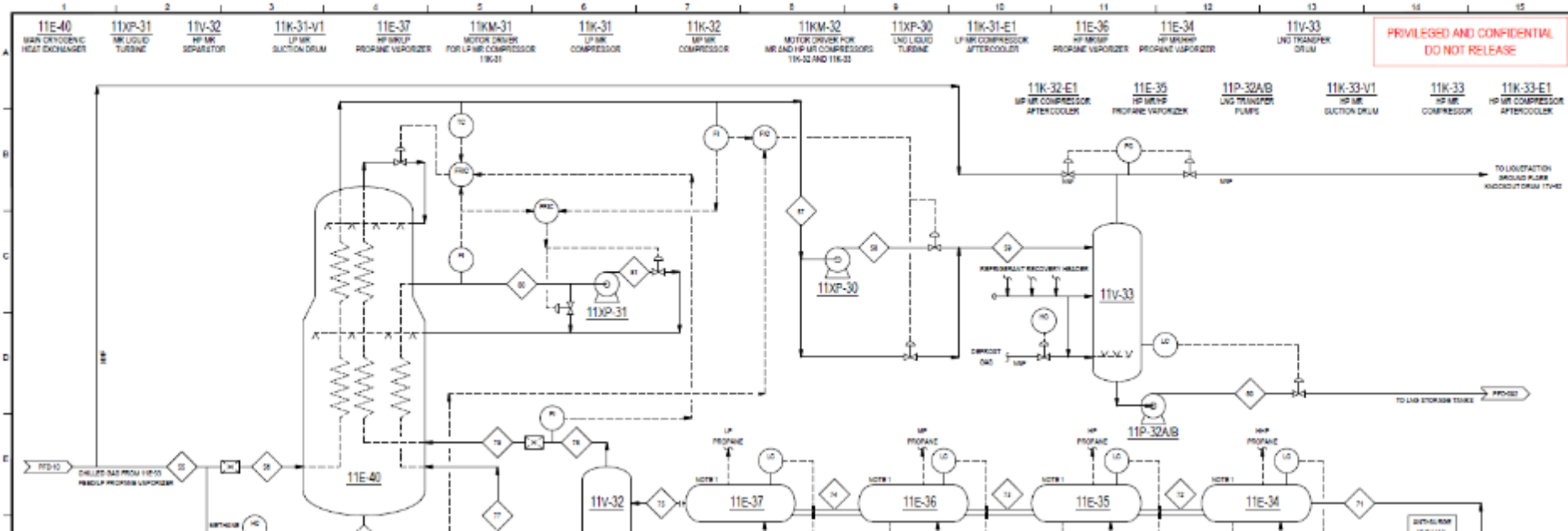


Air Emissions Reduction: Flare Reduction Projects

LQF Flare Reduction Project

Introduction



The 3 liquefaction trains at Freeport LNG's facility at Quintana Island have a low pressure single-phase LNG Transfer Drum (11/12/13V-33) downstream of the Main Cryogenic Heat Exchangers (MCHEs) that was supposed to operate without vapors accumulating in the vapor space. There is a Liquid Turbine, 11/12/13XP-30, in-line between the MCHE and Transfer Drums to extract/recover energy from the pressure reduction that is intended to take place between the MCHE and the inlet to the LNG Transfer Pumps. Due to the subcooled nature of the original plant process design, it was assumed that V-33 would exhibit stable operation at 0.5 PSIG without pressure build-up and little to no overhead flow (NNF) to the Liquefaction Ground Flare. However early operation of the facility has shown that non-condensables in the Feed Gas, also contain significant quantities of Helium (He) and Hydrogen (H2), each of which have a significantly higher vapor pressure than methane (C1) and Nitrogen (N2).

Introduction



The result is that FLNG must operate V-33 at pressures in the 40-60 PSIG range (versus the 0.5 PSIG design) to limit the amount of vapor containing C1, N2, He and H2 going to the LQF flare. Even operating the drum at higher pressures, the amount of gas going to the flare is significant. Keep in mind that even though these non-condensables are inert gases, the flare system must introduce sufficient natural gas such that the flared stream has no less than 800 BTU/SCF heating value. The natural gas used for make-up is then not used to make LNG. FLNG's Air Permit issued by the TCEQ allows zero flaring during normal operation, therefore, any flaring results in a violation of our permit.

Ground Flares



Ground Flares

- Close flare header
- Pressure assisted
- Staging valves (open when pressure above 20 psig, close when pressure is below 5 psig)
- No need for continuous purging, only after a release (N₂ post-purge)
- BTU enhancement to ensure burners maintain no less than 800 BTU/scf



Flared Volumes



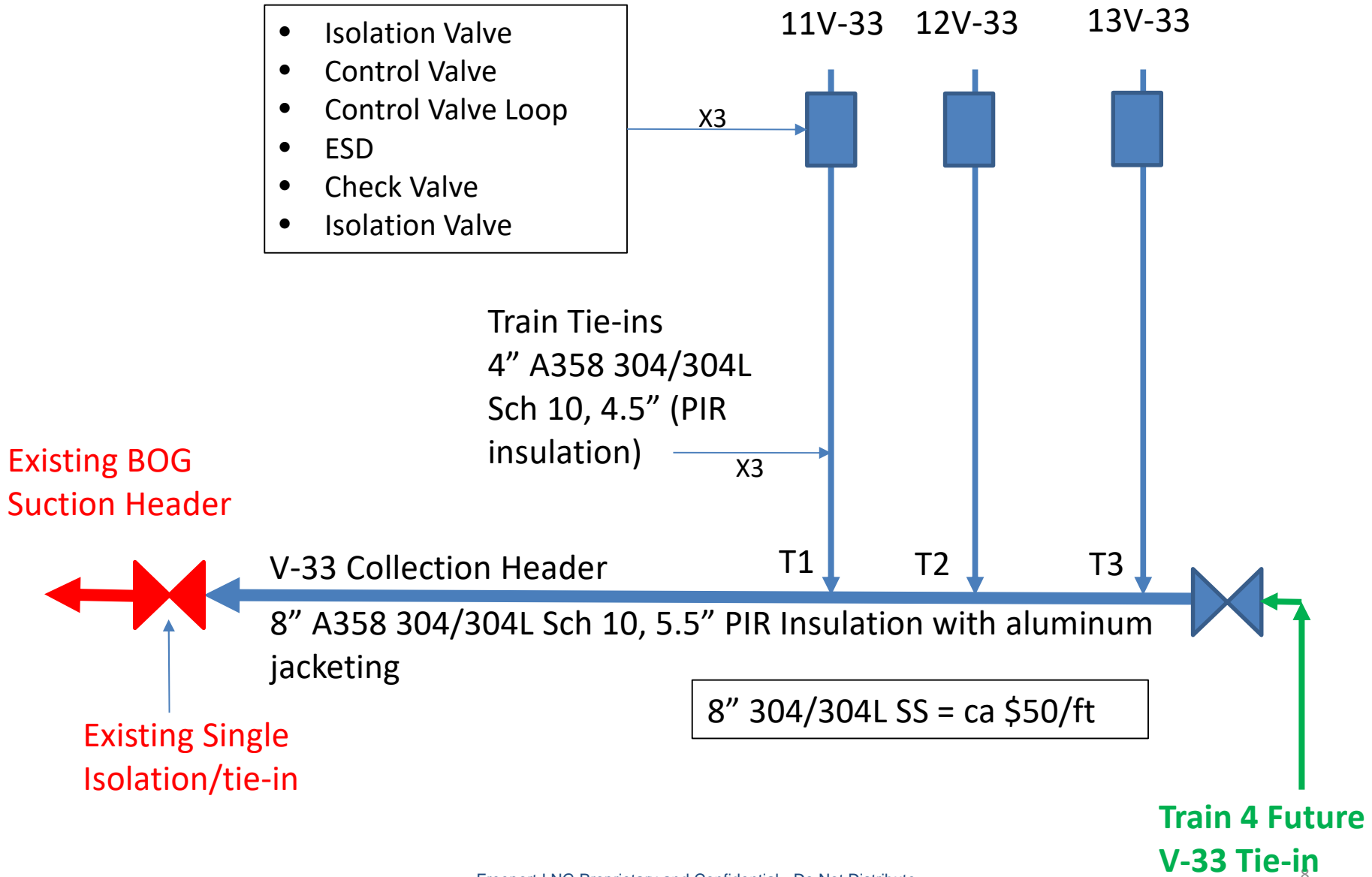
❖ For Normal Operations

Flashed vapor		
Flash Gas Flow	lb/h	2000
Flash Gas Flow	MMSCFD	1.10
Flash Drum Press.	psig	10
Header Pipe		
BOG Header Press.	psig	0.5
Size	in	8

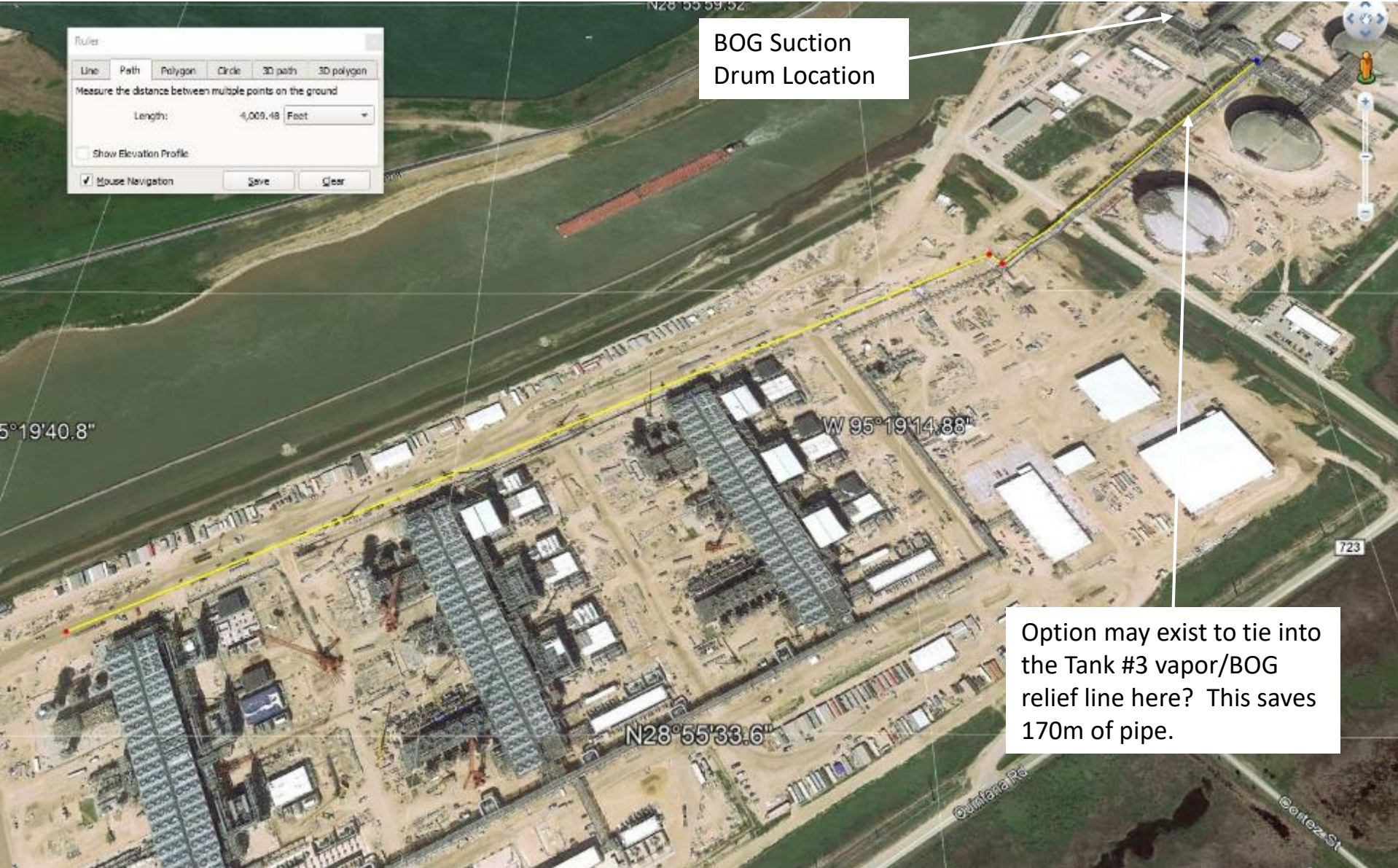
❖ **Production Assumptions:** 2 mol% N2 content and 10 psig V-33 Operating pressure.

	2.0 mol% N2 Case	2.5 mol% N2 Case	3.0 mol% N2 Case
Pressure, psia	704.3	704.3	704.3
Temperature, deg F	-260	-260	-260
Flow rate, MMSCFH	33.6	33.6	33.6

Collection System Overview Schematic



Collection System Route – Main 6" Gathering Line



BOG Suction
Drum Location

Option may exist to tie into the Tank #3 vapor/BOG relief line here? This saves 170m of pipe.

V-33 Gathering Line (6")

-  In LNG Trough
-  In AG Piperack



PTF Flare Reduction Project

Problem Statement:

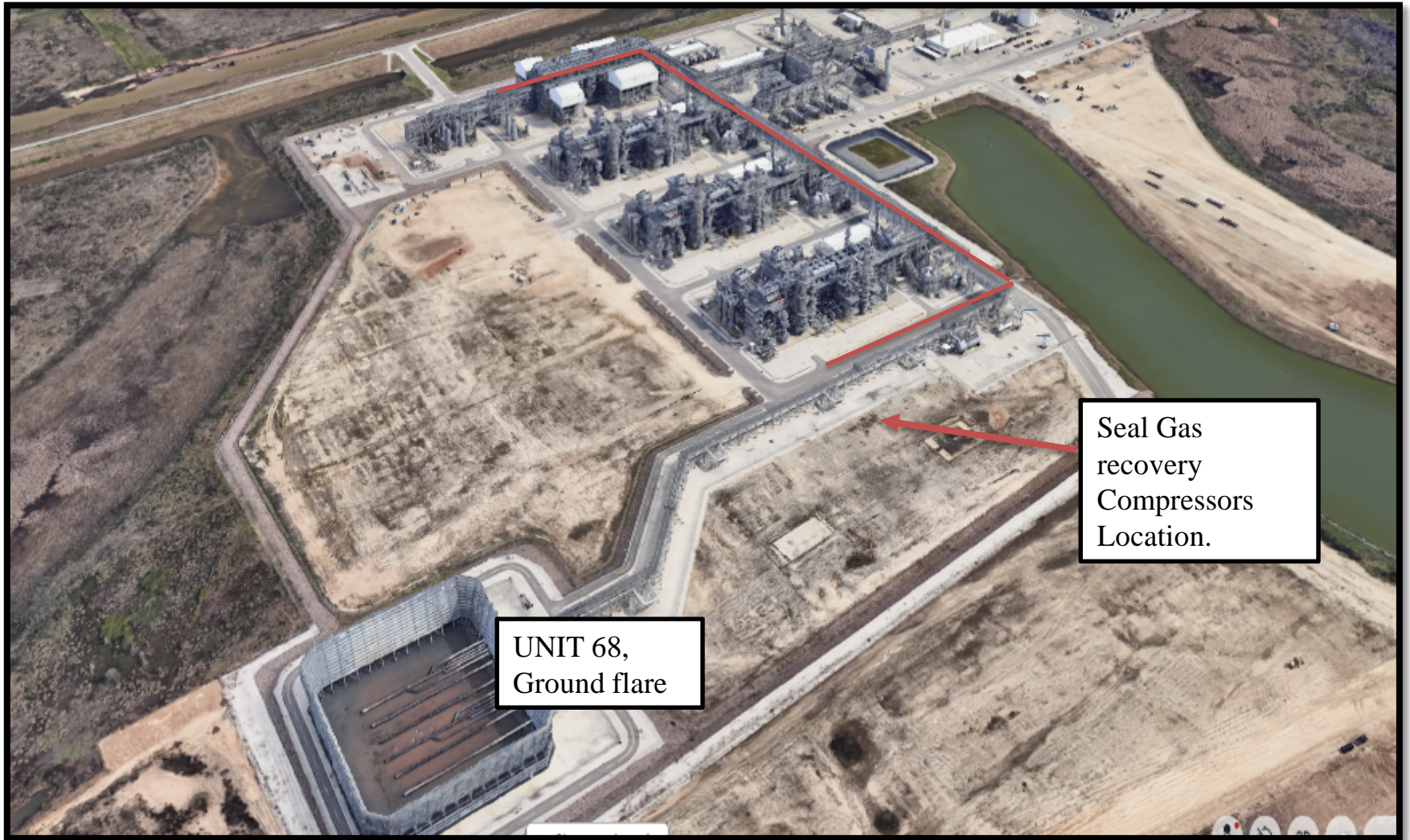
The Freeport LNG Pretreatment Facility (PTF) is experiencing excessive flaring in the Warm and Cold Flare Units during normal operations, resulting in non-compliance with the TCEQ Air Permit. The primary driver is high volumes of N₂ seal gas from compressors and pumps routed to the flare system.

Proposed Solution:

Install two 100% capacity compressors (one duty, one standby) to recover flare gas from both Warm and Cold Flare headers and redirect it to the PTF inlet feed gas line. Compressors will operate only during steady-state operation of the process trains to eliminate routine flaring under normal conditions.

Flare Flows	Normal Expected	Units
Warm Flare	1.00	MMSCFD
Cold Flare	0.04	MMSCFD
Total Flare flow:	1.04	MMSCFD
Total Flare flow:	2,952	lb/hr

- ❖ An additional 2.6 MMSCFD of fuel gas is required for BTU make-up for both the cold and warm flares.



System Overview Schematic

