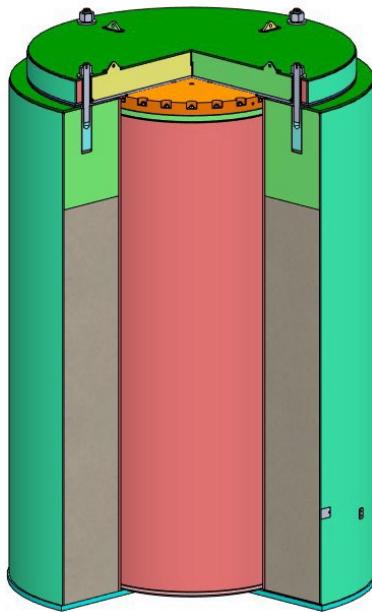


# HI-SAFE® Non-Fuel Waste Storage System



HI-SAFE is Holtec's largest multi-purpose storage module designed to enable long-term onsite storage and off-site shipment of non-fissile radiological waste streams (Class B, C and GTCC). HI-SAFE is the non-fissile material storage counterpart of the HI-STORM family of overpacks in use at nuclear power plants around the world for storage of spent nuclear fuel. Like the HI-STORM systems, the HI-SAFE storage system consists of a vertical freestanding steel weldment filled with concrete or Holtec's proprietary ULTRA-DENS™ shielding material and a structurally competent high integrity *Non-Fuel Waste Canister* (NFWC or "Canister") that confines the waste material. The external dimensions of the HI-SAFE overpack are the same as the HI-STORM system overpack and the same HI-TRAC transfer cask is used to shuttle the loaded NFWC; therefore, the ancillary equipment needed to load both the HI-STORM and the HI-SAFE systems is identical. The HI-SAFE system can be seen in cutaway view in the figure below.

The internal volume of the NFWC is approximately 290 cubic feet which makes it one of the largest waste storage containers for high activity radiological waste available in the industry. The large volume allows for storage of larger dimensioned waste materials and allows for increased package efficiency compared to smaller containers. The NFWC, which has the same external dimensions of Holtec's Multi-Purpose Canister (MPC), is suitable for storage and transport of non-fissile waste generated at a nuclear plant, including activated reactor internals, control components, and operational waste, such as filters and resins. In addition, HI-SAFE is capable of storing High Integrity Containers (HICs), often used at sites for storing of resin and filter wastes in dewatered or solid form without limitation. HI-SAFE systems have been successfully deployed at US nuclear power plants to store cut, flattened, and/or full-length Control Rod Blades, LPRMs, fuel channels and blade guides from BWRs.

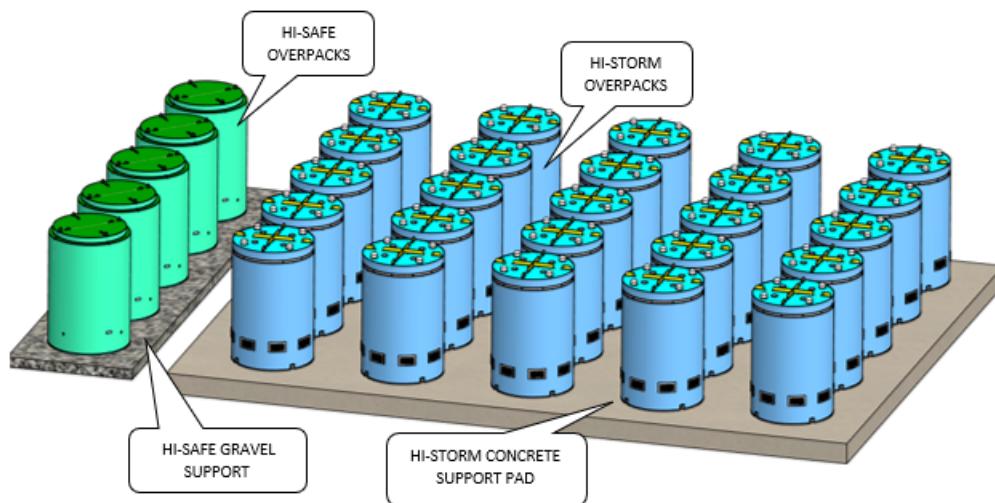


HI-SAFE Overpack Shown with Non-Fuel Waste (NFW) Canister in Cut-Away View

The NFWC is available in a welded or bolted configuration; both configurations are engineered to prevent the release of particulate matter from the Canister. The gasketed version with its bolted-on lid have the added benefit of being able to be re-opened and loaded multiple times.

Some of the key features of HI-SAFE are:

- *Geometric similarity with HI-STORM*: With its steel exterior, buttressed shell structure, and a removable closure lid, HI-SAFE presents a similar visual profile to the HI-STORM, as can be seen from the figure below which shows groups of HI-STORM and HI-SAFE casks side by side.
- *Different models available*: As with HI-STORM, HI-SAFE is available in two models - Model 100 and model FW. This allows a site to use the same ancillary equipment as currently used for the spent fuel storage system presently deployed. This commonality allows the use of the cask transporter, HI-TRAC transfer cask, canister lift cleats, welding equipment and all other loading ancillaries.
- *Co-locatable with HI STORM*: HI-SAFE can be placed either at an Independent Spent Fuel Storage Installation (ISFSI) alongside HI-STORMs (same storage pad) or on separate storage pads designated for non-fuel waste<sup>1</sup>. As shown in the figure below, the storage facility for HI-SAFE may be an engineered pad made of concrete or compacted gravel with appropriate security features (e.g., to comply with proposed 10 CFR 37 security requirements).



---

<sup>1</sup> In the U.S., a Part 50 licensee is authorized to possess and store nuclear waste on the reactor site under the provisions of 10CFR 61.55. This authority is granted to Part 50 licensees under the general license provisions of 10 CFR 30 (for byproduct material) and 10 CFR 70 (for special nuclear material) because they are both necessarily a part of reactor operations. GTCC waste can also be stored at an ISFSI under 10 CFR 72. Like any other reactor-related radioactive waste, the licensee is required to ensure the waste is stored in containers and/or locations (e.g., the spent fuel pool) such that the dose to personnel is ALARA. Regulations of the relevant competent authority with jurisdiction on the plant site.

## HI-SAFE and HI-STORM Casks Shown Side-by-Side (Solid Subgrade Not Shown)

- *Customized shielding:* The extent of shielding engineered in HI-SAFE can be tailored to the activity level of the non-fuel waste. All HI-SAFE systems look alike but their shielding capacity can be adjusted according to with the plant's needs.
- *Virtually limitless dose reduction:* Holtec's proprietary HI-DENS shielding material allows the HI-SAFE module to achieve virtually any desired level of dose attenuation.
- *Transportable NFWC:* The NFWC, with minimal licensing effort, can be shipped in the HI-STAR transport cask in the same manner as the MPCs containing spent nuclear fuel.
- *Multiple barriers against the spread of contamination:* The storage canister provides a high integrity barrier against the release of radionuclides. The storage module includes a version that features a gasketed closure lid designed to provide an independent barrier against the release of radionuclides.
- *Standard Loading Operation:* The steps to load NFW in the plant's fuel pool and place the loaded HI-SAFE in dry storage is a slightly simplified version of the procedure used to load HI-STORMs at the nuclear plant. The time required to execute a pool-to-pad loading of a HI-SAFE system is typically less than 3 days.

HI-SAFE can be used for interim on-site storage and decay storage of radiological waste. This reduction in activity (and dose rate) improves ALARA handling of wastes and improves the site's ability to comply with DOT shipping requirements. The rigorous design of the HI-SAFE allows for the long-term storage of non-fissile waste until such time as the plant ceases operation and the on-site storage facility is decommissioned. Finally, just like the HI-STORM overpacks, HI-SAFE modules are treated as a capital outlay under GAAP principles which alleviates the cost of off-site shipment as an operating expense burden on nuclear power plants. Thus, HI-SAFE accrues the added benefit of reducing the plant's operating cost!