Waste Isolation Pilot Plant (WIPP) Markers Program Development
Panel Presentation

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WIPP: a Department of Energy facility for the permanent disposal of defense-related transuranic wastes

12+ years safely operating a deep geologic repository for radioactive waste in America

Host rock: bedded salt
Repository depth: 2,150 feet/655 meters
Disposal to be followed by decommissioning and markers

When WIPP waste disposal mission is complete, the site will be decommissioned and the underground will be sealed.

Permanent markers will be placed on the surface to warn future generations about the presence of radioactive material.
Passive Institutional Controls (PICs)

- PICs are markers and archives designed to warn and inform future generations about the location, purpose and content of a repository

- In the US, the Waste Isolation Pilot Plant (WIPP) is required by the U.S. Environmental Protection Agency to use markers and other PICs to indicate there is danger below
Advertent and inadvertent intruders

• The inadvertent intruder drills through the repository to get to a suspected resource and needs to be warned there is something below that poses sufficient health and financial (cleanup) risk to merit not drilling here.

• The advertent intruder knows there is a repository, understands the health and fiscal risks, but wants to drill into it, or through it, anyway.
How do we warn potential future intruders?

- Symbols suggesting fear and foreboding have been suggested
- Not a practicable design to implement
- Providing information --not arousing fear, ought to be the governing objective
WIPP Conceptual Marker Design

- The design provides layers of information and warnings
- Redundant messages will be carved into perimeter monuments
- There will also be an accessible information center and two less readily accessible information storage rooms
- Multiple national and international archives will also be used to store WIPP information
A WIPP PIC Concept

BERM: an earth and rock barrier
10m high and 30m wide

INFORMATION CENTRE: maps of nuclear sites and warnings in several languages, plus detailed scientific information on radioactivity

16 LARGE SURFACE MONOLITHS

INFORMATION CENTRE

BURIED RADAR REFLECTORS: show the site is not natural

MONOLITHS: engraved with warning messages and symbols

Buried and sealed information rooms

HOT CELL

Buried warning plaques

HOT CELL: the sealed room used to handle the waste will show that it used to be dangerous to touch

NUCLEAR WASTE: buried 600m below surface

32 engraved monoliths on perimeter of site
Content of information message

• The warned intruder (no longer inadvertent) can be dissuaded if the warning is believed
  • You cannot force belief, it is an internal emotion
  • The way to encourage intruders to believe and not intrude is to tell the whole story and let them judge
  • Thus warning messages must be complete and detailed, not cryptic

• Finding the right amount of information to inform and hopefully dissuade the intruder is an area ripe for developing international consensus & guidance
Yucca Mountain markers: WIPP design adapted to mountain environment

- Clusters of three structures and perimeter monuments (redundancy)
- Archives at each of the three clusters
- Messages/warnings carved into monuments
- Messages/symbols also to be buried in coins made of fired clays

WIPP Concept Variant
Reactions to markers may be complex

• 18,000 casualties from the 2011 tsunami in Japan

• Past generations erected stone tsunami warnings

• New generations understood message, felt sea-wall technology would be protective

• Older generation carried out its ethical obligation to the future
Current generation has ethical obligation to warn future

• Repositories may attract resource hunters
• The best way to warn against this type of intrusion is to describe:
  • What is in the repository and why it is considered useless, and why it is dangerous
• Once a would-be intruder has been informed, he or she is no longer an “inadvertent” intruder
  • If a future society decides to unearth the waste knowing what is there, it is not this generation’s concern or problem.
Ethical considerations also apply to present generations

• Present generations face real threats to their environment
• Current populations face real threats to their health and well being
• Resources ought not to be taken from efforts and materials needed to maintain human life quality today for the sake of preventing low hypothetical threats to far-future humans
WIPP intent


• It is WIPP’s intent to help create an international consensus on marker concepts and message content recommendations with RK&M participants

• WIPP stands ready to lend its experience and expertise to this effort

• We request your interest, and your help