

# MAGNASTOR System

NAC's MAGNASTOR® (Modular Advanced Generation Nuclear All-purpose Storage) System is the first U.S. NRC-approved multi-purpose canister system capable of storing 37 PWR or 87 BWR assemblies, which is about 16% to 28% higher than previously licensed high capacity systems for PWR and BWR spent fuel storage. The system is comprised of the following components:

- Transportable Storage Canister (TSC or canister)
- Vertical Concrete Cask (VCC or storage overpack)
- Transfer System (MAGNASTOR Transfer Cask (MTC), pneumatic MTC Lifting Yoke, and hydraulically-operated adapter plate)
- On-site Transport System (Low Profile Cask Transporter (LPCT) and Vertical Cask Transporter (VCT))

In addition to the primary components listed above, loading of the MAGNASTOR System also requires standard utility services (electricity, air, high purity helium, clean/demineralized water, cask handling and auxiliary cranes, fuel loading equipment, welding system, ancillary support systems, etc.) and consumables (weld and NDE materials, argon, etc.)



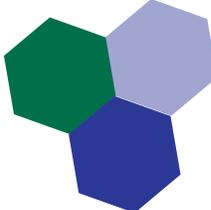
*NAC's Full-Scale MAGNASTOR model, located at Palo Verde Energy Education Center*



*MAGNASTOR VCC Construction at Duke Energy - McGuire*

### MAGNASTOR Parameters:

<b>Fuel Specific Data</b>	<b>PWR / BWR</b>
Maximum Assembly Capacity	37 / 87
Thermal Capacity (Storage)	35.5 kW / 33 kW (Design 40 kW)
(Transport)	24 kW initial license
Fuel Cool Time (Storage)	4 years minimum
(Transport)	To meet heat load limits
Fuel Initial Enrichment	5.0 w/o / 4.5 w/o, U <sup>235</sup> maximum
Fuel Burn-Up (Assembly Average)	60 GWD/MTU maximum



## MAGNASTOR Components:

### **Transportable Storage Canister (TSC):**

The TSC is a welded stainless steel canister that contains the fuel basket structure and confines the SNF contents when welded closed. It is comprised of a shell, base plate, closure lid, closure ring, drain line and redundant port covers.

The installed closure lid is supported on four internal lugs that are also used for lifting the empty TSC. The lifting of the loaded TSC uses a lifting plate bolted to the closure lid design.



**MAGNASTOR PWR Canister with PWR Basket Inserted**



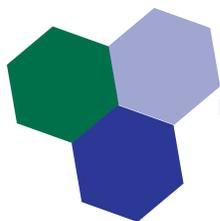
### **Vertical Concrete Cask (VCC):**

The MAGNASTOR standard concrete cask design consists of a reinforced concrete structure with a structural steel inner liner and base. The reinforced concrete shell and steel liner provide the neutron and gamma radiation shielding for the spent fuel stored in the canister. Inner and outer reinforcing steel cages are encased within the concrete shell.

On-site construction of the VCC requires no unique or unusual forming, concrete placement, or reinforcement operations. The concrete portion of the cask is constructed by placing concrete

between a reusable, exterior form and the steel liner. Inner and outer reinforcing bars (rebar) installed near the outer concrete and liner surfaces provide additional structural integrity to the concrete in accordance with ACI standards. The structural steel liner and base are shop-fabricated and field-assembled. Concrete placement, testing and acceptance are in accordance with ACI standard.





## MAGNASTOR Components Continued:



*Transfer Cask Movement*



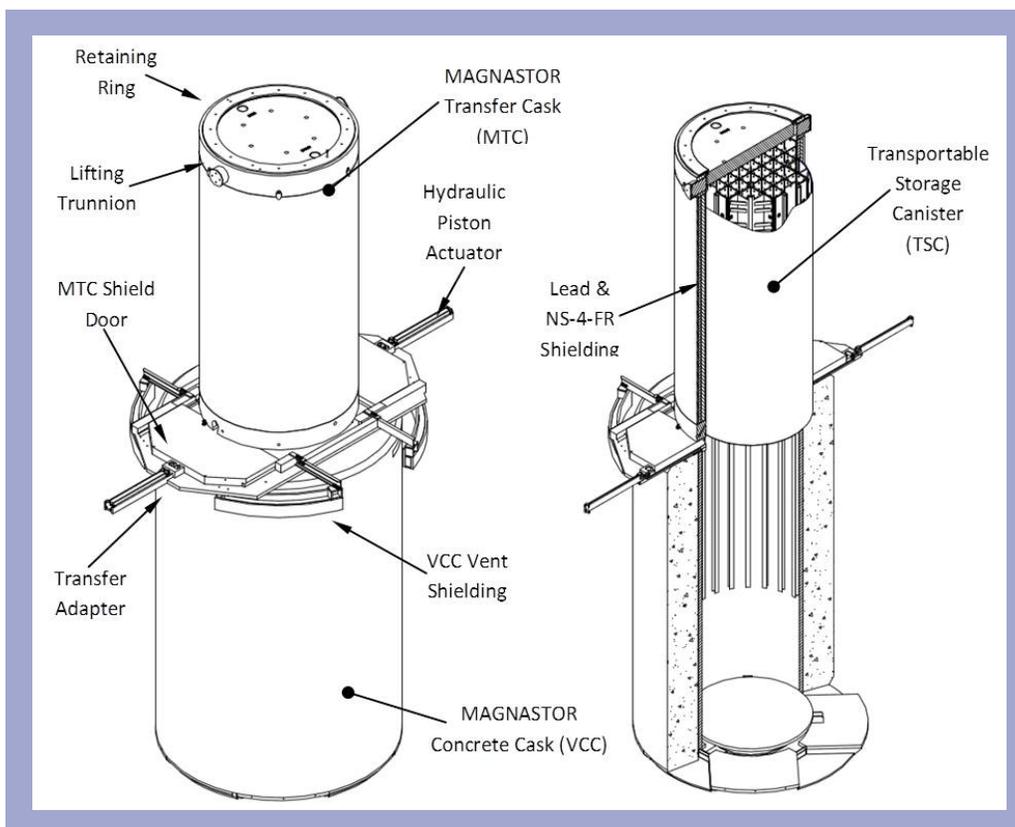
*Shield Doors Open Using Transfer Adaptor*

### **Transfer System:**

The primary components of the Transfer System are:

- MAGNASTOR Transfer Cask (MTC)
- Transfer Adapter
- MTC Lifting Yoke
- Canister Lifting System

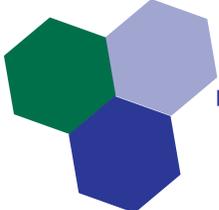
The **MTC** is the workhorse of the MAGNASTOR system. It provides for TSC handling during loading and transfer operations, biological shielding, contamination control and cooling, and structural protection for the TSC throughout the loading, preparation and transfer operational sequences.



*Transfer Cask / Vertical Concrete Cask and Adapter Interface*

The **Transfer Adapter** is a mating interface, transfer shielding and door actuation device for fit up of the MTC to the VCC. The system includes a hydraulic pump, control valves, pressure gauges and hydraulic hoses.

The **MTC Lifting Yoke** and **Canister Lifting System** are used for the vertical lifting and handling of the MTC and loaded TSC.



## MAGNASTOR Components Continued:

### On-site Transfer System

The on-site transfer system is comprised of the low profile cask transporter (LPCT) and vertical cask transporter (VCT). They are used in the transportation of empty and loaded MAGNASTOR VCCs to and from the ISFSI pad. The LPCT is used to move the empty and loaded VCC in and out of the fuel handing building (FHB) and for moving the empty MTC in and out of the FHB. The VCT is used to transport VCCs to and from the outside of the FHB to the ISFSI pad.



### MAGNASTOR System Weights:

Component	Weight (lbs.)	Component	Weight (lbs.)
Fuel	70,500	MTC	121,500
Basket	22,150	Yoke	5,000
TSC	18,000	VCC	237,000
TSC Lid	10,500	VCC Lid	6,000
Loaded TSC	121,150	Adapter	13,000
Water, TSC & Ann	20,000	Passive MTC	150,000

Combination	Weight (lbs.) w/ Std. MTC	Weight (lbs.) w/ Passive MTC
Loaded VCC - (VCC & Lid, TSC & Lid, Basket, Fuel)	364,150	364,150
Transfer Cask, empty - (MTC, TSC, Basket, Yoke)	166,650	195,150
Loaded MTC, wet - (MTC, Water, Loaded TSC)	262,650	291,150
MTC Under Hook, wet - (MTC, Water, Loaded TSC, Yoke)	267,650	296,150
MTC Under Hook, dry - (MTC, Loaded TSC, Yoke)	247,650	276,150
VCC Stack-Up - (MTC, Loaded TSC, VCC, Adapter)	492,650	521,150