



# Green Party of California

Read by Schumann

SLO GREEN PARTY, P.O. BOX 13244, San Luis Obispo, Ca. 93406

EIS000722

## Comment on behalf of the San Luis Obispo (SLO) GREEN Party

at

### Public Hearings, Draft Environmental Impact Statement (EIS) U.S. Department of Energy (DOE)

for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level  
Radioactive Waste at Yucca Mountain, Nye County, Nevada (DOE/EIS-0250-D).  
on January 11, 2000  
in Grant Sawyer State Building, 555 East Washington, Las Vegas, Nevada.

by Klaus Schumann, County Coordinator, SLO chapter of  
California GREEN Party and  
Member of the SLO Nuclear Waste  
Management Committee (NWMC).  
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We request that the following comments and references be included in the official record. We refer to the written comment by former County Supervisor Evelyn Delaney submitted on behalf of the SLO NWMC, chaired by County Supervisor Shirley Bianchi, regarding the transportation of Spent Fuel from the Diablo Canyon Nuclear Power Plant (Diablo) through SLO County and to the documents submitted to the U.S. Nuclear Regulatory Commission (NRC) on 12/8/99 in Henderson, Nevada, by Klaus Schumann on behalf of the SLO NWMC. Included in these documents are:

1. copies of the SLO NWMC Interim Report from 6/2/97 and drafts of the Summary of the SLO NWMC Final Report from 8/13/99 and 11/3/99,
2. the relevant minutes of the SLO Council of Governments meeting from 4/6/96,
3. a request for full scale testing of transportation casks under real life conditions,
4. a statement of support for the Nevada Attorney General's petition to the NRC on 6/22/99, regarding NRC rulemaking to reexamine and strengthen its regulation governing safeguards for shipments of spent nuclear fuel against sabotage and terrorism in light of real world conditions,
5. concerns by the SLO NWMC about placing the monitoring of a privatized transportation operation into the hands of state and/or local governments.

Copies of all above documents are attached. We also include and refer to a letter to the Editor from January 7, 2000 in response to an article in THE TRIBUNE, 12/12/99 Page A1, under the headline "A Place for Nuclear Waste". In addition, we refer to the public comment by Klaus Schumann on behalf of the SLO Nuclear Waste Information Committee (NuWIC) at the DOE Scoping meeting in Sacramento, Ca. on 9/21/95.

## SLO GREEN PARTY COMMENTS

1 Like GREEN Parties everywhere on Earth, the SLO GREEN Party opposes nuclear power and wishes that nuclear wastes had never been produced. Therefore, we first of all urge: stop producing spent fuel NOW! To stop now would still avoid 2/3 of the entire mess. How much sense does a technology make which benefits just one or two generations but then burdens the next 8,000! Without bail-outs, nuclear power cannot economically compete in a deregulated market and is easily replaced with safer and environmentally benign technologies.

However, we do recognize that about 1/3 of the spent fuel is already there and has to be dealt with whether we like it or not. It is in this context that our comments must be understood.

2 Basically, we demand that the DOE draft a new EIS. There are simply too many flaws  
3 in the present one. Moreover, we protest that the entire process is much more driven by the short term financial interests of the nuclear industry than the health and safety interests of the public which you are supposed to represent. To cite just one example: Congress mandates that the transportation of spent fuel must be "commercially viable". Right off the bat, public health and safety issues take a backseat, which has direct implications ranging from cask design and testing requirements to how, where and when spent fuel is transported or stored at the reactors.

Specifically, the SLO GREEN Party raises the following concerns:

- 4 1. The public hearings, including this one, have not been sufficiently announced. This was already pointed out by the SLO NuWIC on 9/21/95 during your scoping meeting in Sacramento. The hearings need to be announced in local newspapers along all potential transportation routes.
- 5 2. The Draft EIS contains no preferred transportation route through SLO County. In fact, we still don't even know whether spent fuel transport will take place by truck, railroad or barge. How can any meaningful analysis of the environmental impacts be done without knowing where the routes are and how it will be transported? For example, if transport by truck should be chosen, the route would go over the notorious Cuesta Grade and then over Hwy 46, known as the most deadly highway in California, representing a set of completely different risks and mitigation necessities than if done by barge or railroad. I am also a member of the SLO NWMC, to my knowledge the only independent public committee in the U.S. on nuclear wastes in a generator county. We are under a mandate from our Council of Governments to develop a concept plan for transportation and/or on-site storage. How can we do so without knowing any of these details?
- 6 3. The EIS does not consider the economic impacts of stigma or perception associated with the proposed action nor does it evaluate any mitigation options. The economy in our County depends on tourism and wine production. Knowledge of regular transportation of spent fuel wastes from the Diablo Canyon Nuclear Power Plant and certainly any kind of accident would create a stigma to the area that would impact our economy. Consumer perception of the high quality wines grown next to transportation routes and/or accident site could be altered. Property values could also be affected near the routes. [ compare New Mexico State Supreme Court, City of Santa Fe vs. Komis, No. 20,325; 8/26/97 ].

- 7 4. While your draft does include the position of the Native American Indians from Nevada on the issue of environmental justice, it does not respond to their valid concerns. Likewise, ancestral rights and religious beliefs of the Chumash Indians in our County were largely ignored when Diablo Canyon was built. Any responsible Draft EIS must respond to raised environmental justice concerns, not ignore them!
- 8 5. Like most power plants, Diablo Canyon lately operates with enriched fuel allowing longer stay of the fuel rods in the reactor. Since there is no empirical evidence for the rate of cladding failure in these spent fuel rods with higher burn-up, all risk assessments and analyses for accident and sabotage/terrorists scenarios are conjecture. In addition, calculations about thermal loads for casks and permanent repository may also be effected. The Draft EIS does not address this important aspect and is therefore seriously flawed.
- 9 6. Neither of the two scenarios in the "No Action Alternative" represent a realistic, reasonable alternative to the proposed action. During the four years I have been working on nuclear waste I haven't heard anyone seriously proposing either scenario. The crucial question for the people in our County is: are we better off having the waste shipped out as soon as possible OR is it better to leave it on-site for an extended period of time? The answer to this question must depend on the risks to the general public and not on the financial interests of PG&E or any other plant operator! Nobody can guarantee that an accident or a terrorist attack is not going to happen. We know that a "maximum severe credible accident" will have terrifying and extremely costly consequences [ see: Sandquist, G.M., et al., "Exposures and Health Effects from Spent Fuel Transportation", for U.S. DOE, OCRWM, 11/29/85 ]. The risk to the general public comes first and foremost from the extraordinary high radioactive content of the shipments. Obviously, if the amount of radioactivity in the casks can be lowered, there will be proportionately less risk to the public.
- 10

For the first 100 years after removal from the reactor, most of the radioactivity in spent fuel actually comes from fission products like strontium-90 and cesium-137. These are the major sources of radiological concern during transportation because they emit both beta and gamma radiation and are the primary sources of exposure during routine operations. Most importantly, they are also the major potential source of irradiation and contamination in the event of an accident or terrorist attack. If we wait with transporting the spent fuel for another 100 years, much of the risk to the public will be avoided in the first place. In addition, we would gain time for technological or scientific breakthroughs to come up with better and safer solutions for transportation and permanent storage.

Therefore, the Draft EIS must include not the totally unrealistic scenarios of the present "No Action Alternative" but rather an evaluation of what we call a "Delayed Action Alternative". An assessment of at-reactor storage options for up to 200 years before shipment to a permanent repository should also be included in a newly written Draft EIS. What are another 100 or 200 years in light of the 250,000 years the wastes will have to be separated from the environment? We had better get it right the first time.

For the SLO GREENS



Klaus Schumann  
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January 11, 2000

To: " A Place for Nuclear Waste " by David Sneed in THE TRIBUNE, 12/12/99, page A1.

Dear Editor:

Thank you for the important article on High Level Nuclear Waste at Diablo Canyon. Clearly, prolonged storage of the deadly spent fuel wastes at the Diablo site is no longer an option but a certainty. The questions now are: How and for how long?

1. How? Monitored dry cask storage. To put even more waste into the existing pools is like putting "all eggs in one basket". If the water drains, for whatever reason, the consequences would be catastrophic, since loss of cooling would result in the dreaded "China Syndrome" several times over. In addition, pools continuously generate low level wastes which also need to be disposed of.
2. How long? At least for another 100 years. Transport then would be a lot safer and far less risky to the general public than transport now, simply because by then the wastes will contain far less radioactivity. They would also be much cooler (temperature) and therefore easier to handle

Yet the nuclear industry, incl. PG&E, has been pushing for transport a.s.a.p. because the present law provides for financial and legal incentives for them to do so. Under the 1982 Nuclear Waste Policy Act it is the taxpayer who assumes ownership and liability of spent fuel the moment it leaves the plant sites!! Rather than giving in to short sighted profit interests of the industry, we must put the safety and health of the public first.

The better way to go would be to keep the wastes on-site for the next 100-200 years and have the federal government take over ownership and liability there. This was offered by the U.S. Secretary of Energy Richardson a few months ago but rejected by the nuclear industry! Personally, I would even go a step further and reimburse the utilities for profit losses in exchange for a halt in waste production altogether. This would still avoid 2/3 of the entire mess and be cost effective for the long run.

How much sense does it make to continue with a technology which benefits just one or two generations but then burdens the next 8000, especially when this technology can't compete economically with other safer and environmentally more benign ones?



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Jan. 7<sup>th</sup> 2000

NUCLEAR WASTE MANAGEMENT  
COMMITTEE  
of San Luis Obispo County, California

SUMMARY of FINAL REPORT

DRAFT 8/13/99.

Submitted for the record: U.S. Nuclear Regulatory Commission  
" Modal Study" update meeting on December 8, 1999 in  
Henderson, Nevada.

by: San Luis Obispo County Nuclear Waste  
Management Committee.

contacts: County Supervisor Shirley Bianchi, chair.  
Phone: (805) 781-4335; E-mail: villabianchi@thegrid.net  
Klaus Schumann (805) 238-4454.

Attached are copies of the Interim Report of our committee from 6/2/97, the relevant minutes from the San Luis Obispo Council of Governments meeting from 4/6/96 and drafts of the summary of the final report from 8/13/99 and 11/3/99. We are requesting that these be included in the official record.

We also would like to go on record as requesting full scale testing of the transportation casks under real life conditions.

Furthermore, we support the Nevada Attorney General's petition of 6/22/99, that the NRC initiate rulemaking to reexamine and strengthen its regulations governing safeguards for shipments of spent nuclear fuel against sabotage and terrorism in light of real world conditions.

In addition, we are concerned about placing the monitoring of a privatized transportation operation into the hands of state and local governments. It has been our experience that neither is equipped for such a task and that they often lack the understanding of the magnitude of potential accident consequences.

December 8, 1999



Klaus Schumann,  
committee member.

#2

April 6, 1996 SLO Council of Government Meeting Minutes

EIS000722

Ms. Sheila Baker, San Luis Obispo, shared an invitation to attend April 11 at 7 p.m. at Cal Poly to hear Dr. Marvin Rizzokof, (Resnikoff) an expert on the management of nuclear waste. SB 544 was endorsed by the Board, and SB 544 requires a concept plan be developed with representatives of 11 groups. The Concept Plan should be modeled after SB 544. Delegate Delany asked about the 11 groups, and Ms. Baker shared a sheet with the information.

Mr. Pat Mullen, PG&E, noted the staff report refers to nuclear waste materials; this proposed plan would address high level waste, not all nuclear waste. President Laurent indicated it is the spent fuel we are concerned with, and Mr. Mullen concurred. Mr. Mullen stated PG&E agreed to the request by the SLOCOG Board to develop the Concept Plan with a joint committee of stakeholders. PG&E has moved forward and met with public agencies.

Mr. Bob Blair, Arroyo Grande said the problem needs to be solved. A solid waste plan needs to be developed.

Delegate Blakely stated the Concept Plan should come from the community and PG&E working together with PG&E doing the groundwork and nothing going into the plan without consensus. He noted that PG&E should be inclusive and the plan must be community based.

Delegate Ovitt moved to reconfirm the motion that passed in November, and Delegate Bailey seconded.

Members discussed the motion as shown on page B-6-11. President Laurent asked Mr. Mullen how PG&E intends to assure the consensus process is conducted, and Mr. Mullen responded they are trying to put together a process with facilitated open meetings of a joint committee that includes key stakeholders. President Laurent asked Mr. Mullen, if it is a committee and meetings are by invitation, and how will PG&E assure public trust. Mr. Mullen said that meetings would be open to the public and recognized the challenge regarding public trust. President Laurent said the first challenge is to make the first meeting on that topic and recommended a facilitator be used. Mr. Mullen said they are looking at the public process.

Members discussed the wording of the motion.

The motion failed on a roll call vote, in the absence of Delegate Carden, with Delegates Blakely, Delany, Iversen, Laurent, Roalman, and Unger voting no.

Delegate Blakely moved to:  
Request a Concept Plan be prepared;  
The Concept Plan will be drafted by a working committee that will include participation by members of concerned organizations and agencies;  
The Concept Plan is to address on-site storage options; the potential transportation routes, means and modes that would be used to move high level wastes from the Diablo Canyon site in the event transportation of these materials becomes necessary or desirable;  
The due date for the Concept Plan be January of 1997.  
Delegate Lady seconded.

Passed 6:5

**NUCLEAR WASTE MANAGEMENT COMMITTEE**

Interim Report - 6/2/97

EIS000722

#1  
**HISTORY**

On April 15, 1997, the US Senate passed Senate Bill 104 which establishes Yucca Mountain, Nevada, as the temporary storage site for high level nuclear waste. This bill also allows nuclear power plant operators to begin shipping some 33,000 tons of HLNW away from current plant sites, beginning in 1998. Another estimated 50,000 tons of HLNW will be generated in the future if all power plants continue to operate under their present licenses. Transportation is scheduled to take place on existing roads/railway systems in 41 states. The Bill is popularly known as the Mobile Chernobyl Bill. Now: HR 45

The purpose of this report is to inform anyone interested about:

1. the existence of our committee, which is to our knowledge the only independent public committee in the United States formed in a generator county (Diablo Canyon Nuclear Power Plant);
2. the concerns of residents, local government, and other agencies in our county regarding certain aspects of transportation itself, such as cask design, cask testing requirements, transportation routes, police protection from sabotage/terrorism, preparedness of emergency services, costs, and foremost, the potential consequences of accidents. (Please refer to Pg. 7, Analysis by Nevada Agency, attached);
3. the fact that our local government, along with many other local governments in California, as well as nearly 150 organizations nationwide, and 70% of the American public (Research/Strategy/Management, Inc., opinion survey conducted January, 1996) favor a Presidential Blue Ribbon Committee assessment before any HLNW is shipped (Senate Bill 544);
4. monitored  
✓ the availability of storage options at the plant sites other than the pools currently in use, e.g., dry cask storage above ground, the same method being considered for interim storage at Yucca Mountain;
5. the possibility that the passage of Federal legislation at this time is premature and irresponsible at least until all transportation concerns have been addressed and solved before shipment begins.

The Committee that created this plan was formed by the San Luis Obispo Council of Governments (SLOCOG), a joint powers authority responsible for regional transportation planning, metropolitan planning, congestion management countywide. During the summer

and fall of 1995, public comments before the body expressed concern with PG & E's planning for the transportation of high level radioactive waste.

While SLOCOG staff resisted involvement, claiming pre-emption by state and federal law, they ultimately agendized a discussion in November, 1995, at which time PG & E presented a rough outline of their transportation plans. Public comments called for public involvement in the planning, and for consideration of monitored on-site storage as an alternative to transportation. Delegate Bill Roalman (SLO), made a motion, approved by SLOCOG, which directed PG & E to jointly with a public committee analyze options and draw up the plan. The minutes, however, added one misleading word not in the motion, leaving the impression that it was up to PG & E alone to form the committee. PG & E continued planning in-house while hosting "informational forums" and saying members of the public who attended them were the "public" side of the committee. Members of the public who felt this was a betrayal of Delegate Roalman's motion asked in March, 1996, that the minutes be revised and direction clarified. In April, at a hearing agendized as an opportunity to "reconsider direction," David Blakely (5th District Supervisor) made the motion which passed, creating the present committee. Delegate David Blakely moved:

- Request that a Concept Plan be prepared.
- The Concept Plan will be drafted by a working committee that will include participation by members of concerned organization and agencies.
- The Concept Plan is to address: onsite storage options; the potential transportation routes, means and modes that would be used to move high-level wastes from the Diablo Canyon site in the event transportation of these materials becomes necessary or desirable.
- The due date for the Concept Plan is January, 1997.

→ see attached minute

Accordingly, an independent public committee was formed utilizing facilitation by the Central Coast Conflict Resolution Center. PG & E, owner/operator of the Diablo Canyon Nuclear Power Plant, at first participated, then dropped out after facilitation.

The committee met and chose a name for itself: Nuclear Waste Management Committee. The intent of the name was to manage information, not nuclear waste, and to keep the name short and manageable. It was decided that the scope of the committee was to be the information available regarding the transportation of nuclear waste only from Diablo Canyon to the county line, or following the direction of the initial motion by Supervisor Blakely, on-site storage at the Diablo Canyon facility itself. The Committee also believed that a discussion as to whether Diablo Canyon should or should not exist was irrelevant to the Committee. Diablo Canyon and the spent fuel exists, and that was to be the focus of the Committee.

Initially, Third District Supervisor, Evelyn Delany was Chairwoman of the Committee. Under her direction a scoping hearing was held in the City/County Library, and at that time considerable controversy arose relative to the goals of the committee. Some proposed that only transportation of spent nuclear fuel should be discussed and some indicated that on-site

storage was an option that should be also discussed, based on the original motion by Supervisor Blakely. ~~X~~ ②

On June 24, 1996 we heard from Paul Standish, Department of Energy, regarding general issues involved with nuclear waste transportation. There was quite a bit of controversy at this meeting also, and as a result the Conflict Resolution Center was contacted to help resolve the issues raised. From these issues the committee formulated the direction which we intended to go. Because the scope of the committee was determined to be somewhat less narrow than some had hoped for, some prior members, such as PG & E, chose not to be actively involved.

Subsequent to that June meeting, Supervisor Delany resigned as Chairwoman of the committee. At that point it was determined that I would act as Chair, although the position is more one of implementing the direction of the committee. The steering committee which eventually formed consists of representation from environmental organizations, CalTrans, CHP, and the Port San Luis Harbor Authority, although PG & E has been notified of every meeting. Because of some confusion on the part of some committee members, we determined that our next speaker should be someone who could discuss and educate the members as to the physical nature of the material we would be talking about. Is all nuclear waste dangerous? If not, what parts are and what are not? Dr. Arthur Rosen, Nuclear ③ Physics Professor Emeritus, Cal Poly, agreed to meet with us on June 24, 1996, and basically educate us so that we knew what we were talking about, and all would be able to talk about the same things. In short, we defined our terminology.

④  
Our next panel speakers were Bob Halstead, Transportation Advisor, State of Nevada Agency for Nuclear Projects, spoke to us on October 30, 1996, regarding the Department of Transportation (DOT) computer-determined routes out of Diablo Canyon, and also the potential for terrorism. The three routes chosen by DOT are by truck Diablo Canyon to Highway #101 over Cuesta Grade to Highway #46 East out of the county. By rail to #101 to the railhead in the City of San Luis Obispo and south out of the county, eventually to Port Hueneme. Or the third alternative is by barge out of Port San Luis south to Port Hueneme. Officer Richard Hogan, Division Commercial Enforcement Officer, CHP, discussed the responsibilities of CHP, John Wiejorik, State Office of Emergency Services, ⑤ discussed State responsibilities, and Jeff Hamm, County Administrative Office of Emergency Services, discussed county responsibilities, which are minimal at this time.

Our fourth panel will consist of a representative from CalTrans and one from DOT to discuss the specifics of transportation from the engineer's perspective. Our fifth meeting will be concerned with public safety, and our final meeting will discuss on-site storage. At that point we will begin the arduous task of compiling all of the information into a final report which will be submitted to all agencies, the media, organizations and individuals who are at all interested.

When the due date of January, 1997 was established, it was with the understanding that we would have help, both in-kind and financial, from both government agencies and PG & E.

~~X~~ ① Dr. Remikoff at Cal Poly 4/11/96 → see attached minutes (top) ⑨

That aid has not been forthcoming, except for \$200.00 from Mothers for Peace. We are deeply grateful to them. Our committee has made considerable progress on its own. We have located speakers and panelists who have donated their time, and the other costs have been picked up by individual members of the committee.

It must be expressly stated that the Committee has neither finished its work nor reached any final conclusions. Its final report will be put forward in a few months. Although the deadline for this report was originally mandated for January, 1997, by SLOCOG, substantial delay has been caused by the lack of public funding as well as the failure of cooperation on the part of PG&E and SLOCOG staff. The Committee believes that this interim report was necessitated by both the recent developments in the US Congress and the potential private temporary storage sites on Indian tribal lands at the Mescalero Apache Indian reservation in New Mexico and/or at the Goshute Indian reservation in Utah.

As of this date, SB 104 would seem to confirm our Committee's concern that our questions should be answered as soon as possible. Although we were given to understand that our Committee was premature, that decisions would not be made until the year 2010 at the earliest, SB 104 would indicate that this date could be changed and moved closer to the year 2000 at any time. Thus, we are moving forward with all of the speed we can, considering that we are doing so without any funding whatsoever, and with all volunteer help. Speakers and panel members would be much easier to find if we had the funding to bring them to San Luis Obispo.

We are all looking forward to having this effort concluded in just a few more months. Final copies of our report may be obtained by contacting me at the addresses and numbers below. We will retain copies of your requests.

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8/13/99

**NUCLEAR HIGH-LEVEL WASTE--STORAGE vs TRANSPORT:  
AN EVALUATION OF OPTIONS**

Bill Bianchi, Fred Frank, & Eric Greening

Given the prospect that legislation such as HR 45 could initiate transportation of high-level nuclear waste, it is timely to consider the nature of this waste, the likely ways it could be packaged and transported, and what preparations can be made by state and local jurisdictions for emergencies which could result from any less-than-perfect luck in handling this potentially lethal cargo. While the Federal Government has pre-empted state and local authority over the life-cycle of nuclear power, state and local agencies will be likely first responders to any accident, and will have an obvious interest in protecting their lands, waters, and people from dangerous contamination.

High-level waste is defined as "spent" fuel rods. The term "spent" is misleading, since fuel rods are far more radioactive after their useful lifetime in a nuclear power plant than they are at the beginning. The pencil-eraser-sized fuel pellets, with enriched uranium in a ceramic matrix, are contained in sealed zirconium alloy tubes 13.3 feet in length (the "fuel rods"), which are packed into bundles of up to 264 active rods to form a "fuel assembly." (see Figure 1). During their 4 1/2-to-6-year period in power production, the fuel rods accumulate over 100 radioactive elements and isotopes with half-lives varying from billions of years to microseconds. They are also literally HOT (350 degrees C, or 662 degrees F), with approximately 3% of the rods cracked, and many pellets turned to dust.

For transport, a pod or inner cask designed to carry several assemblies (4 for a typical truck cask; 21 for a typical rail cask) would be intended to retain the assemblies during transport and final placement in the repository. The pod would be transported in a radiation-shielded, reusable canister called a Multiple Purpose Canister (MPC)--see figures 2A and 2B. (At present no MPC has been tested or approved.)

To understand the health consequences of even a minor breach of containment, refer first to the chart [currently Table 2] showing "Permissible Quarterly Intakes of Radionuclides." Note that these thresholds are in micro-curies (millionths of a curie). Now, refer to [currently Table 1]: "Estimated Inventory of Major Radionuclides in Spent PWR Spent Fuel [sic?]. Note that these figures are in curies, and are 11 to 12 orders of magnitude (hundreds of billions to trillions of times) greater than the quarterly thresholds.

The degree to which public safety would be affected by an accident during transport depends on the degree to which the above containment is breached. An accident could involve anything from a truck rollover with no breach to penetration of the entire outer and inner containment by a truck bomb or an armor-piercing anti-tank projectile. Thus, the extent of the hazard at the site of an accident could span a wide range and must eventually be detailed in an emergency response plan.

Before examining such scenarios, let us examine the local context and options.

Diablo Canyon Nuclear Power Plant currently has about 1300 "spent" fuel assemblies in underwater storage. Pacific Gas and Electric estimates that their "spent" fuel capacity will be filled by 2006. Options at that time would be: 1. Creation of additional pool

capacity, 2. Dry storage for assemblies that have substantially cooled for a decade or more, 3. Transport offsite, or 4. Plant shutdown. Preparation for the chosen option should be underway now if deadlines are to be met.

### ON-SITE STORAGE OPTIONS

Safe storage requires substantial shielding, cooling, and means to prevent leakage. Nonetheless, onsite storage properly implemented and monitored, appears to be the safest option. The fuel assemblies would remain isolated from public access and under the care of experienced professionals. On-site personnel and safety officers are trained to handle radioactive accidents and cleanups. Accidents within the plant—at least minor ones—are to some degree isolated from the larger environment. None of these factors exist on public rights-of-way, where transport options would provide more physical handling and accident risk than any storage option.

However, onsite storage should not be thought of as safe. Storage pools could be drained in an unexpectedly strong earthquake, triggering a catastrophic radiation release. This is assuming that spent pool enlargement rather than dry cask storage is the chosen option. Dry cask storage is challenging with relatively young “spent” fuel because of the enormous amount of heat to be dissipated. Still, it must be considered a viable option with waste a decade or more old, although it must be noted that rotating high-level waste through and into two modes of storage increases the amount of handling, and thereby the potential for accidents during handling. Providing two types of storage also increases the expense!

Dry cask technology is “off the shelf;” a storage facility could be built that would allow nearly automated transfer of assemblies to dry casks and then to the storage area.

Casks are simply large concrete tubes lined with radiation barriers and sealed. They can be very strong, since, if they are not transported offsite, weight is not a serious limitation. If thermal problems are not addressed by preceding permanent dry storage with long periods of pool immersion, they can to some extent be addressed by very significantly reducing the number of fuel assemblies in each cask, at the cost of providing significantly more space for the same number of assemblies. Seismic safety could be further enhanced through isolation design.

A dry cask storage system could be designed in less time, and perhaps at less cost, than enlarged pools. Monitoring and maintenance would be less costly.

Storage facilities could be housed within an extension of the plant’s existing storage structure or in a separate structure nearby. Enclosed storage would provide a first line of defense against any leakage reaching the wider environment. Emergency response to minor spills and leaks could be handled by plant personnel. More serious accidents would trigger existing emergency procedures outlined in the Diablo Canyon Nuclear Power Plant Emergency Response Plan. This could involve staffing the County Emergency Operations Center and implementing extensive federal, state, and local emergency operations to monitor radiation levels, notify residents, evacuate where required, and deal with the on-site cleanup or entombment (depending on severity). Nearly all likely emergency responders conduct coordinated bi-annual drills under the direction of the Nuclear Regulatory Commission.

While significant long-term environmental damage could ultimately result from a worst-case scenario involving onsite storage, immediate danger to the public would be minimized by existing containment and by emergency procedures already in place.

The greatest deterrent to onsite storage is economic. Federal law holds utility companies responsible for their nuclear waste only so long as it remains on utility company property. Once it is offsite, all expenses must be borne by the broader base of Federal taxpayers. Utilities, in an increasingly competitive, cost-cutting environment, are unlikely to voluntarily assume full life-cycle costs of nuclear power generation if any transport option is legally permitted whereby taxpayers would subsidize and assume the risk for management of the ever-accumulating high-level waste. HR 45 would permit--and virtually guarantee--such transport.

Legislation has been proposed that would allow the Federal government to assume responsibility for on-site waste storage but it has been opposed by the utilities.

### TRANSPORT OPTIONS

While accident risk for movement of any given load of high-level waste may be low, the sheer number of such loads introduces a significant risk factor. The number of trips required depends on the number of fuel assemblies contained in each transport cask, which, in turn, depends on weight restrictions on the mode of transport. As there is no rail line to Diablo Canyon, nor a useable harbor on PG&E property, trucks must be used to get High-Level Waste out of the Plant, at least for initial stages of the trip. The number of assemblies per load would be controlled by Caltrans weight limits and permitting standards. As the chapter on routes explains, no blanket policies exist regarding permission or routing of extra-legal loads; specific requests based on weight and its distribution among axles would need to be evaluated by permitting authorities.

If the rail cask (125 MPC) were used and transferred at a rail yard, the 125 metric ton (275,625 lb) MPC would be trucked at a gross vehicle weight (GVW) in excess of 160 tons or four times legal load limits. With each truck holding 21 fuel assemblies, this would require in excess of 190 truck trips and truck-to-rail-car transfers during the 30-year life of the Plant. Are rail siding and crane facilities available? Where are these facilities to be located? Could reloading from legal weight cask trucks to a 125 MPC at the siding be a possible option? These questions may never be answered, nor need to be, as the Office of Civilian Reactor Waste Management (OCRWM) decided, as of Fiscal year 1996, not to pursue development of this MPC beyond the initial design stage.

The next smallest cask is the 75 MPC weighing 75 metric tons (165,375 lb). The GVW here would approach 110 tons or 2.75 times the legal load limit. This cask would transport 12 assemblies so that at least 333 trips would be required during the life of the plant.

The legal load cask, the GA-9, weighs 54,000 lbs. A specially designed truck weighing 26,000 lbs, carrying one GA-9 cask, just reaches the legal maximum load 80,000 lb. Such a rig could transport only 4 assemblies from a pressurized water reactor such as Diablo, so there would be at least 998 trips involved.

A newly-conceived system design involves sealed double-purpose canisters which can be inserted into concrete overpacks for onsite storage, or placed in a transportation overpack for transport. The entire road transport package would have the unbelievable

weight of 225 tons (almost six times legal load limits), distributed over numerous axles on a heavy haul trailer 160 feet long! It is hard to imagine such a behemoth navigating the existing roads of San Luis Obispo County, particularly during turning movements!

It must be clearly stated that the actual casks described above, all of them, have never been used, nor tested in real-life situations. Training films showing locomotives colliding with casks are misleading. The casks shown are not fuel assembly casks being considered for High-Level Waste transportation. The specifications which casks must meet have not changed since the early sixties and do not demand that they keep their integrity at collision speeds over 30 mph, nor resist puncture if dropped on a sharp object (such as a protruding rock) from more than 40 inches. Figure 3 shows these and other specifications, which are internationally recognized and unlikely to change; the only form in which any proposed cask designs have met these tests is through computer modeling. Our committee has seriously questioned the adequacy of these specifications in real-life situations such as head-on collisions (where impact speeds represent the sum of individual speeds), rolling downhill off the road in rough country, or longer-duration fire exposures. Our concerns have been supported in the Summary Public Scoping Comments, Environmental Impact Statement for a Proposed Repository at Yucca Mountain, Nevada, Department of Energy, Yucca Mountain Site Characterization Office, May 1997. Here, 44 commentors requested "...that a full range of accidents, especially low-probability/high consequence accidents, should be evaluated in the EIS." Overall, transportation received the highest number of responses (1036) to this document, among all possible areas of concern.

Whatever designs may be explored in the future are caught between conflicting constraints: safety (which requires as much shielding as possible), weight (any effective shielding is extremely heavy) and cost (The only way to strike a reasonable balance between weight and shielding is to carry as few fuel assemblies per load as possible, but this multiplies trips and thus the expense of the entire operation—as well as the statistical probability of one or more serious accidents.)

Even at a relatively low-intensity accident site where the worst damage to the MPC might be a puncture of the pod, an important characteristic of the system that must be considered is the huge amount of heat produced by the "spent" fuel. The surface of the fuel rods, upon arrival at the repository, is projected to have a mean temperature of 350 degrees C (662 degrees F): see pp. 5-12 and 5-13 of the Department of Energy, OCRWM, site Characterization Report, Yucca Mountain—DOE/RW—0498, #15, April 1997. The magnitude of the heat released during transport was not part of DOE's presentation (by Paul Standish, OCRWM, Yucca Mountain, May 1996). the above temperature exceeds the melting point of lead (327.4 degrees C), despite lead being used in the gamma radiation shield nearest the assembly pod surface.

Such lead may be in an alloy with a higher melting point than that of pure lead itself, but W. R. Lahs nonetheless recognized the possibility of lead shielding failure in Transporting Spent Fuel—Protection Provided Against Severe Highway and Railroad Accidents, NRC Bulletin—NUREG/BR—0111, March, 1987, from which our Figure 5 is adapted. Lahs states that depleted uranium (melting point 1132 degrees C) has been considered as the gamma ray shielding. But this material is more toxic than lead, is an alpha emitter, and, if powdered, spontaneously ignites. That this risky material was even

considered can only indicate that questions regarding the assumptions used in fine modeling require further investigation. The magnitude of heat generation can be estimated from the thermal power residual in the "spent" fuel as represented in Figure 6 (from model work done at DOE's Oak Ridge National Laboratory). For pressurized water reactor "spent" fuel, the thermal emission after 12 to 15 years in storage adds up to between 10 to 15 Kilowatts/Metric Ton of initial heavy metal. A rail MPC containing 21 assemblies would have 9.689 MTIHM on board, emitting roughly 100 to 150 kilowatts of heat, or 5700 to 8550 BTU per minute.

The outer neutron shielding on the MPC transport cask is either a water jacket or polyethylene; both could be compromised by high temperature exposure. The water jacket would be destroyed if punctured, allowing the MPC to heat up. If the MPC were buried under debris or soil during an accident shielding could be compromised. There are numerous scenarios where emergency response personnel could encounter serious problems, but the most serious would be if thermal or mechanical shock shattered the sealed rods (cladding). This could lead to major releases of highly radioactive material into the environment.

The most extreme accident scenario is a terrorist incident where a truck bomb or anti-tank missile penetrates the pod. Here, the best outcome would be for the ejected fuel pellets to remain intact so as to be swept up like a spilled bag of rabbit feed. But, because the original integrity of the fuel pellets is lost to varying degrees with thermal and radiation exposure while in the reactor, many pellets have disintegrated and additional pellets could easily shatter, resulting in a dust plume which could uncontrollably scatter lethal material with the wind. It should also be recognized that fuel rods are pressurized at the time of manufacture, further increasing the chances of dispersal.

Should a serious accident occur in wet weather or in a wet location, the following statement from the Yucca Mountain OCRWM report is relevant: "Flow-through tests of spent nuclear fuel focused in four different areas: 1. UO<sub>2</sub> matrix dissolution tests on pressurized and boiling water reactor fuels at a variety of burnups; 2. Dissolution rate tests with oxidized fuels; 3. Grain-boundary penetration rate tests; and 4. Gap inventory tests for Iodine-129. Cesium and strontium dissolved congruently with uranium, which is consistent with data obtained with grain specimens of the types of fuel that have been tested so far. However, the Technetium-99 data have not been consistent, for the different burnup rates ranged from almost none to factors of seven depending on experimental conditions." (Burnup means a measure of nuclear reactor fuel consumption expressed as the percentage of fuel atoms that have undergone fission or as the amount of energy produced per unit weight of fuel.)

Thus, there is measurable water solubility, allowing the hazard to go wherever water might go from an accident site. Mobility in water is apparent; mobility in soil would be site-specific to the accident location, as would be cleanup.

There are serious unresolved issues regarding any responsibility emergency first responders might or might not have to endanger their own health in attempting to render aid and stabilize the materials at radioactive accident sites. An additional dilemma presents itself in the choice between maximum advance notice of intended shipments (which would inform potential terrorists of opportunities for maximum mayhem) versus

attempts at secrecy and disguise, which would thwart terrorism at the risk of allowing first responders and citizen "good Samaritans" to stumble unwittingly into toxic and potentially lethal accident scenes.

Assuming that High-Level Waste were to be transported from Diablo Canyon to Yucca Mountain, Nevada or some other interior site, the journey would inevitably begin by truck, and, at Yucca Mountain, would end by truck. In between, there is the possibility of transfer to barge or rail for part of the trip.

No detailed proposal for barge transport has been available to the public, but it has evidently been discussed. The barging would occur between Port San Luis and a railhead at Port Hueneme. Needed physical changes to the wharf areas would likely be extensive, and sea-borne casks would be particularly vulnerable to storm-related incidents and to sabotage. If the ocean were to become contaminated, the danger zone would be difficult to monitor and impossible to control. Economic impacts to fishing and coastal tourism could be severe, and large areas on land could be subject to increases in background radiation due to evaporation of contaminated seawater and re-condensation into fog banks and rain clouds.

Rail transport of fuel assemblies would present serious logistical problems due to the enormous weight of the rail casks, the need to transfer them to and from trucks, the rail routes through populated areas, and accident-prone steep areas such as Cajon Pass.

Heavy equipment would be needed to transfer casks at the railhead, and an accident (such as dropping a cask on a sharp object) could have enormous consequences.

Rail routes present serious security problems since they traverse remote areas where sabotage could be difficult to detect or control. (Case in point: the Sunset Limited derailment in Hyder, Arizona.) Emergency response to remote sites could be slow.

In populated areas, a derailment or grade-crossing accident could present unimaginable problems to emergency responders and the public. In rugged areas, a derailment could lead to serious rupture of one or more casks. In any area, a derailment or collision could be followed by fire, seriously compromising cask shielding. A derailment in notorious Cajon Pass resulted in a 700-foot fireball! The potential for uncontrollable spread of radionuclides in such an accident is terrifying to contemplate.

Highway transport has the advantage that casks would be able to stay on the same trucks for the entire journey, and the disadvantage that the sheer number of truck trips required makes at least one serious accident statistically probable.

While truck routes could to some extent be planned to avoid the most densely populated areas, they could not as easily avoid other constraints such as bridges over major water supplies such as Twitchell Reservoir, the California Aqueduct, and many rivers and streams, not to mention many sites upwind of major population centers.

In San Luis Obispo County, California, and throughout the Mountain West, routes are either heavily trafficked or narrow, often with steep or curvy stretches that enhance accident risks. More remote highways such as California 166 suffer from slow emergency response times, a patchwork of responsibility as the road wanders between Santa Barbara and San Luis Obispo Counties, and topographic "holes" where cellular phones do not work and even the new call boxes cannot be installed.

In the West in general and California in particular, accident rates on the highways are likely to increase for the foreseeable future; not only is the number of vehicles on the

road climbing, but road conditions are deteriorating rapidly. Pavement laid in the road-building boom of the 1950's and 1960's is reaching the end of its useful life, and funding for the enormous tasks of repair and reconstruction has yet to be identified.

The choice between storage and transport of High-Level Nuclear Waste may seem like that between death by hanging or death by drowning, but our committee inclines to the belief that onsite storage is the lesser of evils, where casks can be constantly monitored and tended by people trained to do exactly that, rather than being exposed to all the risks of a hazardous trip.

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## EMERGENCY RESPONSE

Response to accidents involving high-level nuclear waste might range from simply monitoring a cask on a disabled truck to large-scale evacuation triggered by terrorist attack. Emergency response may be required if a transport vehicle were disabled in a residential area because people may be subjected to unsafe radiation levels if exposed for prolonged periods. A truck bomb terrorist attack could indefinitely contaminate water supplies for tens of thousands of people. Further, thousands of square miles of land could be contaminated for thousands of years. Massive evacuations and decontamination would be required.

Emergency response to nuclear accidents in San Luis Obispo County would depend on location and the extent of the radiation hazard. Generally, the first responders would be the fire agency who has jurisdiction. In most trucking accidents the California Highway Patrol would be the scene manager. Railroad accidents, in most cases, would involve the fire agency as a first responder. (The California Department of Forestry would be the most likely fire agency involved.)

The fire agencies in southern San Luis Obispo County receive radiation protection training because of their mutual aid response to Diablo Canyon nuclear power plant. This training involves the basics of radiation hazards, monitoring, personal radiation protection and decontamination. Radiation protection training is essential for first responders to a nuclear accident. We are fortunate that many of our first responders have a minimum level of training. It should be recognized, however, responders do not carry the monitoring equipment and could not determine the level of radiation hazard as an accident scene. Also, most north county fire personnel and new employees do not have radiation protection training.

It is expected that all accidents involving nuclear wastes will require the response of the county Hazardous Incident Response Team (HIRT). The county HIRT has received a substantial amount of training on nuclear radiation hazards and decontamination. They have some monitoring equipment, breathing apparatus, protective clothing and decontamination equipment. The level of training and equipment will allow them to deal with small scale radiation hazards. Larger scale incidents would require both state and federal assistance.

Leaders and members of the county HIRT said that additional training and more equipment is needed. Presently, there are about 30 members of the HIR. About six members are usually available to respond to emergencies. It is also recommended that all first responders be given the additional training. Some members of the county HIRT suggested that they saw little danger in transportation of high-level nuclear waste since they had seen training films showing a locomotive impacting a cask with those subsequent leaks. They were surprised to learn these were not casts that will be used for transport.

I also discussed the characteristics of fuel assemblies and potential problems and radiation hazards posed by accidents. They expressed great interest in learning more about cask design and the characteristics of high-level nuclear wastes. Members of the county HIRT also appeared concerned about potential vulnerability of transport tasks to rupture considering the current design standards.

### **POTENTIAL ACCIDENT RESPONSE**

A transport rollover might trigger the following response: 911 report by passing motorist; response by CHP; response by fire agency; request for HIRT (if motorist reports truck is carrying nuclear waste or dispatch is notified of time and route of shipment); fire company arrives on scene and sees placard; notifies County Fire Emergency Command Center(ECC) and secures scene; ECC notifies US Department of Energy, Nuclear Regulatory Commission and EPA; CHP arrives, takes charge of incident; fire officer recommends staying up wind of cask at a distance of several hundred feet and against rescue of trapped driver; CHP requests Sheriff evacuation of downwind residential area and more CHP assistance; within 30 minutes the HIRT arrives; radiation levels normal 100 feet up wind ; radiation levels above normal 50 feet upwind of truck and cask indicating rupture of cask; HIRT informs CHP Incident Commander of leak; IC requests massive mutual aid from many local agencies and requests assistance from Federal Agencies with radiation management capability; IC is informed nearest Fed responder two hours from incident and heavy rescue equipment will be 8 hours, County Emergency Operations Center activated; Chief Officer from CDF/ County Fire arrives and establishes joint CHP/ Sheriff /CDF command structure; HIRT monitoring picks up high radiation levels two miles down wind of scene; ICs halt evacuation and call for indoor protection on

Emergency Broadcast Radio; several vehicle accidents are reported as the result of evacuation order; Sheriff Deputies have difficulty detaining residents in need of decontamination; truckdriver pulls himself free and runs toward HIRT unit, rad monitors go off scale; personnel on scene scatter trying to avoid driver; a HIRT member calms him and attempts decon but driver has persistent ingested contamination and an apparent broken arm; and so it goes an hour into a moderate accident scenario

## RECOMMENDATIONS

- Do not transport high-level nuclear waste from DCNPP
- **If any transport is done**, trucks must be escorted front and rear by fully equipped and qualified radiation management specialists.
- Escorts must be in communications with a designated emergency agency at all times during transport.
- All first responders shall be provided radiation protection training at levels deemed appropriate by SLO county.
- All first responders shall be equipped with radiation monitoring equipment.
- The county HIRT shall be receive additional training in high -level nuclear waste handling systems, specifications and design of transport casks, specific radiation hazards associated with spent fuel rod assemblies
- All HIRT members shall be provided with personnel radiation monitoring devices.
- The CDF/CO ECC , as well as , all other first responding agencies shall be notified in writing 24 hours in advance of all waste shipments.
- *Safety inspections for waste hauling trucks before each trip*
- *Driver training and certification of all drivers*