

BRIEFING

NUCLEAR WASTE TECHNICAL REVIEW BOARD

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- **WIPP LESSONS LEARNED ; HISTORY AND TECHNICAL ISSUES**

- **March 19, 2014**

Purpose of EEG

Conduct independent technical review of impact of WIPP on public health and environment, as well as radiation monitoring at WIPP and in surrounding communities

Essential Elements for a State Technical Evaluation

- OBJECTIVITY neither pro nor con
- INDEPENDENT no approval of work
- COMPETENT senior, knowledgeable
- MULTIDISCIPLINARY but focus on radiation protection

Essential Elements (cont)

- **Publish analyses. EEG issued 90 reports.**
- **Presentations at public and professional meetings**
- **Testify at Legislature and Congress**
- **Field trips with NAS, univ and agency experts**
- **Encourage staff for key roles in prof societies**

In 1999, EEG Concurred that DOE had met EPA Stds and Recommended Disposal

- **Part of success of WIPP is public confidence from EEG's independent evaluation of impact on public health**
- **Local officials supported proposed project**
- **Governor and Legislature committed to give project a fair hearing**

BLUE RIBBON COMMISSION REPORT

Recommendation 6

- “...By all accounts, this group [EEG] was instrumental in assuring New Mexico citizens and their representatives—not only in the immediate vicinity of WIPP but across the state—that their health and welfare interests were being protected and that their concerns were being heard and adequately addressed.”

RADIOACTIVE WASTE DISPOSAL IS NOT UNIQUE IN EXPOSING PEOPLE TO IONIZING RADIATION

- **IONIZING RADIATION IS A BENEFICIAL TOOL
THAT MANKIND WILL NOT ABANDON AND IS
HERE TO STAY**
- **Medical diagnostic and therapeutic applications**
- **Nuclear power**
- **Sterilization of medical devices**
- **Food preservation**
- **Research and industry**

What is unique about radioactive waste disposal problems?

- **Predicting naturally occurring and man-made intrusions in the distant future**
- **Assurances that today's radiation protection standards will not change substantially in thousands of years**
- **High Cost**
- **No system to verify that assumptions, models, calculations and conclusions are correct**
- **Society's demand for greater standards in waste disposal than other environmental and public health hazards**

What is WIPP?

- **A \$19 Billion repository for 6.4 million Ci of defense TRU waste incl 12.9 MT of Pu-239**
- **DOE wished to include defense spent fuel**
- **Waste is highly heterogeneous**
- **CH-TRU waste is in DOT Type A carbon steel vented containers (incl 55 gal drums and Std Waste Boxes). (lid must stay on for a 30" drop test)**
- **Waste is respirable, soluble**
- **Isolation based on containment in salt beds**

Some Technical Issues

- Acceptance Criteria. Change 2 mi to deep borehole to 1 mi, 1% respirable fines, 10 year drum longevity
- Brine reservoirs, dissolution and breccia pipes
- Relocate rep 2 km S after 15m bbl brine reservoir found
- Redesign Monitoring equipment for radioactivity in stack
- Establish Monitoring offsite
- No stds for 10-100nCi/g alpha emitters
- Double containment req dropped for CH-TRU shipping container

Actinides implicated in Feb 14, 2014 release at WIPP

Radionuclide	<u>Pu-239</u>	<u>Am-241</u>
Total Curies in Rep	795,000	485,000
Half Life (years)	24300	433
5 rem Annual Limit from Inhalation (ALI)		
NRC 10CFR20		
Bq/year	370	370
μCi/year	0.01	0.01
μg/year	0.117	0.003
Inhaled in 10 μm dust particle mg/year	1.5	0.008

Past HLW Disposal Efforts

- Screening candidate HLW sites by listing, rating and comparing favorable characteristics.
- Appointing Negotiator to have a state volunteer
- In 1982 Congress req'd DOE to evaluate need for a 2nd rep. DOE determined it would be easier to authorize increase in 1st rather than develop 2nd. Only true if there was a 1st rep
- Shallow burial of TRU discontinued by DOE in 1970

Status of HLW Disposal in US

- **Although more than \$22 B have been spent over past 56 yrs for HLW disposal, all efforts have been unsuccessful**
- **Rather than argue about whose fault, it is more productive to identify actions to resolve this seemingly intractable problem**
- **Assuming we are now serious about such disposal, specific recommendations follow**

Regulatory Standards

- **Resolve jurisdictional disputes between regulatory agencies promptly. Cannot evaluate performance of a system without a yardstick.**
- **States do not regulate radioactivity , only non- rad constituents via delegation by EPA of RCRA. EPA certified in 1992**
- **Most of NRC and EPA Standards appear salvagable. Make generic rather than site-specific.**
- **Requirement to predict a radiation dose from particulate resuspension and inhalation over a million years is meaningless. As is ingestion from diet. The time period should be meaningful. Perhaps 10,000 yrs.**

Regulatory Radiation Standards

Pu-239 is considered to be the most hazardous r/n at WIPP.

- **HLW repository has about 43 x more Pu-239 than WIPP**
- **After 10,000 yrs, WIPP Pu-239 reduced to 0.752 the original**
- **After million yrs, 25 Million Ci Pu-239 in HLW rep would decay to 10.5 μ Ci --a needlessly restrictive reduction**

A bucket of lead is as hazardous today as it was a million years ago. Society does not require estimates of the toxicity of releases from repositories of lead batteries

Characterize Two Sites

- **Various proposed sites have been found unacceptable.**
- **Nation can ill afford to re-start clock decades later.**
- **Take a fresh look at crystalline rock, bedded salt, basalt, tuff**
- **The US has more HLW for disposal than the authorized capacity of the first rep of 70,000 MTHM.**
- **This provides the Nation with a double benefit—a home for the second and a backup for the first**

Independent State Review

- **Essential to have a technical multi-disciplinary state group evaluating a proposed rep since state's interests are not necessarily the same as DOE**
- **In NM, the EEG provided that expertise for WIPP**
- **Of 90 reports, Four reports on 655 m waste handling hoist were co-authored by Thos Sargent, known for his mathematical rigor. He received Nobel Prize in Economics 3 years ago.**

Actions by Congress

- **In 1982 Congress wisely established system for HLW disposal with specific responsibilities for DOE, EPA and NRC**
- **Subsequently White House with Congressional leadership canceled the effort and abandoned the system**
- **Congress and the Administration need to agree to a system and stick with it.**
- **Congress should hold hearings to specify incentives for a State to volunteer as a candidate**
- **Congress should address BRC recommendations**

Don't Ask Congress to Solve Technical Problems

- DOE wished to bring waste to WIPP before meeting EPA standards by conducting experiments. Congress agreed and required them to be done. They were without merit and were canceled. Congress then had to change the law.**
- DOE disliked the EPA requirement to predict behavior of waste for 10,000 yrs. Congress then asked NAS for views. NAS believed 1 million yrs to be more appropriate.**
- Moral . Don't ask Congress to solve technical problems. That is the technical community's job.**

Technical Community Responsibilities

- **Engineers and scientists should present papers at national meetings such as WM showing merits of disposing HLW in their home state from waste generated in other states. The paucity of such research has been construed as Not-In-My-Back-Yard (NIMBY-ism).**
- **Essential that public believes in objectivity by technical community to have confidence in our conclusions.**

U.S. POPULATION RADIATION EXPOSURE (Person-Sieverts)

	<u>1980s</u>	<u>2006</u>	
• Medical	123,000	899,000	x 7.3
• U.S. Nuclear Power Plants	565	110	x 0.2

NCRP 160 (2006)

BENEFITS AS WELL AS RISKS

- **The public accepts this astonishing increase in medical radiation in the belief that the benefits clearly outweigh the risks.**
- **For HLW disposal , many people focus solely on the risks and do not consider the benefits.**
- **Benefits, as well as risks, need to be discussed in public forums with elected officials and the technical community.**
- **Public acceptability of activities in defense of the country is greater than acceptability for disposal of commercial HLW.**

FUNDING

- **Over \$13 Billion spent on YMP**
- **Over \$26 Billion collected from rate payers for electricity from nuclear power plants**
- **Estimated cost of YMP \$97 Billion**
- **HLW requiring disposal exceeds authorized quantities**
- **Future funding will be more difficult to obtain**

RECOMMENDATIONS TO DOE

The Jan 2013 DOE plan is to select a site by 2026 and begin HLW disposal by 2048

Publishing the following

- Identify potential rock formations in different areas of country**
- Identify incentives for states to volunteer**
- Develop better cost estimates than \$2T to \$4.8T**
- Develop Benefit Risk Analyses**

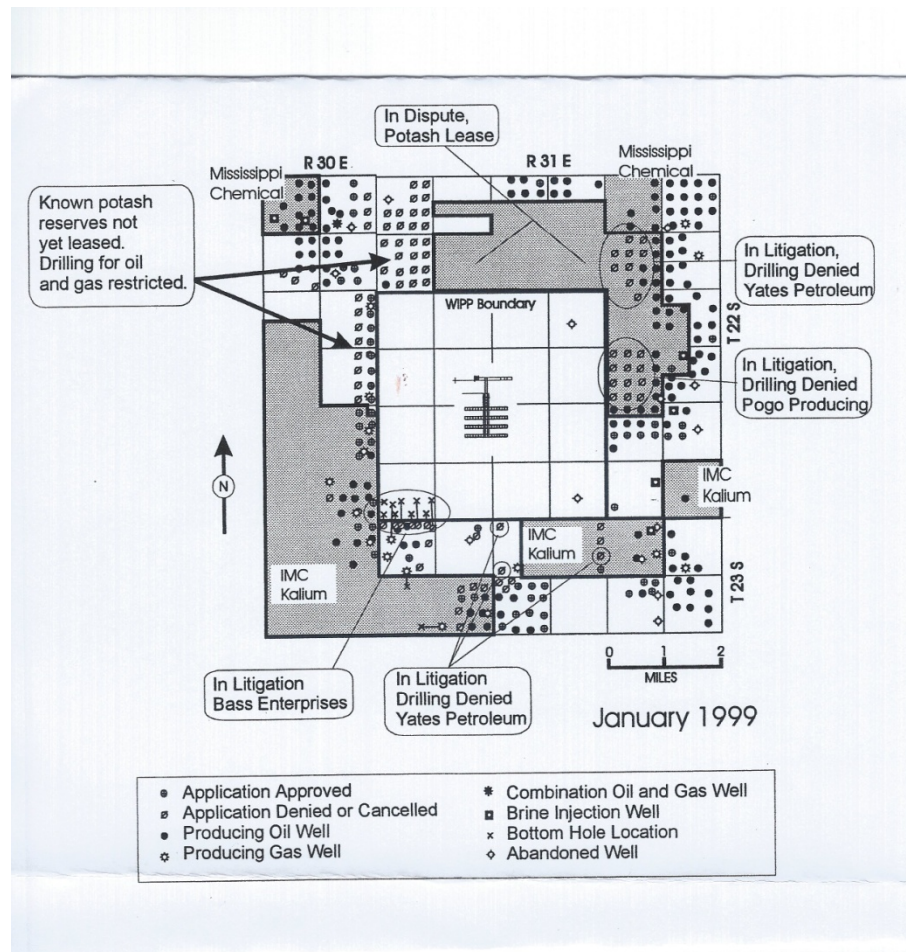
RECS to DOE (continued)

- **State the maximum inventory for the first repository**
- **Status of funds collected to date from ratepayers**
- **Analysis of financial and other consequences should we continue to fail to take title to spent fuel**
- **Encourage staff and contractors to present papers for HLW disposal at national meetings**

Is Area in SE New Mexico Suitable for HLW Disposal?

- **We don't know. Site has not been geologically characterized for HLW disposal.**
- **Determination of adequacy of site is not an ad-hoc decision. Congress gave that job to EPA and NRC**
- **Mineral Resources are substantial in area.**
- **Thermal loading for HLW high**
- **Total curies for HLW large**

1999 Map of 64 mi sq in SE NM showing mineral resources



1957 NAS Report Recommended Bedded Salt for HLW Disposal as well as following

- Liquid HLW
- Complete geological investigation before authorizing construction
- Locate in area near power reactors to minimize transportation
- Select cavities at shallow depth to reduce room collapse
- Check out large number of sites