Phase III: Large Pilot Testing of the MTR Membrane Post-Combustion CO_2 Capture Process

(DE-FE0031587; FOA 1788)

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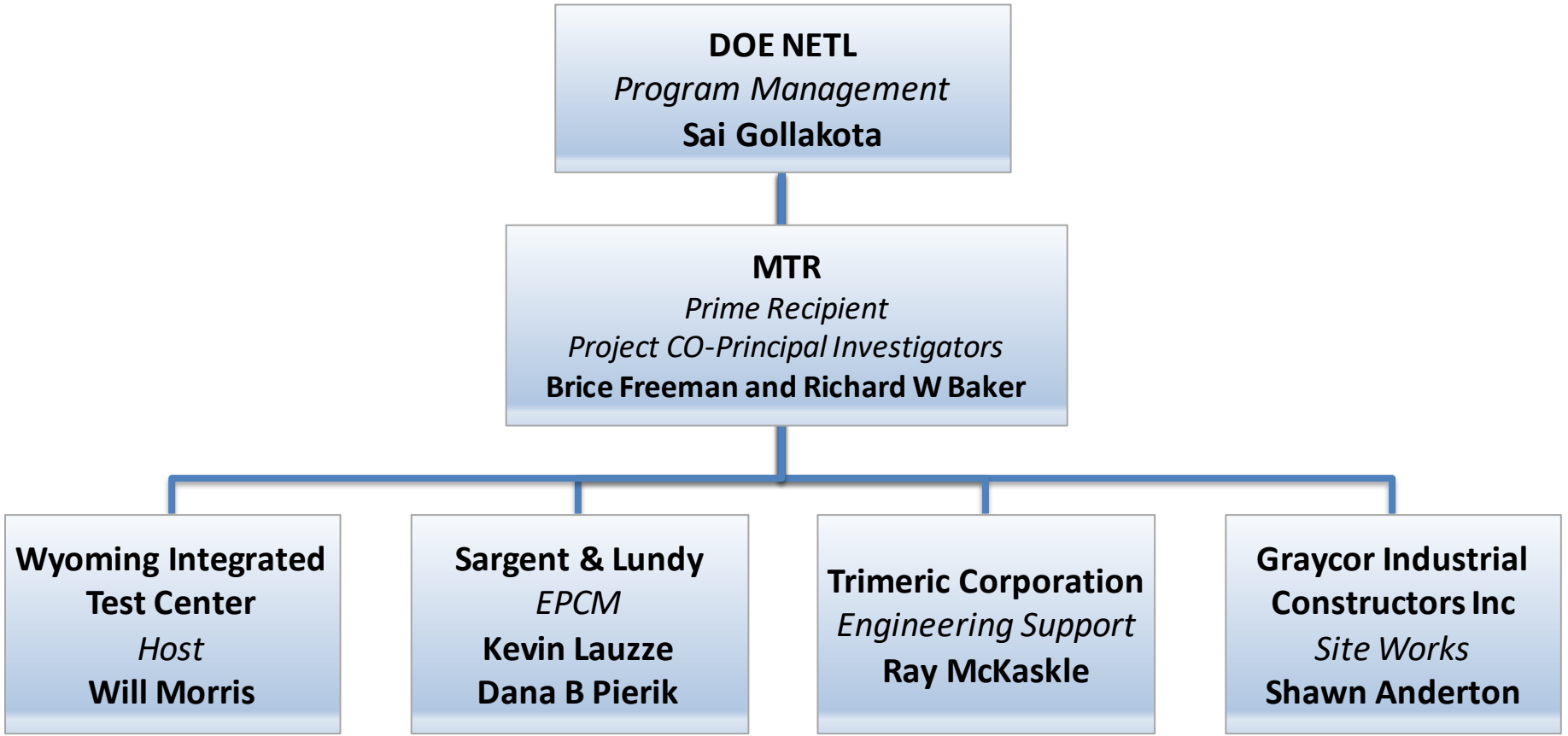
NETL FY21 Project Review Meeting
August 12, 2021

Project Overview

- **DOE-NETL Project Manager:** Sai Gallokota
- **Project Team:** MTR (prime), Sargent & Lundy, WITC, Basin Electric (Host), Trimeric
- **<u>Overall Goal:</u>** Design, build, and operate a 10 MW_e large pilot membrane capture system

Phase I	Phase II	Phase III
• Feasibility • Site selection • Create team $1.2 million	• FEED study • Permitting $3.8 million	• Build, operate, and demonstrate process performance and costs $64.7 million

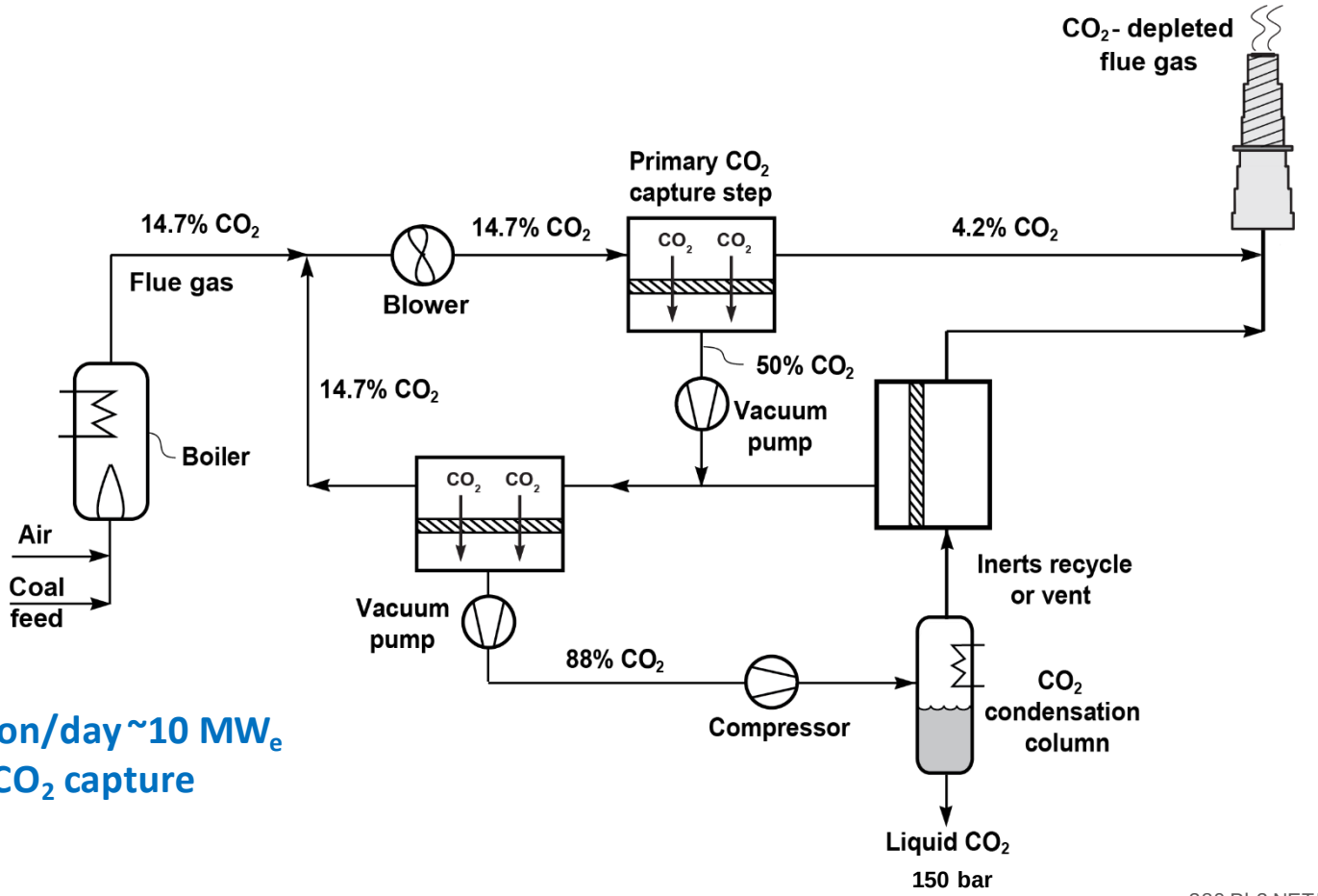
The Project Team



Phase III Roles and Responsibilities

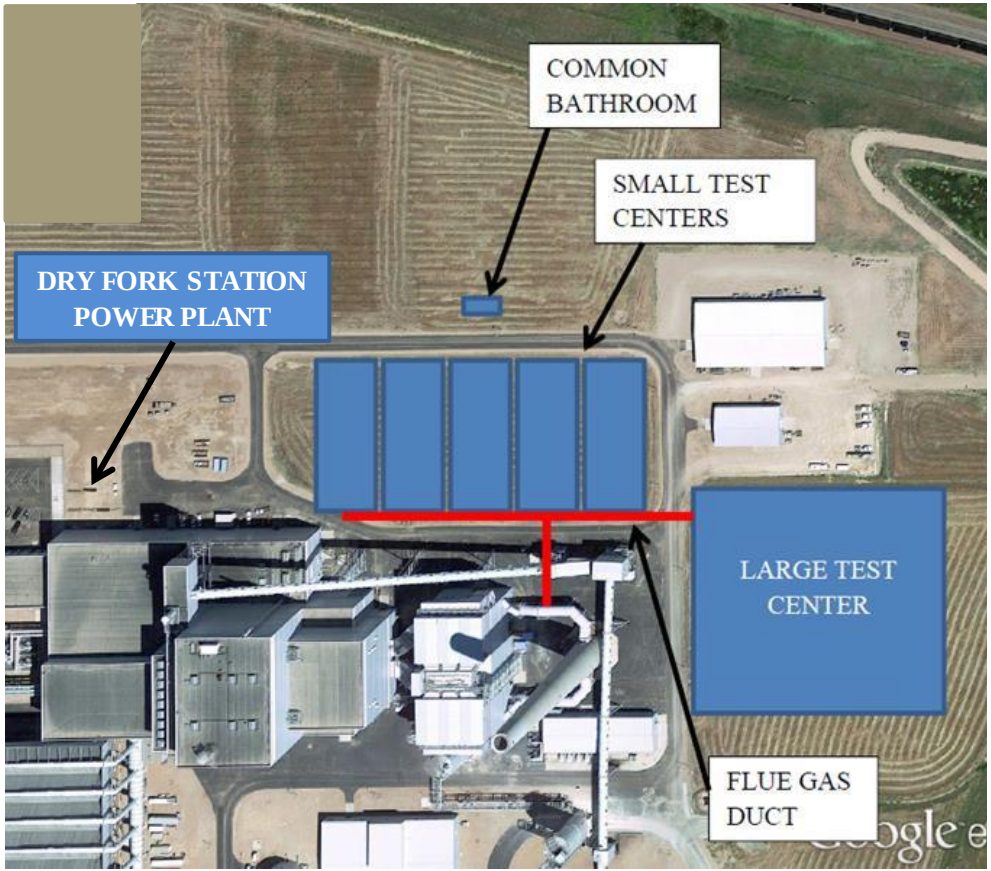
- Phase III project: $64.7 million / October 1, 2021 - August 30, 2026
  - **WITC**: Host site
  - **MTR** (prime): Fabrication of the membrane unit and operation of the system
  - **Sargent & Lundy**: Management of system detail design, supervision of site works and system installation
  - **Trimeric**: Engineering support
  - **Graycor Industrial**: Site works and installation of the system

The MTR CO_2 Capture Design



150 ton/day ~10 MW_e
75% CO_2 capture

Basin Electric's Dry Fork Station



- The Wyoming Integrated Test Center at Basin Electric's Dry Fork Station
- Modern power plant, full controls
- High CO_2 concentration flue gas
- Test center can supply 20 MW_e of gas
- Power, utilities and flue gas connections in place
- Immediately adjacent to WY CarbonSAFE injection site
- Six miles from an existing CO_2/EOR pipeline

Outcomes of the Phase III Program

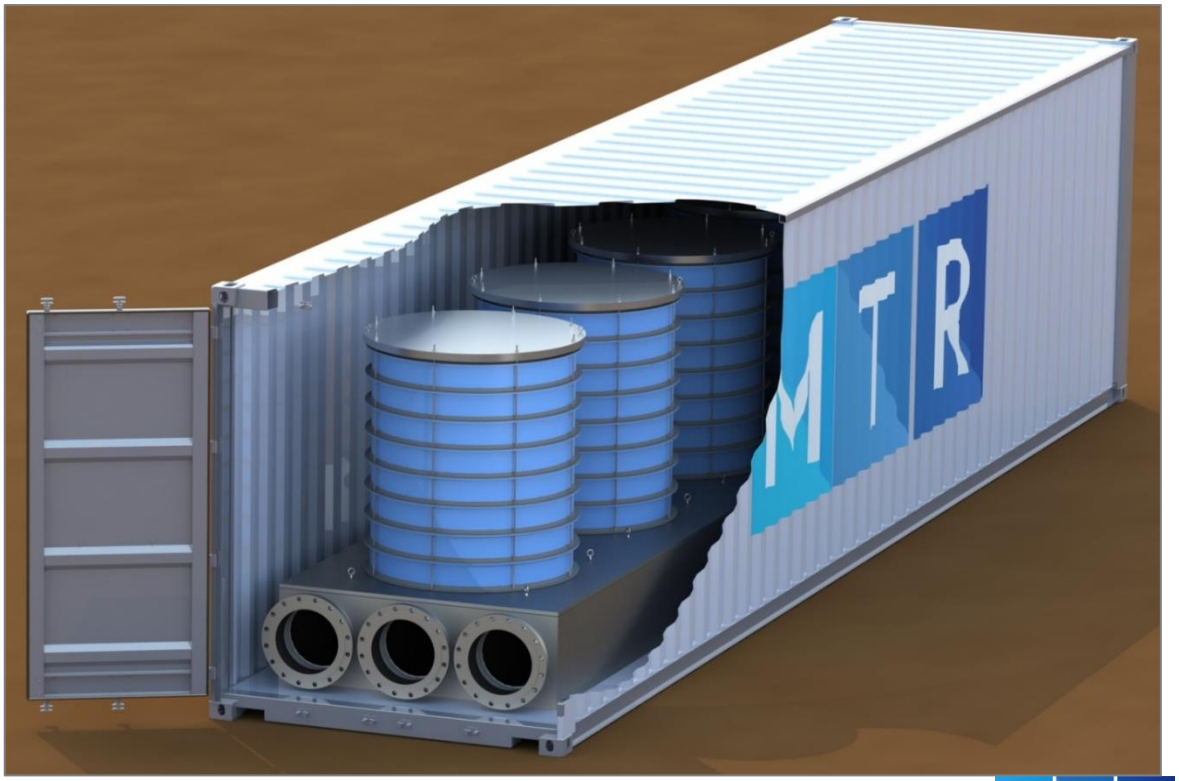
- Demonstration of the total process at a relevant scale (DCC, membrane separation unit, CPU, delivers liquid CO_2)
- Technology moves from TRL-6 to TRL-7
- Validation of membrane unit skids, the building blocks of future systems
- Scale-up and cost reduction
  - Module skid cost reduced by 50% in this program

MTR Testing at the National Carbon Capture Center (1 MW_e)

Spiral modules had large feed-to-residue pressure-drops and a large footprint

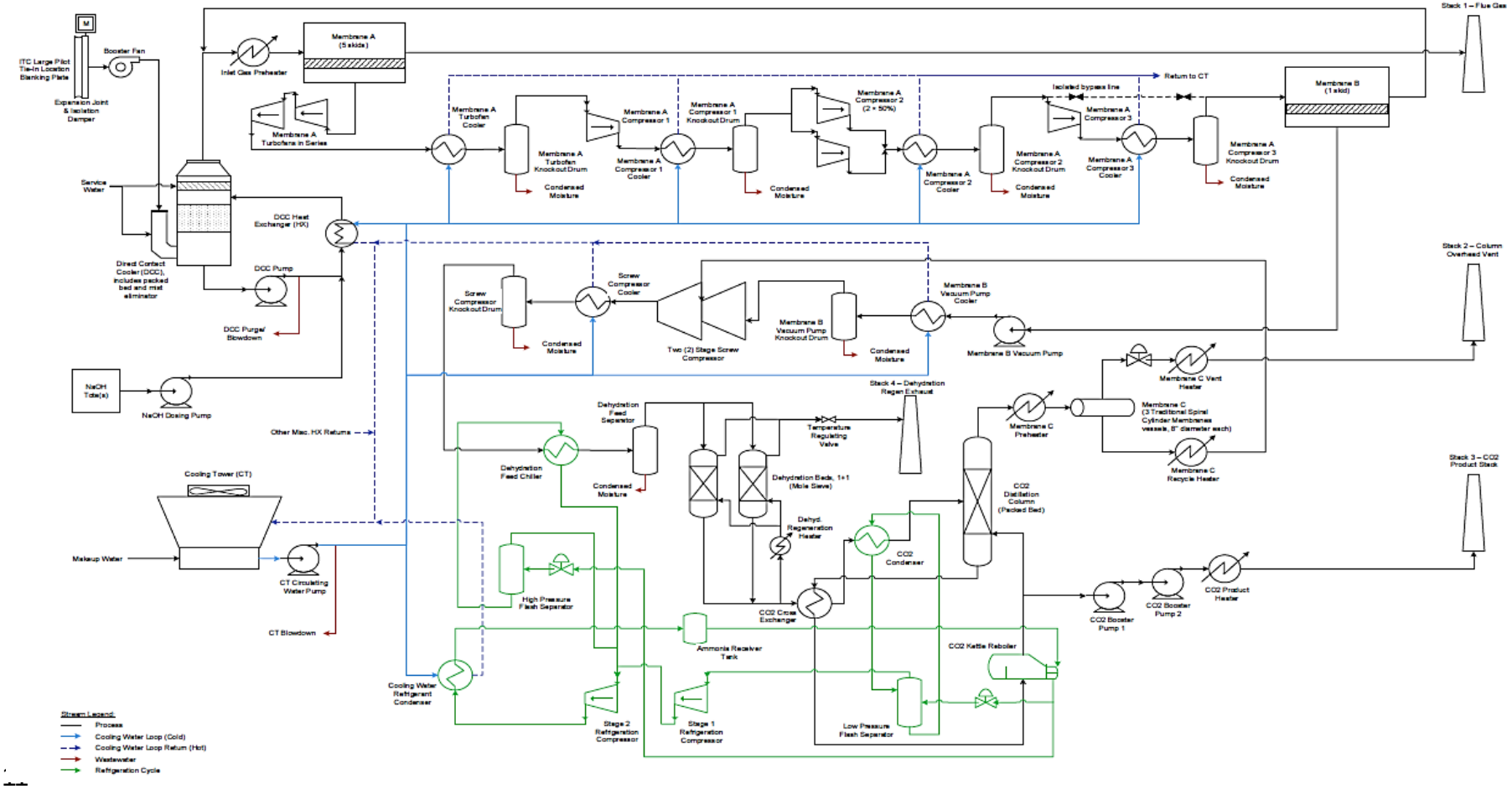
Plate-and-frame modules cut footprint pressure-drops and cost in half

The Large Pilot will Evaluate Stainless-Steel and Lower-Cost Plastic Housings in a Container-Sized Skid

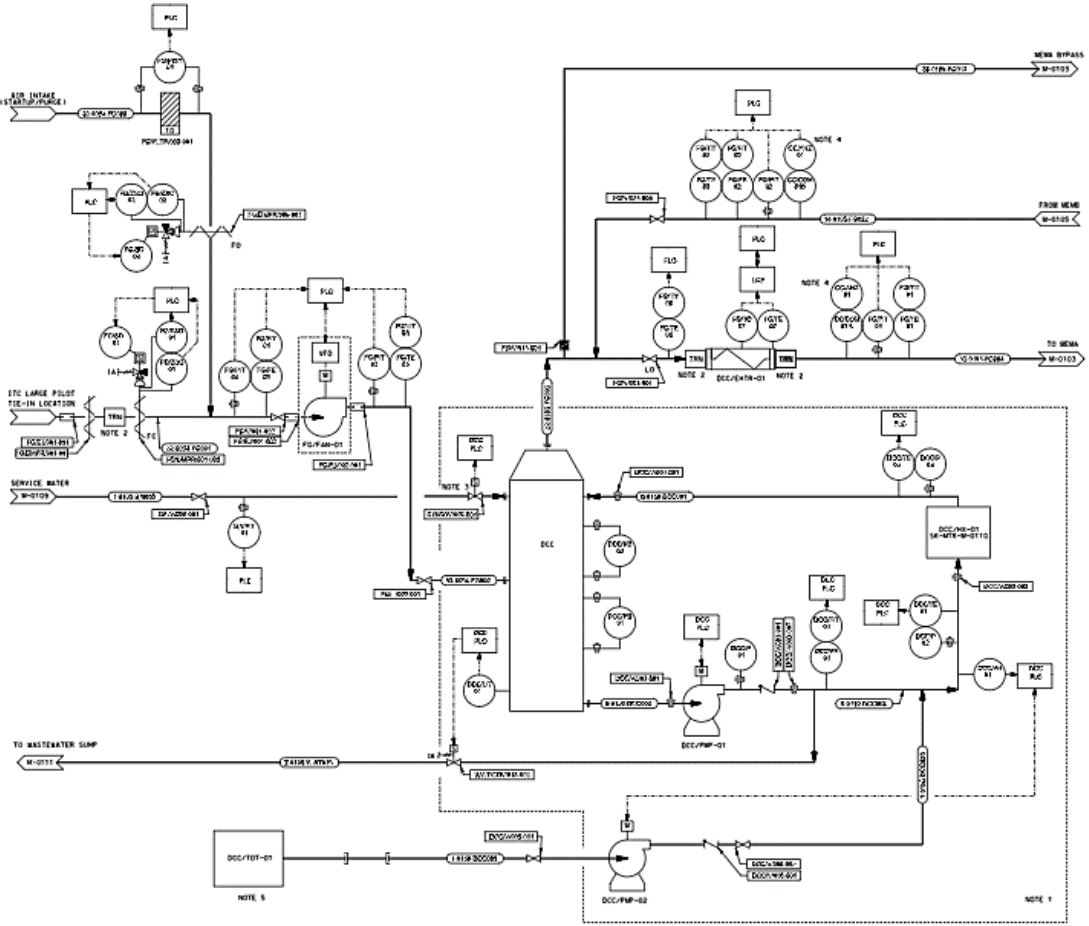


The TNO Test Unit During Installation

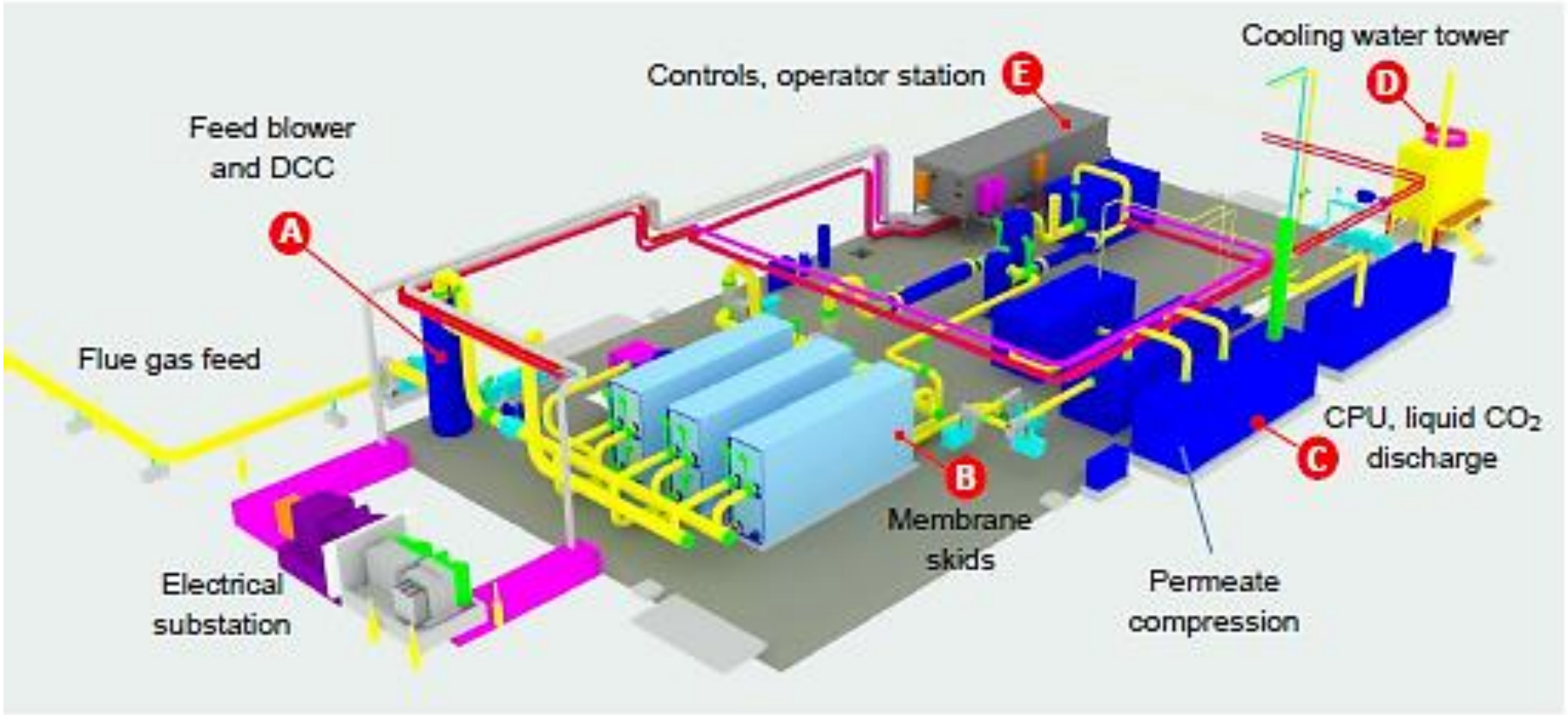
The Phase I Process Flow Diagram



The Phase II Partial Process Flow Diagram (The DCC)



Layout of the Large Pilot System



Large Pilot at DFS

Acknowledgments

This material is based upon work supported by the Department of Energy under Award Number DE-FE0031846.