

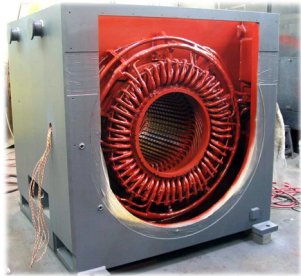
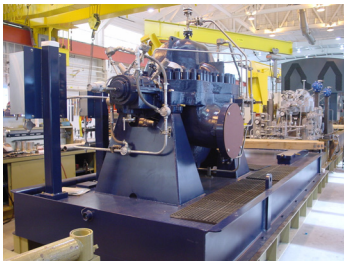
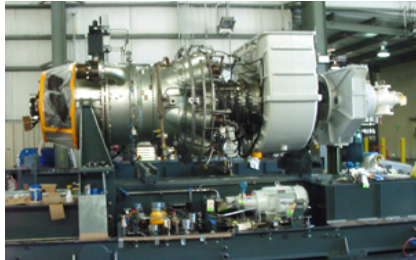
## Module Facts

- 56 truckable modules plus miscellaneous platforms, skids and tanks.
- Control modules, power distribution centers, and pipe headers fabricated by ASRC.
  - Pipe headers for the four electrified stations will be split into segments, shipped, and re-assembled on site. Segments are 19' 6" wide, 19' to 44' long, 28 to 44 tons each (12 pieces total —three segments per station).
  - Control modules are 17' wide, 62' long, 53 tons each (5 total).
  - Power Distribution Control modules are 21' wide, 60' long, 58 tons each, (5 being manufactured; a sixth will be installed at PS1 in an existing building).
- Variable frequency drive-switchgear modules, pump-motor modules fabricated by VECO.
  - VFDs are 16' wide, 43' to 53' long, 55 tons each (12 total).
  - Three at each station — only two have switch gear. The ones with switchgear are larger.
  - Pump modules are 18' 6" wide, 49' long, 88 tons each (12 total).

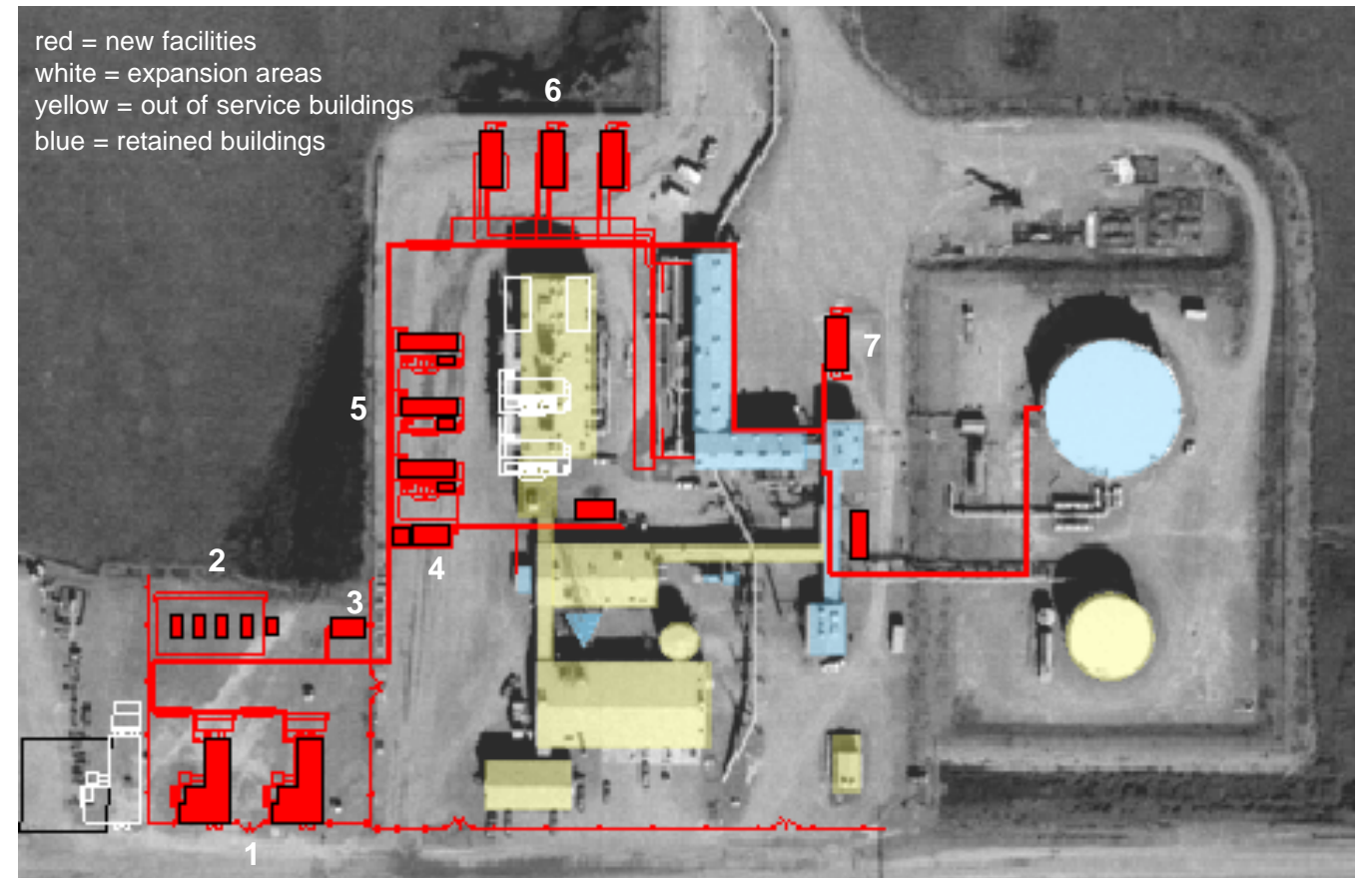


- Pump superstructure bases are in different stages of completion inside the VECO fab shop and will be moved to another fabrication facility at Pt. MacKenzie for finalization.
- Four diesel power generators will power Pump Station 5. Two modules, fabricated by Precision Power, will each house two generators.

## Engineered Equipment

- 6,500-horsepower electric motors were purpose built for the project based on a proven design. Alyeska's extensive testing program revealed excessive vibrations at a particular speed. The manufacturer, Electric Machinery, modified the motor housings to include circular springs which eliminated the unacceptable vibrations.
 
- Each operating pump station will house three Sulzer two-stage centrifugal pumps. Each pump is powered by an electric motor. The VFD varies the frequency of the power to control the motor and pump speed.
 
- Five Siemens Cyclone gas turbine generators will provide primary power for some Pump Stations — two each at Pump Stations 3 and 4, and one combined with the local power grid will power Pump Station 1. The turbine generators will be housed in arctic enclosures assembled on site.
 

# Pipeline Reconfiguration Project and Module Facts



1. turbine generators; 2. turbine fuel tanks; 3. diesel backup generator; 4. control module; 5. variable frequency drives; 6. pump-motor modules; 7. power distribution center module.

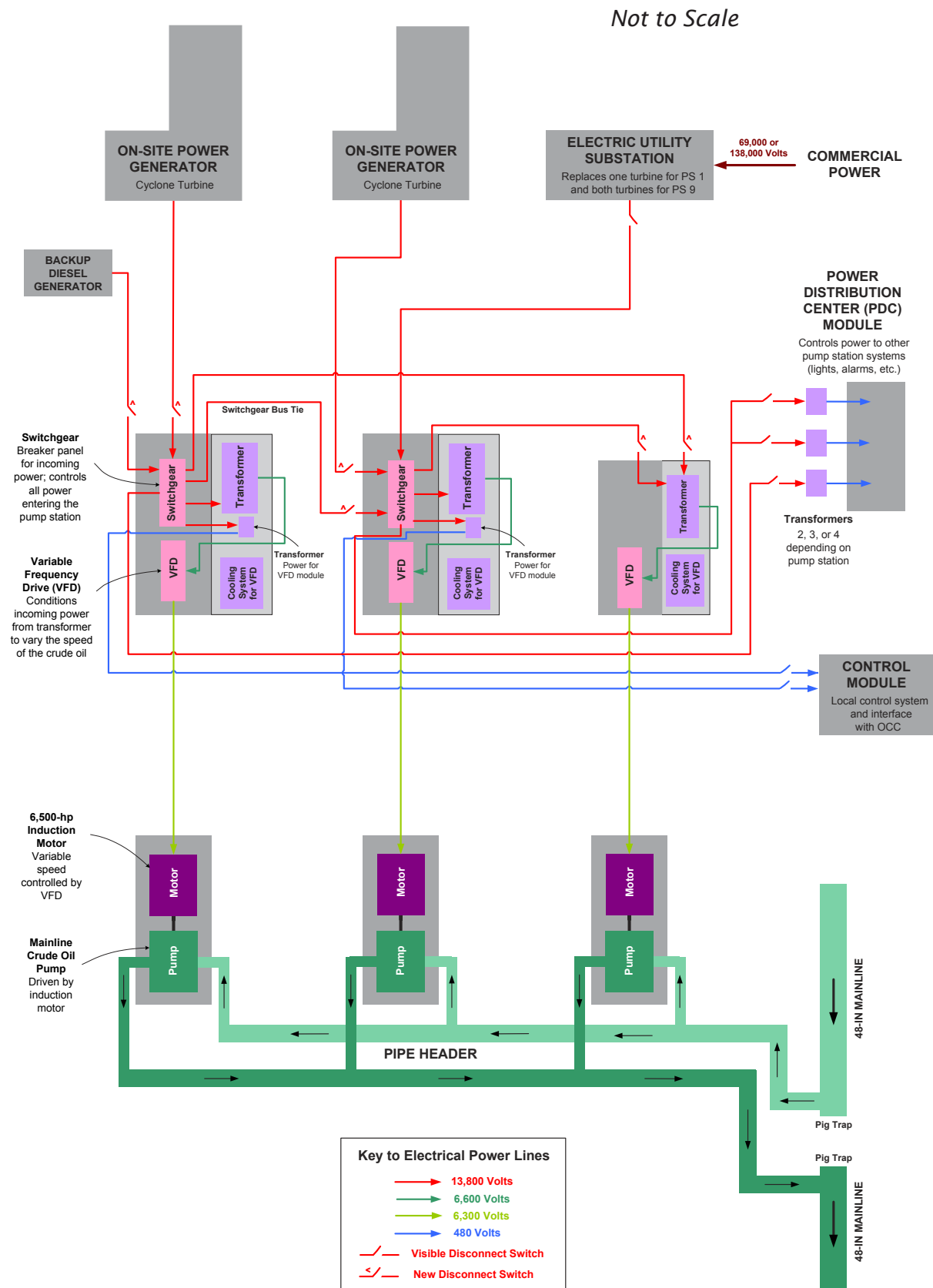
## Objectives

- Minimize cost of transportation and extend economic life of TAPS and North Slope oil fields.
- Modular and scalable to accommodate throughput variations more efficiently.
- Simplify facilities, renew assets, and automate using proven technology.
- No decrease in safety or operational integrity.
- Maintain existing pipeline reliability.

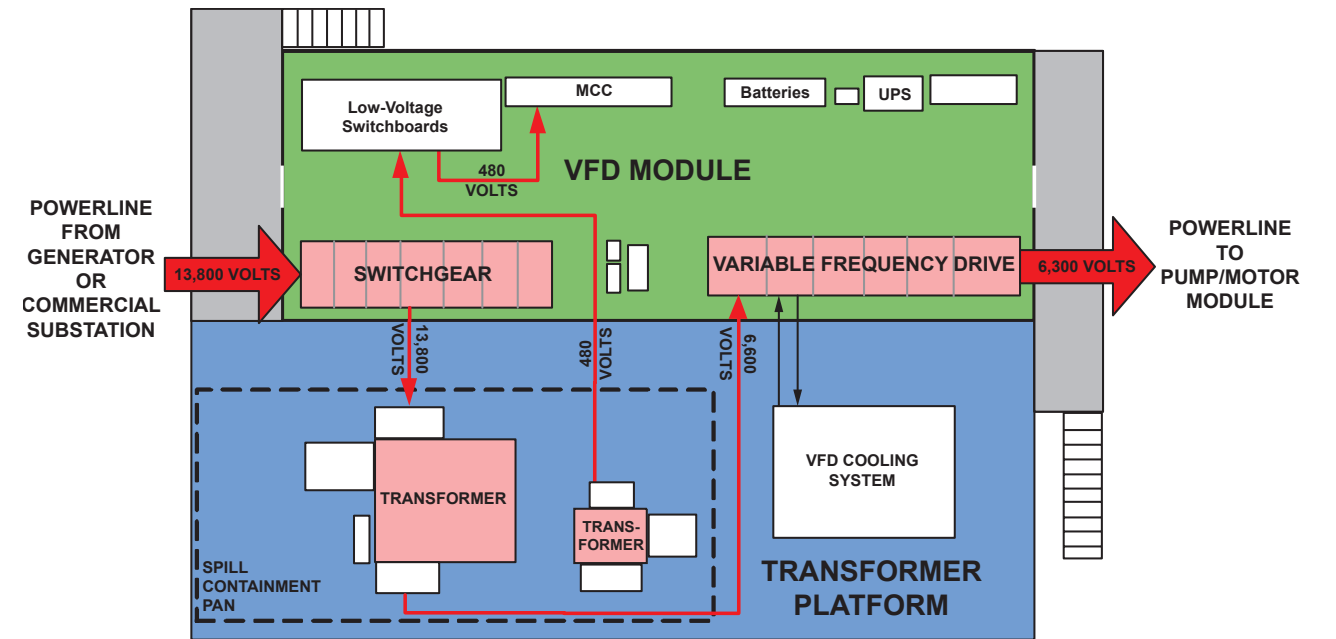
## Scope

- Install four new Pump Stations (1, 3, 4, and 9).
- Upgrade PS 5 relief station.
- Lifecycle / control system upgrades.
- Amend the Oil Spill Contingency Plan (OSCP).
- Switch to regional maintenance and emergency response.
- Upgrade security and remote monitoring systems.

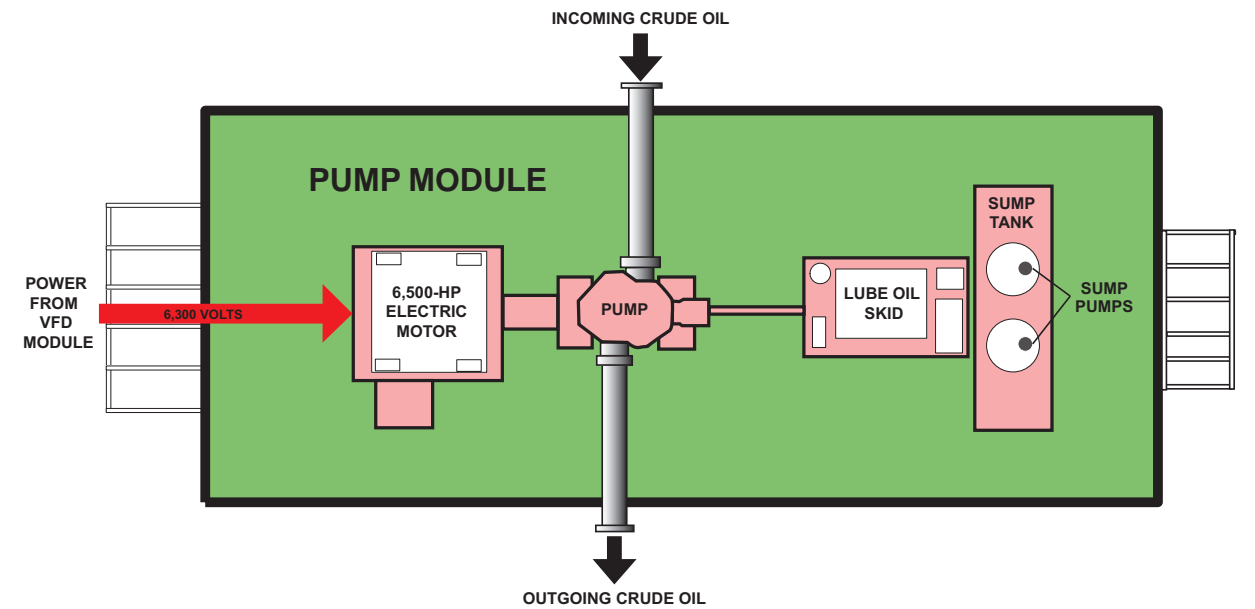
## Typical Pump Station Schematic



## Anatomy of a Module



Three variable-frequency-drive (VFD) modules will be installed at Pump Stations 1, 3, 4 and 9. All three will contain VFDs, while two will also contain switchgear. A platform adjacent to the module will hold a cooling system for the liquid-cooled VFD, a transformer to step down the incoming power from 13,800 volts to 6,600 volts, and a station transformer to provide 480-volt power to the module. The VFD controls the frequency of the power in order to vary the speed of the pump motors.



Three pump modules will be installed at each of Pump Stations 1, 3, 4 and 9. All will contain an electric motor, a crude oil pump, a lubricating oil skid for the pump and motor, and a sump tank to collect any oil leaks. Oil enters the module on the suction side of the pump and leaves on the other side of the module through the discharge side of the pump. The sides of the modules will consist of louvers open to the outside air to help ensure proper ventilation. Crude oil piping will run into and out of the pumps through a new pipe header system that will tie in to the existing crude oil piping near the pump station manifold buildings.