

SUMMARY INFORMATION
10 CFR Part 60 Performance Objectives Requirements
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SEC	10 CFR 60: REQUIREMENTS	NUCLEARSAFE TECHNOLOGY
60.111	Operation up to and through closure. (a) Protection of workers against radiation to EPA standards. (b) Retrievability of waste for up to 50 years.	Worker protection against radiation is guaranteed since waste modules are loaded and unloaded from the nuclear transport vehicles by shielded HTV* automatic and remotely controlled mechanical tubular handling equipment which limit radiation exposure to personnel. The equipment itself is shielded from the biosphere by a special radiation protective rig floor enclosure system. This type of tubular handling equipment routinely described as an "Iron Roughneck" is digitally operated remotely without human intervention. The waste modules are rapidly placed below ground level and there is no further contact with personnel. Use of sophisticated re-entry and retrievable devices as used today in the oil industry allows easy retrieval of nuclear waste modules from deep burial in the lateral wellbores of the repository. The actual retrieval process would entail "drilling out" several specialized "bridge plugs", several thousand feet of cement and removing several hundred feet of specialized bentonite clays from the wellbores. In addition, the NuclearSAFE system is designed and implemented to allow retrieval even under and after disastrous conditions similar to a wellbore blow-out or some major negative natural event like an earthquake. The NuclearSAFE process also allows for demonstrated magnetic ranging protocols to find and re-enter wellbores that are completely destroyed to retrieve the waste capsules.
60.112	Radiation release after closure must conform to EPA levels for both anticipated and unanticipated processes.	The NuclearSAFE system has 3 levels of designed protection. Engineered Waste Barriers – 10,000 year life. Multiple layers of Steel – Wellbore Casings and Capsule walls, High Strength Specialized Cement, Radionuclide absorption media. Structural Barriers – 10,000,000 year life. Selection of underground zones (structures) which are hydrodynamically closed by structural shapes. No fluids can enter or leave the repository zone. Anticlinal or Synclinal formations & faulted systems. Stratigraphic Barriers – 10,000,000 year life. Design selection of underground formations whose stratigraphy or layered native rock types & properties (e.g. clays, shales) prevent fluid flow away and limit diffusion processes away from the nuclear repository.

Performance assessment of the three levels of protection listed above using the applicable computer codes shows that there shall be no measurable release of radiation from the deep underground system due to anticipated or unanticipated events or processes.

Comparison of the deep repository behavior to published natural analogues of radioactive material burial shows that radiation release levels shall conform to EPA levels.

60.113 Performance of particular barriers after permanent closure.

- (1) (a) Engineered barrier to substantially contain HLW during the radiation and thermal fission period. More than 300 years and less than 1,000 years.

There is no expected release of HLW from the 15,000 to 20,000 feet depth of the deep underground repository in our engineered systems in the isolated geologic basins which have been demonstrated by radiometric dating as stable for over 25 million years. The combination of multiple steel casings and cement layers along with specific corrosion resistant metal enclosures of the solid nuclear waste, in concert with engineered bentonite clay systems and specialized "bridge plugs" along with thousands of feet of cemented well bore are sufficient to maintain the integrity of the lateral as well as vertical wellbores and thereby contain the solid HLW.

Performance assessment of the three levels of protection listed above using the applicable computer codes shows that the HLW from the deep underground system shall be contained for at least 1000 years. Comparison of the deep repository behavior to published natural analogues of radioactive material burial show that the HLW shall be substantially contained for at least 1000 years..

- (b) Release of nuclides shall be gradual over long time periods. Ground water should be appropriately considered. Release rate of radionuclide less than 1 part in 100,000 per year of inventory.

In the event of unexpected release of radiation from the 15,000 to 20,000 feet of deep underground burial in engineered systems in the selected isolated geologic basins, release will be infinitesimally slow. Ground water at 20,000 ft is never able to contaminate the potable surface ground waters which are never found below 1,000 ft depth under any circumstances.

- (2) Geologic setting. Location should be such that pre-emplacement groundwater travel time along fastest path of nuclide travel from the disturbed zone to the accessible environment shall be more than 1,000 years.

No groundwater can hydrodynamically escape the repository structural combination of natural and engineered barriers in the isolated basins where emplacement occurs at depths in excess of 15,000 to 20,000 feet. This feature of the repository allows groundwater containment for at least 1,000 years.

60.136 Preclosure controlled area.

- (a) Preclosure zone must be established.
- (b) Limits of radiation to any individual should not be exceeded.
- (c) Preclosure area may be traversed by highway, railroad or waterway as long as public health is protected.

Actual drilling controlled area is small and only a matter of a few acres, which is easily controlled by massive physical barriers as well as conspicuous visual warnings. Further actual direct access to the buried HLW is only possible by using a large complicated, long time-consuming, highly visible drilling process to re-enter the bottom of a 20,000 foot wellbore.

Depth of burial and engineered barriers precludes any radiation reaching the biosphere.

Actual required surface area is less than a few acres and as such would be insignificant and easily protected from public traffic. Also NuclearSAFE has developed non-textual graphic based warning signs that can be etched into durable rock solids for long term viability and provide warning to all who approach the location area.

* - HTV - Horizontal to vertical