Contract No:

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Disclaimer:

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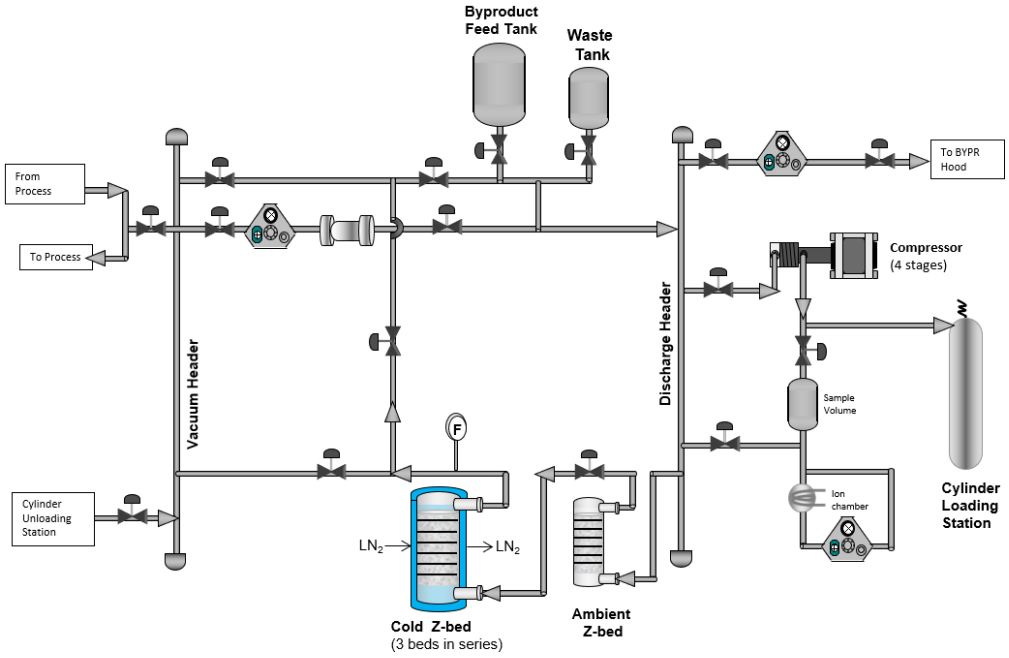

Byproduct (He-3) Purification and Loading Diagram

System Background:

Helium-3 rich gases are first sent through ambient z-bed to remove moisture. The helium-3 gas is purified by passing it through three liquid nitrogen cooled Z-beds in series. These Z-beds remove contaminants (i.e. inerts and other small amounts of hydrogen isotopes). Purified gases are stored and sampled for loading inside the Feed Tank.

The cold zbeds can be regenerated by allow the cold zbed to warm-up to ambient. The trapped gas is removed and sent to the waste tank for further processing.

Purified helium-3 is pumped from the feed tank through a multi-stage compressor cylinder loading.

Equipment descriptions:

Zeolite Beds: ambient Z-beds are utilized to adsorb any moisture that may reside in the gas being processed. Cold Z-beds are utilized to condense and trap heavier gases such as argon, nitrogen, oxygen etc. Any residual quantities of hydrogen isotopes can be caught here as well.

Cold Z-beds are liquid nitrogen cooled with three beds in series in a vacuum jacketed dewar. The beds are regenerated by allowing them to warm to ambient temperatures. This warm up causes the Zbed to desorb any captured oxygen, nitrogen , argon and other contaminants. These are sent to the waste tank for further processing.

Compressor: multi stage compressor is used to charge purifier helium-3 from tank to cylinder at a pre-determined pressure. Pneumatically driven using inert gas.

Vacuum pumps: used to evacuate piping and equipment and complete transfers into the system.

Ion chamber: located in sample manifold.

Instrumentation:

Operations

1. Ambient Zbed: temperature monitoring, pressure monitoring
2. Liquid Nitrogen Z-beds: temperature control, temperature monitoring, pressure monitoring
3. Feed tank: temperature monitoring, pressure monitoring, mass spec samples
4. Waste tank: temperature monitoring, pressure monitoring, mass spec samples
5. Compressor: pressure monitoring, pressure control
6. Cylinder loading: temperature monitoring, pressure monitoring, mass spec samples
7. Relief header: pressure monitoring, pressure control
8. Vacuum header: pressure monitoring, mass spec samples