste in inventory at Barnwell, at full operation. We may express this in three ways:

The radioactivity (long-lived) in the Barnwell inventory will be:

(a) Approximately fifteen times as much as all the fission product radioactivity produced by all atmospheric weapons tests in all time by the combined testing of the USA plus the USSR.

(b) Approximately the radioactivity that would be left decaying for 10's and 100's of years from a large, full-scale nuclear war.

(c) Approximately the long-lived radioactivity of 192,000 Hiroshima or Nagasaki atom bombs.

Let us turn to the kinds of radioactive substances present after the Barnwell plant has been in full operation, using the 5-year residence time for radioactive waste (remembering that the AGNS report suggests an even higher residence time). Again, from the point of view of minimizing

the potential hazard, I shall consider only the major radioactive materials, and shall consider only those species which produce a hard gamma ray on decay, (more than 400 KEV).

The AGNS Environmental Report will serve as a source to ascertain the total radioactivity inventory at 5 years of operation. (Table 3.6-1, page 74, Section 3, of the Barnwell Nuclear Fuel Plant Environmental Report). I shall add one additional radioactive substance, Strontium-90, which although it does not emit a hard gamma ray, is very important for consideration of certain accident consequences.

After correcting for radioactive decay, one reaches the final figures for radioactive inventory of hard gamma emitters presented in the following table, (Table 1).

TABLE 1

Hard Gamma Ray Contributors Built Up in the Fuel Reprocessing Plant Inventory at Five Years

| Isotope | Half-Life | Megacuries per ton daily input | Megacuries per 5 tons daily input | Final Equilibrium Inventory at 5 years, corrected for decay (Megacuries) |
|---|---|---|---|---|
| $Zr^{95}$ | 65 days | 0.3774 | 1.887 | 176.2 |
| $Nb^{95}$ | 35 days | 0.7127 | 3.564 | 180.0 |
| $Ru^{103}$ | 40 days | 0.1329 | 0.665 | 38.4 |
| $Ru^{106}$ | 1.0 year | 0.7641 | 3.821 | 2011.0 |
| $Cs^{134}$ | 2.1 years | 0.2031 | 1.016 | 1128.8 |
| $Cs^{137}$ | 30 years | 0.1329 | 0.665 | 1165.1* |
| Total | | | | 4700 Megacuries |

* The $Cs^{137}$ inventory has been corrected for the slight decay it undergoes while in storage.

Since we will require it later, the $Sr^{90}$ inventory is expected to be 91/133 x $Cs^{137}$ inventory, or (0.68)x$Cs^{137}$ inventory.
In megacuries, this is 792 megacuries of $Sr^{90}$.

The Consequences of a One Percent Release of the Barnwell Inventory

We shall consider here how large an area and how many people might require evacuation if one percent of the inventory of the Barnwell plant were to be released to the atmosphere. Note, it is not our purpose to examine the probability of such an occurrence, but the consequences. If the consequences are very serious, then the fullest independent assessment of the probability is urgent and essential.

Prediction of which region of the United States will be affected and how much affected depends, of course, on the weather circumstances at the time of the release. We shall consider a couple of possibilities, including the local South Carolina situation and that for more distant regions. With differing weather conditions, the regions affected will, of course, be different, but the order of magnitude of consequences not very different.

Some Consequences at a Distance.

1. Assume 1% of the radioactivity inventory released to the atmosphere.
2. It is approximately 465 miles, straight line, from Barnwell, S.C. to Washington, D.C.
3. Assume a wind in the direction of Washington, D.C. of 19.3 miles per hour. Thus, in 24 hours, the center of the radioactive "cloud" will be over the Washington, D.C. area.

From the reports of Tamplin (Tamplin, A.R., "Prediction of the Maximum Dosage to Man From Fallout of Nuclear Devices I. Estimation of the Maximum Contamination of Agricultural Land, UCRL-50163 Part 1, January 3, 1967), the radius of such a cloud at 24 hours is approximately 103 miles. (Using the radius as $2\sigma$ - two times the horizontal standard deviation of dispersion of the material) $\sigma$ = 51.6 miles at 24 hours.

Now let us consider that rainfall occurred at this time, which at a maximum, can wash all the radioactivity to earth in the region under the cloud. What is the deposition on the ground?

The Area of the Cloud = $\pi(103)^2 \simeq$ 33,400 sq. miles.

One percent of Barnwell Inventory = (0.01)(4700) = 47 megacuries or 47,000,000 curies. (1 megacurie = 1-million curies).

Deposition, average, per sq. mile = $\frac{47,000,000}{33,400}$ = 1407 curies/sq.mile

Now, from the book, "Effects of Nuclear Weapons, p. 491-2, Samuel Glasstone, Editor, USAEC, 1962", it is known that a deposition of hard gamma emitters of 1 curie/sq.mile leads to a dose of $1.2 \times 10^{-4}$ R/day from external radiation, just by being in such an environment. No eating of contaminated foods is required. Just being there guarantees the radiation.

But we have 1407 curies/sq.mile, so the dose will be

$(1407)(1.2 \times 10^{-4})$ = 0.169 R per day.

The R unit is a measure of radiation exposure. Note that 0.169 R is equal to the so-called "allowable" exposure for one whole year for peaceful atomic energy purposes, and it is widely agreed that this latter exposure would have serious consequences. So, people in this vicinity would get their yearly "allowance" in one day. In a year they would get roughly 300 times as much, or about 50 R. While there will be some decay, it will not be reduced to 25 R per year for several years, and will continue at nearly that level for over a decade. It is obvious that such exposure is not thinkable; and that evacuation of the affected area must be considered. This means evacuation of Washington, D.C., Baltimore, Maryland, Annapolis, Maryland, Wilmington, Delaware - everywhere within a radius of 100 miles from Washington, D.C. In effect, this includes all of the District of Columbia, most of Maryland, most of Delaware, a good part of Virginia and West Virginia.

If the wind were blowing a little faster, before the radioactive cloud encountered a rainstorm, it could center on Trenton, New Jersey, in which case it would be necessary to evacuate Philadelphia, Pennsylvania, New York City, most of New Jersey, a fair part of eastern Pennsylvania, and a fair part of southern New York State.

It is seen that we are dealing with a situation that might require evacuating millions, or tens of millions, of people, or acceptance of the severe radiation injuries, in the form of cancer and leukemia, that would otherwise result.

If anyone doubts that the economic consequences of such evacuation could run into tens of billions of dollars, he is not being realistic. And this says nothing of the societal dislocation of evacuation of Washington, D.C., the capital of the United States.

Of course, the wind might blow in a different direction, and a rainstorm might intersect the radioactive cloud in a region with somewhat fewer people. In any event, whichever way the wind is blowing, some 33,000 square miles of the U.S. would become uninhabitable. The winds might be such that it would mean evacuation of most of the State of Florida instead.

Some More Local Possible Consequences.

Columbia, South Carolina is about 55 miles from Barnwell. Atlanta, Georgia is about 180 miles from Barnwell.

Let us consider the prospects at 8 hours after release of 1% of the Barnwell inventory, with winds to place the cloud over Columbia, South Carolina (requires 7 miles per hour wind) or over Atlanta, Georgia (requires 22 miles per hour wind). If the radioactive cloud then encountered a rainstorm, over one or the other of these areas, we can calculate the dosage.

The radius of the cloud at 8 hours is approximately 36 miles (again, using $2\sigma$ as the radius). The area of deposition is $\pi\ (36)^2$ = 4076 square miles.

$$\text{Deposition} = \frac{47,000,000}{4076} = 11,530 \text{ curies/sq. mile.}$$

The dosage received by being in this vicinity is

$$(11,530)(1.2 \times 10^{-4}) = 1.38 \text{ R per day,}$$

or about 400 R per year. This is simply deadly, and in the one case Columbia, South Carolina and everything on a radius of 36 miles from Columbia would obviously have to be evacuated. In the other case, Atlanta, Georgia and everything 36 miles away from it must be evacuated.

In summary, under highly credible meteorological conditions, the consequences of a 1% release of the radioactivity inventory at Barnwell would be a disaster unimagined for any peacetime situation in the United States. The economic cost, to say nothing of making millions of people refugees from radioactivity, will undoubtedly be measured in the billions or tens of billions of dollars.

In Case There is No Rain:

Agricultural Consequences of a 1% Release of the Radioactivity Inventory at Barnwell at Full Operation

We might suppose that "luck" would be on our side, and that the radioactivity cloud won't run into a washout by rain, after a 1% release of the Barnwell radioactivity inventory. In that case we will, of course, still have what is known as "dry" fallout. While this may mean we wouldn't face evacuation of millions of people, the agricultural consequences, as we shall see below, can be almost equally devastating. Let us consider the "no-rain" situation in detail.

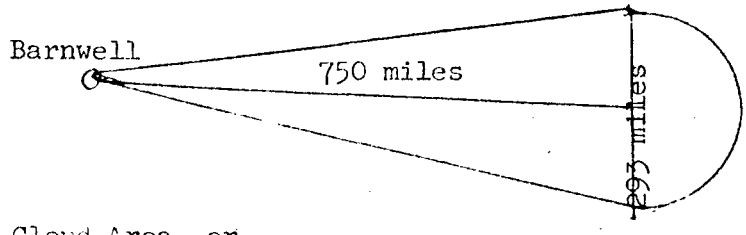
1. Let us assume the wind were blowing at about 15 miles per hour in the direction of Buffalo, New York.

2. The distance from Buffalo to Barnwell is about 750 miles, so the center of the radioactive cloud will reach the US border at Niagara Falls at some 48 hours.

From Tamplin's data* on maximum expected by fallout at 48 hours, we can expect the fraction of the total cloud radioactivity that will fall out is $8 \times 10^{-14}$ per sq. meter.

Now, let us estimate the agricultural contamination. At 48 hours, dispersion of the cloud will make the cloud diameter approximately 293 miles ($\sigma = 1.18 \times 10^5$ meters, diameter in $4 \times \sigma$, so diameter = $4.72 \times 10^5$ meters, or 293 miles).

So, a sector of the country, centering upon Barnwell will be involved.




The overall area involved will be $\frac{(750 \times 293)}{2}$ + 1/2 the Cloud Area, or

$$110{,}000 + 1/2\ (67{,}800) = 110000 + 33{,}900 \tilde{=} 144{,}000 \text{ sq. miles.}$$

* See previous Tamplin reference

How badly will milk from this region of 144,000 square miles be contaminated? We can be conservative, and thereby underestimate the seriousness of the problem by considering all parts of the region to be contaminated only as badly as the most distant region - that is at 750 miles from Barnwell. We can be certain that in all regions closer to Barnwell the contamination will be more severe.

We recall that our inventory (Table I) contains

$Cs^{137}$ 1165 megacuries, or $1165 \times 10^{12}$ microcuries.

$Cs^{134}$ 1129 megacuries, or $1129 \times 10^{12}$ microcuries.

$Sr^{90}$ 792 megacuries, or $792 \times 10^{12}$ microcuries.

(1 Megacurie = $10^{12}$ microcuries)

The dry fallout depositions, for 1% inventory release, will be

For $Cs^{137}$ $(11.65 \times 10^{12})(8 \times 10^{-14}) = 0.93$ microcuries/sq. meter

$Cs^{134}$ $(11.29 \times 10^{12})(8 \times 10^{-14}) = 0.90$ microcuries/sq. meter

$Sr^{90}$ $(7.92 \times 10^{12})(8 \times 10^{-14}) = 0.64$ microcuries/sq. meter

And from Table 3, we can estimate the dosage to be received via milk for forage receiving such depositions. These are tabulated in Table 2.

Table 2

Dosage to Children via the Milk Pathway

| Radionuclide | Deposition | Deposition required to give 1 Rad via Milk (Whole Body) | Dosage in Rads via Milk (Whole Body) |
|---|---|---|---|
| | Microcurie/ sq. meter | Microcurie/ Sq meter | |
| $Cs^{137}$ | 0.93 | 0.12 | 7.8 |
| $Cs^{134}$ | 0.90 | 0.058 | 15.6 |
| $Sr^{90}$ | 0.64 | 0.038 | 16.9 |
| | | Total Dosage in Rads (via Milk) | 40.3 Rads |

It is absolutely unthinkable that milk contaminated to this degree can be consumed. Children drinking such milk would have a four-fold increase in risk

of cancer and leukemia. Fresh agricultural produce from this region of 144,000 square miles would be obviously unsalable. While, after a period of months, the milk level will be much reduced, the agricultural produce from the region would be unacceptable for many years, because of radioactivity acquired in the produce via the soil-root pathway (much, much less active than the early milk, but unacceptable).

It is important to have a good idea of what 144,000 square miles of agricultural land being rendered unusable really means. For the wind direction considered, this would mean rendering unusable for agriculture the following:

| | | | |
|---|---|---|---|
| | Approx. | 1/10 | of South Carolina |
| plus | approx. | 1/10 | of North Carolina |
| plus | approx. | 1/5 | of Virginia |
| plus | most . | | of West Virginia |
| plus | approx. | 1/6 | of Ohio |
| plus | more than | 1/2 | of Pennsylvania |
| plus | approx. | 1/4 | of New York State |

plus a significant part of Ontario province in Canada.

This represents a minimum tabulation, for fallout rendering agricultural land unusable will still be occurring beyond 48 hours, and hence encompassing more of Ontario province, Quebec and much more of New York State.

The economic costs alone will undoubtedly be in the multi-billion dollar category, not to mention indignation, rage, fear, and dislocation.

And of course, if the wind were blowing in some different direction, the areas involved will be the same, but the victimized states would be different. It would only be lessened if the wind happened to be blowing to the Southeast, since much of the fallout would then be over the ocean.

Thus, the overall magnitude of the disaster will be comparable with that previously described for rainout of the radioactivity. In one case (with rain) we contemplate evacuation of millions of people; in the other case (without rain), the agricultural loss is staggering beyond usual comprehension.

Ex G

## The Consequences of an 0.01% Release of the Barnwell Inventory (One-ten thousandth of the Total Inventory)

We have seen above that 1% release can lead to massive evacuation of major population centers. And we shall now see the very serious economic consequences of even one-hundredth of this quantity released. For this we shall direct our attention to the effect of deposited radioactivity upon forage, thence to milk to be consumed by children.

We shall consider three radionuclides, $Cs^{137}$, $Cs^{134}$, and $Sr^{90}$.

From Table 1 we have the inventory at 5 years as 1165 Megacuries of $Cs^{137}$, 1129 Megacuries of $Cs^{134}$, and separately, that there would be 792 Megacuries of $Sr^{90}$.

Ng and co-workers* have calculated the minimum deposition of these radionuclides required to deliver 1 Rad to children drinking 1 liter of milk per day. This is the so-called "grass-cow-milk-child" pathway. The values are listed below in Table 3. (1 Rad is approximately equivalent to 1R).

Table 3

Minimum Deposition on Forage to Give 1 Rad to Children Via the Forage to Milk Pathway (Whole Body)

| Radionuclide | Half Life | Minimum Deposition required to give 1 Rad** | |
|---|---|---|---|
| | | microcuries/sq. meter | curies/sq. mile |
| $Cs^{137}$ | 30 years | $1.2 \times 10^{-1}$ | 0.31 |
| $Cs^{134}$ | 2.1 years | $5.8 \times 10^{-2}$ | 0.15 |
| $Sr^{90}$ | 28 years | $3.8 \times 10^{-2}$ | 0.098 |

Let us consider the case described above, rainout at 24 hours, such that 33,400 sq. miles of land receives the deposition. Since we are here concerned with agricultural land, it is of little moment what the wind direction or speed is.

*UCRL 50163 Part IV, May 14, 1968.

**Dr. Ng (personal communication) suggests the $Cs^{137}$ and $Cs^{134}$ values may be raised, from more recent data, which would reduce their contribution to dosage. However, the changes would not materially alter conclusions about unacceptability of milk contaminated by $Cs^{137}$, $Cs^{134}$, and $Sr^{90}$.

And we are assuming $\frac{1}{10,000}$ of the inventory at Barnwell to be involved in the deposition.

Therefore

$\frac{1}{10000}$ X 1165 = 0.1165 megacuries $Cs^{137}$ (116,500 curies)

$\frac{1}{10000}$ X 1129 = 0.1129 megacuries $Cs^{134}$ (112900 curies)

$\frac{1}{10000}$ X 792 = 0.0792 megacuries $Sr^{90}$ (79,200 curies)

Depositions are

For $Cs^{137}$, $\frac{116500}{33400}$ = 3.5 curies/sq. mile

For $Cs^{134}$, $\frac{112900}{33400}$ = 3.4 curies/sq. mile

For $Sr^{90}$, $\frac{79200}{33400}$ = 2.4 curies/sq. mile

Translating these into rads delivered via the milk pathway

| | | |
|---|---|---|
| For $Cs^{137}$ | 3.5/0.31 | = 11.2 rads |
| For $Cs^{134}$ | 3.4/0.15 | = 22.7 rads |
| For $Sr^{90}$ | 2.4/0.098 | = 24.5 rads |
| | Total | 58.4 rads |

Children drinking such milk would receive 58.4 rads, which is more than 100 times the yearly "allowable" dose. Such a dose would cause a many-fold increase in cancers and leukemias in such children. It is obvious that milk from these 33,400 square miles is unthinkable for drinking purposes. The loss to agriculture from this and crop contamination would be phenomenal. In time, the $Cs^{134}$, $Cs^{137}$, and $Sr^{90}$ would find their way into the soil, having been weathered off the forage. But the agricultural problem is not over, for we must now consider crops grown in the area, the so-called "soil-root pathway".

From Ng et al, we have the data for the deposition required to give one Rad by the soil-root pathway, presented in Table IV.

Table 4

Minimum Deposition Required to Give 1 Rad to Children via the Soil-Root Pathway

| Radionuclide | Half Life | Deposition Required to Give 1 rad | |
|---|---|---|---|
| | | microcuries/sq meter | curies/sq. mile |
| $Cs^{137}$ | 30 years | $4.2 \times 10^{2}$ | 1090 |
| $Cs^{134}$ | 2.1 years | $1.3 \times 10^{3}$ | 3370 |
| $Sr^{90}$ | 28 years | $4.8 \times 10$ | 124 |

Contribution from $Cs^{137}$ = 3.5/1090 = 0.003 rads

$Cs^{134}$ = 3.4/3370 = 0.001 rads

$Sr^{90}$ 2.4/124 = 0.019 rads

Total = 0.023 rads

While these doses are not "disastrously" high, I would doubt that such agricultural products would be salable, and the effect would last for many years. The combination of severe early contamination of milk and crops from such a region, followed by long term significant, unacceptable contamination of crops from an area like 33,000 square miles (that happens to be an area just a little larger than South Carolina) would represent economic losses in the billion dollar class. And all this if only one ten-thousandth of the Barnwell inventory of radioactivity were released to the atmosphere.

Some Side Effects of Either Type of Accident

There is little doubt about one primary effect of either type of accident, which would be an immediate demand by the public for a shutdown, not only of Barnwell but also of the entire nuclear power industry. And I must say I believe this reaction would be totally appropriate, since the warnings concerning such possibilities have been quite broadly presented. There would be no reasonable excuse by the nuclear industry. And the widespread public antipathy to Allied Chemical and Gulf Oil Corporation might lead to boycotts that could shake these industries economically beyond repair. The South Carolina Legislature would have a great deal of explaining to do to the citizens of South Carolina and other states.

## The Plutonium Product

There are two products of the Barnwell Facility, uranium and plutonium. There is little, if any reason to be concerned about the uranium product. There are several reasons to consider that the plutonium product may be a total nightmare. The AGNS report states carefully that plutonium must be absolutely contained in the course of shipment away from the plant. And it states further that there exists considerable difference of opinion concerning how this may be accomplished. But one does not acquire a real feeling for the fantastic implications of the quantities of plutonium that will be shipped.

There are two problems presented by the plutonium product:

(1) The Safeguards Problem

(2) The Extreme Toxicity of Plutonium

### The Safeguards Problem

Plutonium has other uses besides its being a fuel for electric power production. Specifically it is the basic ingredient for the simple fabrication of atom bombs. Throughout the world, authorities on nuclear energy regard the danger of diversion of plutonium by black market techniques either to governments or to private organizations as a major, unsolved problem.

Let us consider some of the quantities involved in Barnwell shipments and compare them with the 14 pounds (7 kilograms) widely stated to be about the amount required for a 20 Kiloton atom bomb like that which demolished Nagasaki.

From Table 3.6-1 in the Barnwell report, the datum is given that each ton of uranium processed will yield 338 Curies of Plutonium-239, the desired product. One Curie of Plutonium represents approximately 16 grams of $Pu^{239}$. In one year at Barnwell, there will be 1500 tons of uranium processed, so the annual plutonium product requiring shipment will be (338)(16)(1500) = 8,110,000 grams of plutonium,

Ex.G

/— 146

or 8110 kilograms. That's enough to make about 1100 Nagasaki-type atom bombs, a very interesting quantity indeed for the future black market in plutonium.

On page 30, Appendix VII of the Barnwell Environmental Report, it is stated that the plutonium will be shipped in solution as plutonium nitrate in containers, each holding 25 kilograms of plutonium. It is stated there that 2 to 3 such containers will be carried per truck shipment. So we can say that on the average, there will be approximately 63 kilograms of plutonium per shipment. For a total of 8110 kilograms of plutonium, this means $\frac{8110}{63}$, or about 125 separate shipments per year out of Barnwell.

Each shipment represents enough plutonium for about 9 atom bombs (Nagasaki size). Can such shipments be hijacked? Before answering this question, it is worthwhile asking another question. If, two years ago, one had been asked about the liklihood that three huge airliners would be successfully hijacked to the Middle East within one week by terrorists, I am sure the probability estimate would have been vanishingly small. Until it happened. Anyone who underestimates the ingenuity of determined terrorists and underworld operators does so at grave peril. The probability that a plutonium shipment will be hijacked successfully will be estimated as very low until the first shipment is hijacked.

The Toxicity of Plutonium

There is a great deal in the Barnwell Report about the irradiation of bone by plutonium. I am more concerned about the production of lung cancer by plutonium. My colleague, Donald Geesaman*, has published estimates that the inhalation of 10,000 particles of plutonium dioxide may produce one fatal human lung cancer. It doesn't require that one person inhale all 10,000 particles - this is a statistical problem, and it means that for every 10,000 particles inhaled into human lungs, there will be one lung cancer. Ten people inhaling 1000 particles each will produce the same effect as one person inhaling 10,000 particles.

* GT-121-70. Plutonium and Public Health. Presented at Univ of Colorado, Boulder, Colorado, April 19, 1970.

1- 147

Let us go through the arithmetic relating to these plutonium shipments. For example, let us suppose that some terrorists were desirous of spreading plutonium oxide around near a major metropolitan center. Let us suppose that that one container with 25 kilograms of plutonium were exploded open by bombing or by some combination of bombing and fire. With high temperatures, much of the plutonium nitrate would be probably converted to plutonium oxide. We can explore the worst case, namely <u>all</u> 25 kilograms converted to particles averaging one micron in diameter.

1 micron diameter means each particle has a volume of $5 \times 10^{-13}$ cc. The density of plutonium dioxide is 11.46 gms/cc. So each such particle has $(11.46)(5 \times 10^{-13})$ or $5.7 \times 10^{-12}$ grams of plutonium oxide.*

So, for 25 kilograms, we get $\frac{25{,}000}{5.7 \times 10^{-12}}$ or $4.4 \times 10^{15}$ particles. If all these particles ultimately found their way into human lungs, that represents $\frac{4.4 \times 10^{15}}{10^{4}} = 4.4 \times 10^{11}$ lung cancers. Enough plutonium for 440 billion human lung cancers. Now, there are only 3 billion people on earth, so we <u>aren't</u> going to get 440 billion lung cancers in any hurry. So, let us suppose there are a number of inefficiencies in this whole process, and as a result, only one particle out of ten million potential plutonium oxide particles finds its way into human inhalation pathways. That still means 44000 lung cancers could be produced as a result of this terrorist act. That's a lot of diplomatic leverage for terrorists. Please note that all the inhalation needn't occur right away. The plutonium oxide particles can settle to the ground, be resuspended and carried by winds over and over, even to very great distances from the point of original dispersal. With a half-life of 24,000 years, such plutonium will be around to produce cases of lung cancer for periods of more than fifty times as long as world history from the birth of Christ to the present time. Every 10,000 particles inhaled can represent one fatal human cancer, wherever and for all practical

*Barnwell Plutonium is even worse than $Pu^{239}$, because of contamination with $Pu^{238}$ and $Pu^{240}$.

purposes, whenever the plutonium is inhaled.

We spread plutonium around Palomares, Spain when one of our bombers crashed there. A massive clean-up campaign was carried through and shiploads of contaminated soil were collected to be returned to the USA. But people in Palomares are not too convinced all is well. Palomares is reported to be a ghost town area now. How many people will enjoy living near a site of a massive plutonium dispersal? If we ship enough plutonium on our highways, there are going to be some terrorist explosions and dispersal, and I would suspect there are going to be ghost towns in addition to old mining towns in Nevada and California.

The Barnwell Facility points up some good reasons for the widespread concern over diversion of plutonium into the hands of terrorists and the underworld. One small atom bomb, properly placed on the Barnwell Facility could, I would suspect, release a good deal more than one percent of the radioactivity inventory there. And we have already discussed the catastrophic potential consequences of a one percent release.

## Recommendations

We can all hope that neither the 1% release or the 0.01% release accidents ever occur at Barnwell. But hope alone is not enough. As stated at the outset, I am in no position to estimate the probability of either accident, from sabotage, from cooling equipment failure, from earthquake, or from hostile action. Certainly the Barnwell Environmental Report provides nothing in the way of reassurance that such accidents cannot occur. Everything hinges on the probability that such releases may occur. I doubt that anyone can seriously challenge the possible consequences if the releases of this magnitude occur. Depending upon the weather, the precise magnitude of the disaster, and its form, can vary, but the broad outlines are not overstated.

And we can all hope that plutonium diversion or dispersal into the environment will not occur.

I am completely convinced that Allied-Gulf Nuclear Services feels it is doing its very best to make such accidents remote. But that is not sufficient assurance. That the AEC or its advisory committees have reviewed the project is also not good enough.

No one of totally independent stature has been assigned the specific job, of figuring out how such releases could occur, what all the vulnerabilities are, and what the chances are of such occurrence. And it is the absence of such critical engineering adversary review that is precisely what has been missing from every aspect of the entire nuclear power industry.

The Board of Directors of the Allied Chemical Corporation should be demanding such an independent review.

The Board of Directors of Gulf Oil Corporation should be demanding this review.

The Legislature of the State of South Carolina should be demanding this review.

The health and fate of ten million or more Americans may depend upon the answers.

Perhaps this discussion may help clarify why an increasing body of opinion expresses concern over the development of the nuclear power industry. The morality of going ahead with the nuclear power industry deserves serious questioning. Especially is this true when the prospects are so bright for alternatives, such as generation of all the electricity we could ever require from solar energy.

South Carolina, and Barnwell County in particular, needs industry and needs jobs. How much brighter our discussions today would be if Allied Chemical and Gulf Oil Corporations were proposing a major solar electricity research and development program at Barnwell. Such a facility providing 3000 jobs, not 300,

would make excellent sense for the Corporations, for South Carolina, and for the world. Sooner or later, this is inevitable. Why not sooner, and in South Carolina? Why not A.G.S.F. - Allied-Gulf Solar Facility? Toward a bright future, rather than a radioactive one.

# SUMMARY RECOMMENDATIONS

TO

THE NUCLEAR STUDY COMMITTEE

OF

THE LEGISLATURE OF THE STATE OF SOUTH CAROLINA

John W. Gofman, M. D., Ph. D.

Division of Medical Physics

University of California

Berkeley, California

A Supplement

to

Detailed Testimony

January 7, 1972

## Summary Recommendations

In the accompanying testimony I have estimated for you the potential consequences of certain releases of part of the radioactivity inventory at the Barnwell Fuel Reprocessing Facility, at full operation. Those consequences can be summarized in three very brief statements:

(a) The possible evacuation of millions of humans because of the rendering of such cities as Washington, D.C., Philadelphia, Pennsylvania, or New York City uninhabitable.

(b) Possible damages in the neighborhood of 10-Billion Dollars from a single such release.

(c) Diversion of plutonium for black market atom bombs or plutonium poisoning.

These estimates are, of course, a bit disturbing. I have carefully avoided estimating the chance of such an occurrence, because such an estimate is outside my area of expertise.

But the South Carolina Legislature and the Boards of Directors of both Allied Chemical and Gulf Oil cannot avoid, and must not avoid, acquisition of reliable, independent assessment of such probabilities. It is, of course, human nature to shy away from having to think about the unthinkable. And, hence, there is every reason to expect that, from several quarters, the kinds of accidents discussed in the full testimony will be dismissed out of hand.

I have a constructive suggestion to propose to you as a simple and rapid method for elimination of obfuscation and cobweb-adorned thinking on such matters.

I. Let us assume that the Allied-Gulf Nuclear Services Corporation deems the prospect of such accidents to be ridiculously small.

II. If that should be the case, AGNS and the parent corporations would assuredly be happy to back that opinion with a full assurance of financial liability. At present, since liability is limited to 560-million dollars, it is clear that 95% of damages from a 10-billion dollar accident would necessarily be uncompensable.

Therefore, I propose that the Legislature of South Carolina consider proposing to Allied Chemical and Gulf Oil the provision of a legal contract as follows:

> "In the event of an accident at the Barnwell Facility, the full financial resources of Allied Chemical and Gulf Oil Corporations will be available for compensation claims, over and above those covered by the Price-Anderson Act insurance."

Such a simple contractual document will provide an enormously effective fog-cutter on these matters. If, by any chance, the question is raised that such a contract conflicts in any way with Federal pre-emption, then I offer a second suggestion.

> That suggestion is that the Legislature of South Carolina will defer consideration of permitting fuel reprocessing in South Carolina until the Price-Anderson Act is repealed, and financial responsibility is thereby restored to the nuclear power industry.

The Allied Chemical Corporation, the Gulf Oil Corporation, and the Electric Utility Industry all should, of course, be in the forefront of a National demand for repeal of the Price-Anderson Act. These great industries

have so often expressed their full confidence in the safety of the nuclear power industry. The time has arrived for them, therefore, to take the lead in removing those ominous clouds of doubt occasioned by the absence of adequate financial responsibility for this industry.

EXHIBIT "H"

Mrs. Barbara Mindling, Post Office Box 400, Virginia City, Nevada telephoned the following message to be submitted to the Committee on March 7, 1975:

"I would like the residents of Nevada to have a say in the decision about the disposal of atomic waste in Nevada. More information should be made publicly available as to the pros and cons of atomic waste in Nevada".