



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

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December 10, 1999

MEMORANDUM TO: Theodore S. Sherr, Chief  
Licensing and International  
Safeguards Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

THRU: Charles W. Emeigh, Section Chief  
Licensing Section  
Licensing and International  
Safeguards Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

*C. E. Emeigh*  
12/10/99

FROM: Charles E Gaskin, Safeguards Project Manager  
Licensing Section  
Licensing and International  
Safeguards Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

*Charles E. Gaskin*  
12/10

SUBJECT: SAFEGUARDS LICENSING OF THE YUCCA MOUNTAIN GEOLOGIC  
REPOSITORY OPERATIONS AREA (GROA)

The Department of Energy (DOE) has requested a meeting to discuss safeguards licensing at the GROA Facility. In preparation for this meeting, I have been asked to prepare some discussion points to indicate the magnitude of the facility, the type of material anticipated to be stored at the facility, the differences between some Nuclear Regulatory Commission (NRC) and DOE views of safeguards for the materials, and some options which we may consider.

In the licensing of material which will be stored in the GROA facility, the NRC is presented with difficult licensing and regulatory issues. The following discussion presents some background and options we should consider. In view of the types of material we can anticipate, the NRC should be questioning its ability to appropriately regulate these materials since some material does not directly match the NRC regulations.

To date I have encountered the following types of materials mentioned in various meetings with DOE and assorted documents:

- Commercial spent reactor fuel
- Naval reactor fuel
- Vitrified logs containing Pu
- High level waste

*DFO3*

- Research Reactor HEU spent fuel

While 10 CFR § 73.51 directly refers to the GROA above ground storage area, the magnitude of the operations which will take place at this facility far exceeds the operations at a typical independent spent fuel storage facility. We can expect the transfer of material from shipping casks to storage casks to create points of vulnerability to radiological sabotage on a continuing basis. Further, if material such as plutonium (Pu) in vitrified logs is made available, the question of theft becomes more important. Despite the presence of high radiation, Pu remains a viable target for theft or diversion if it is in discrete containers.

In preparation for that meeting the following questions should be considered:

1. Do we recognize that "self-protecting" is a viable means of eliminating the threat of theft or diversion in all cases?

NRC has taken the position that SNM sufficiently diffuse throughout a large amount of other material is sufficiently unattractive that a lower level of protection may be used. Two examples which drive this policy are Kerr McGee and the Shoreham slightly irradiated fuel shipment. In both cases considerable amounts of SNM were diffuse throughout large volumes of equipment or material. NRC also reduced physical protection requirements for large cores containing HEU based upon this principle. DOE on the other hand gives great credence to the state of "self-protecting", defined as 100 rems at one meter from the surface.

2. Do we have enough knowledge about spent naval reactor fuel to determine whether the measures described in 10 CFR § 73.51 are sufficient to protect against sabotage of spent naval reactor fuel?

NRC has information concerning the amount of material that would be released upon sudden disruption of the spent fuel in commercial shipping and storage casks. However, naval reactor cores undergo a far different burn-up cycle than commercial reactor fuel. Thus, residual fission products could present a significant hazard to the health and safety of the public. At the very least, we need more information on fission products and residual U-235 remaining in spent naval reactor fuel in order to justify our protection measures in a licensing hearing.

3. While vitrification is a mandated course of action, does it provide high assurance of protection against both sabotage and theft of SNM?

Attractive materials in discreet locations would seem to be possible targets for theft or diversion. While we may recognize some reduction of physical protection due to the irradiation, it would seem additional surveillance of this material may be necessary. At one time DOE was using what they called the "spent fuel standard" as a means for storing plutonium. This standard was stated as making it as difficult for a sub-national threat to recover the plutonium from the vitrified waste form as it would be to recover it from commercial reactor

spent fuel. If the vitrified logs meet such a standard, then its theft concern should be no more than for spent fuel from commercial reactors. Someone with spent fuel reprocessing and plutonium expertise is needed to help determine if the "Standard" represents as difficult a recovery problem for SNM as it is difficult for reprocessing spent reactor fuel and recovering SNM.

4. What vulnerabilities are there for high level waste?

"High-level radioactive waste or HLW means: (1) Irradiated reactor fuel, (2) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, and (3) solids into which such liquid wastes have been converted." Based upon this definition, one could speculate many different sabotage scenarios that we should be concerned with. Each scenario will have to be examined to determine timely response and just what loss of control would mean. This will be particularly interesting once a licensing hearing begins.

Options

1. Apply 10 CFR § 73.51 just as we currently do at ISFSIs. That is, prevent the loss of control in order to prevent an offsite release of 5 rem (10 CFR § 72.106) without regard to the type of material being stored in the facility. This would accept the premise that the DOE material is equivalent to light water reactor spent fuel.
2. Protect each form of material differently and in accordance with the attractiveness of the material. For example, vitrified Pu logs and spent research reactor HEU fuel may be handled as material that could be subject to diversion, while spent reactor fuel could be handled as it is currently handled. High level waste and spent naval reactor fuel would also have to be considered separately.
3. Review the current regulations with an intent to modify 10 CFR § 73.51 to accommodate all the anticipated material.
4. Discuss with the DOE the possibility of storing the higher risk material at another facility.

I would prefer Option 1 but recognize that we may be forced into Option 2. If Option 2 is adopted the technical basis for the protection levels would have to be determined.

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