

SCPS Helium Recovery System



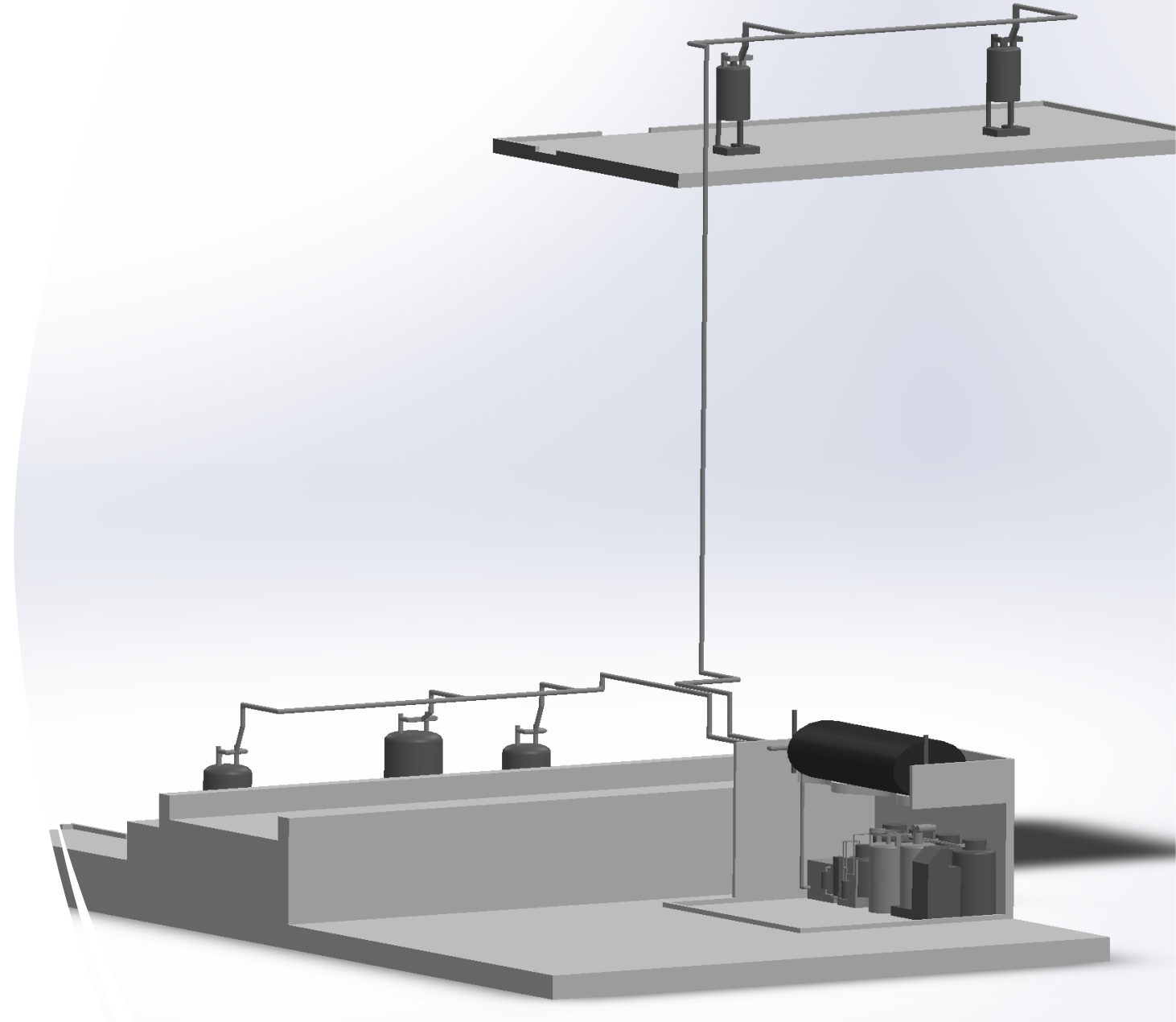
Connections to the Magnets

- Magnets are connected to the system via a two-valve system.
- The upper valve is used to completely isolate the helium recovery system and is always left open.
- The lower valve is only opened during helium fills with the magnet being connected via a smaller bypass line when it is closed. This prevents the possibility of damage in the event of another magnet quenching.
- During helium fills each other magnet connected to the system is isolated and opened to atmosphere for further protection.



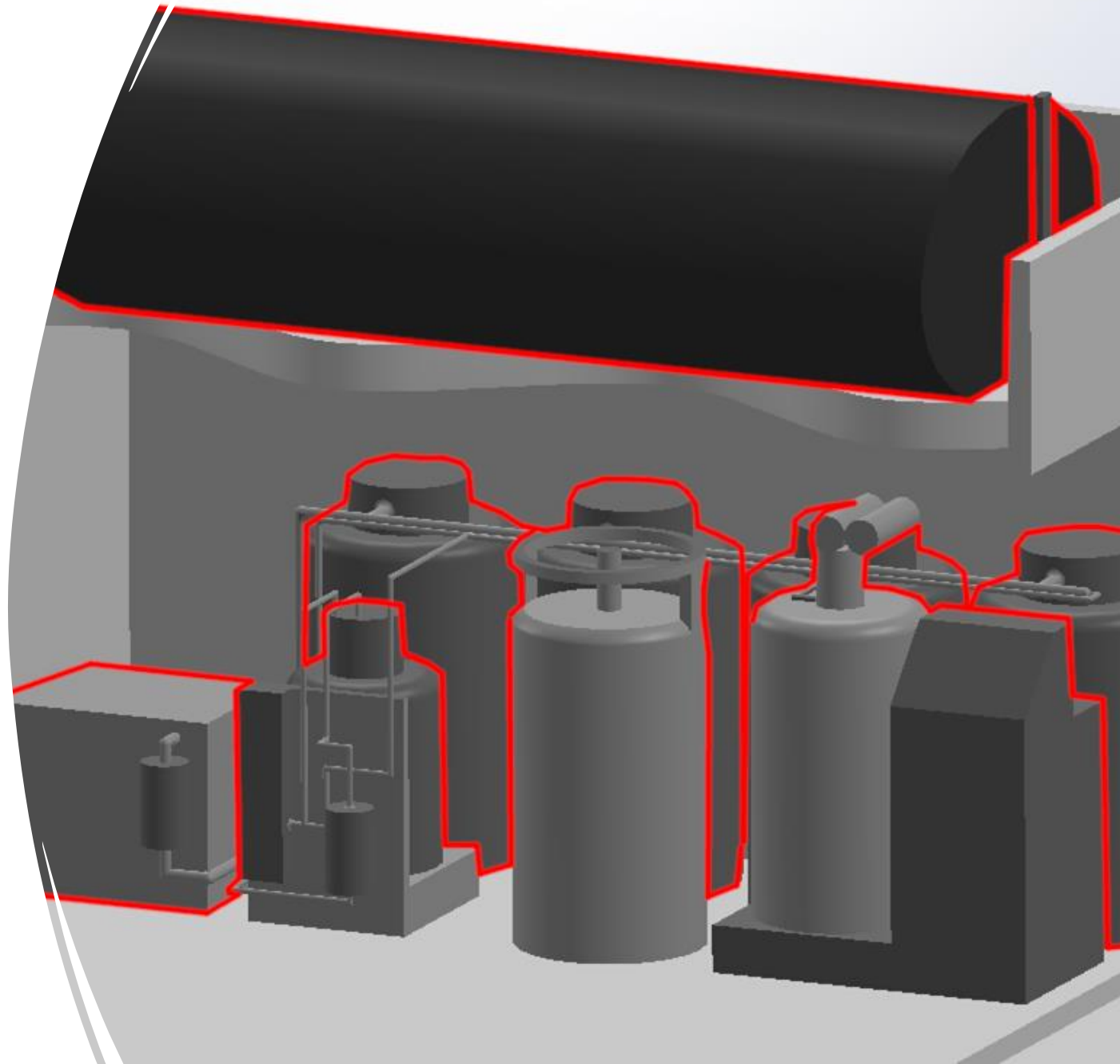
From Magnet to Bag

- All 5 SCPS magnets are connected to the recovery system via a series of stainless- steel pipes.
- These pipes funnel the helium to a capture bag located above the helium recovery system.



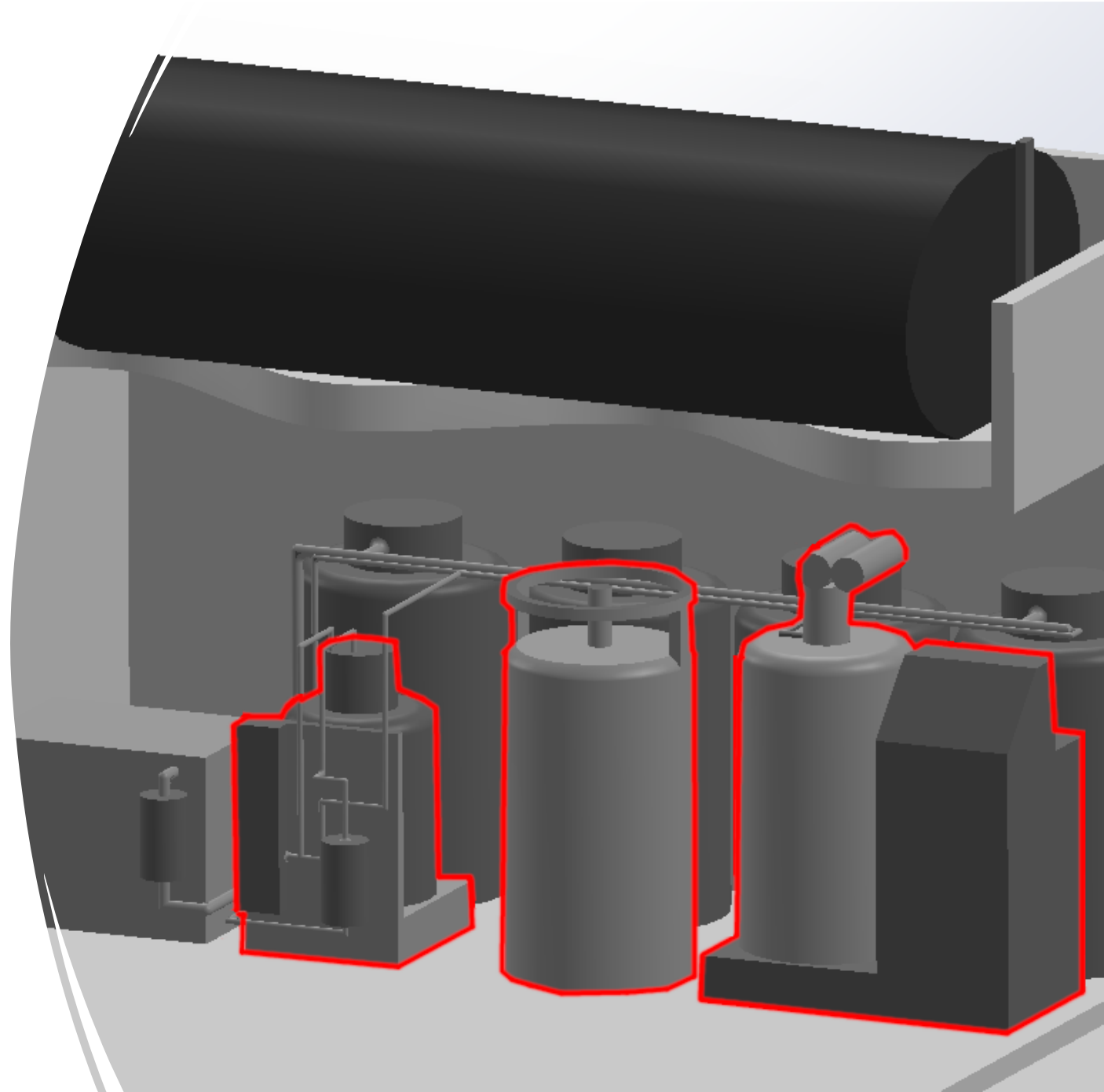
Gas Capture and Storage

- Gas is collected in a 10 m³ bag. This holds the equivalent of 10 liquid liters.
- When the bag is full, a compressor pumps the gas into 4 gas storage tanks. It takes 30 minutes to empty the bag and 1 full bag equates to 50 psi in the tanks. The pressure limit of the tanks is 400 psi.
- The compressor is controlled by 2 laser switches which tell the compressor when the bag is full and empty.



Gas Liquification

- For liquification, gas is first passed through a liquid nitrogen cooled purification unit before being sent to the liquefier.
- The liquefier can store up to 150 L of liquid helium, liquefying at a rate of approximately 15 L per day.
- When needed, helium can be transferred from the liquefier to a transferer dewar.
- All helium boil off from the system is captured and returned to the bag.



Filling Schedule

- We operate on a 16-week cycle filling 4 magnets every 8 weeks (with a 4-week split) and the other magnet every 16 weeks.
- This provides a constant helium reserve without exceeding the storage limitations.
- More frequent fills are possible since all boil off is captured.
- Currently, we use approximately 1200 L per year from the recovery system

Magnet	300 level north	300 level south	Basement walk up	Basement 600	Basement 500
Week 4			Fill		Fill
Week 8	Fill			Fill	
Week 12			Fill		Fill
Week 16	Fill	Fill		Fill	

Things to look out for

- Overfilling the bag.
- Bad timing with the bypass.
- Filling the transfer dewar.
- Eccentricities of the system.

