Infrared Radiant Tube Heaters – A New Direct Use Technology

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Outline

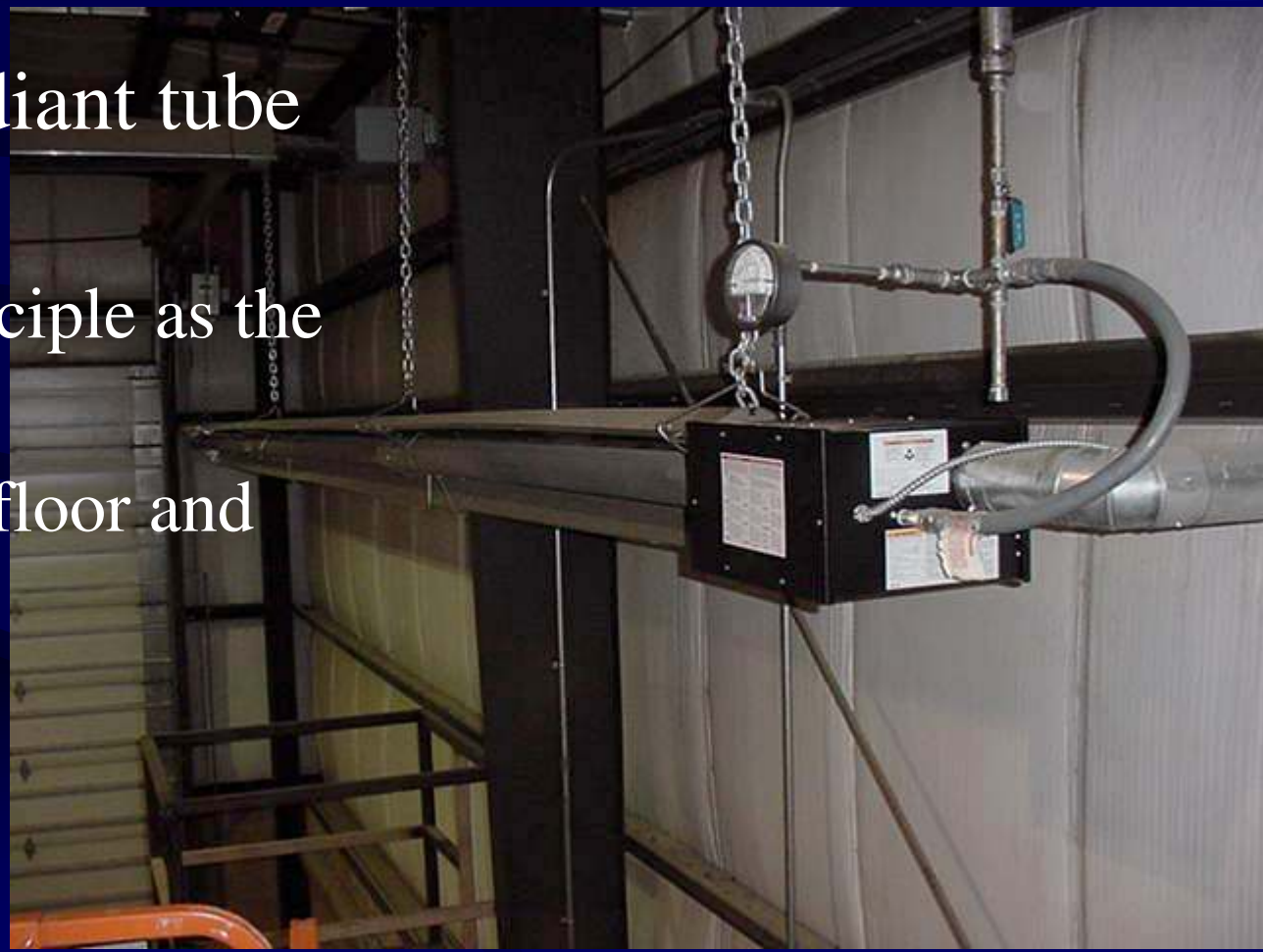
- Introduction
- Frederick and Fairfax case studies
  - Feasibility study
  - Design
  - Construction
  - Operation
- Summary

Introduction

- Technologies for utilizing LFG
  - Conventional: boiler, electricity generation, pipeline upgrades…
  - Emerging technologies:
    - Vehicle fuel, micro turbine, fuel cells, greenhouses...
    - Infrared radiant tube heaters - 1st in US

Principle of Operation

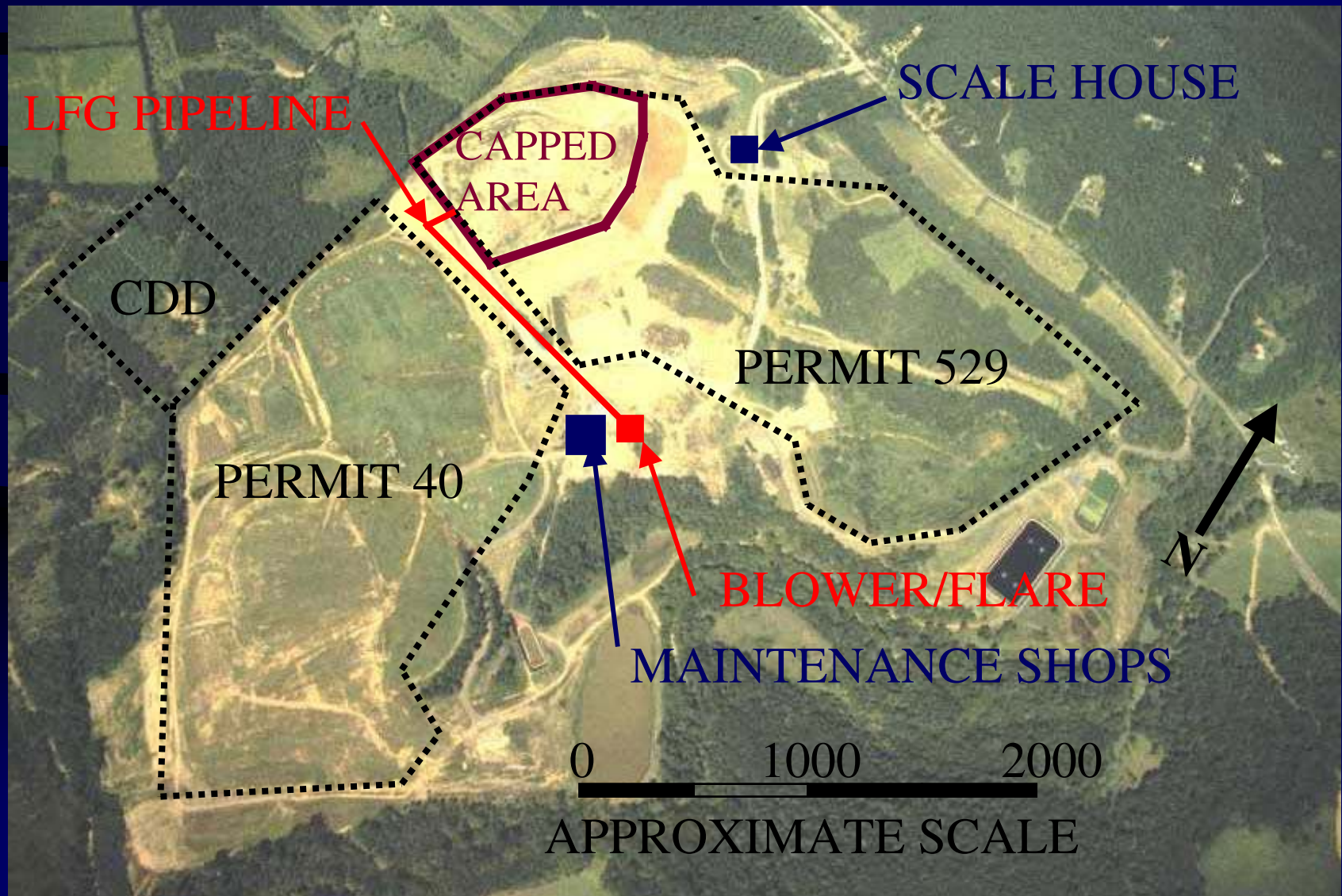
- Infrared radiant tube heaters
  - Same principle as the sun
  - Heats the floor and objects



Frederick Profile

- Permit 529; opened 1993, ~ closure 2030
- 170-acre facility; 90 acres for landfilling
- 1.5 million tons of waste
- 550 tpd
- 6-acre portion capped in 1999
- 500 cfm

Frederick County Landfill, VA



I-95 Profile

- Closed
- 260 acres landfilled
- 22 million tons of waste
- 130-acre portion capped
- 300 collection devices

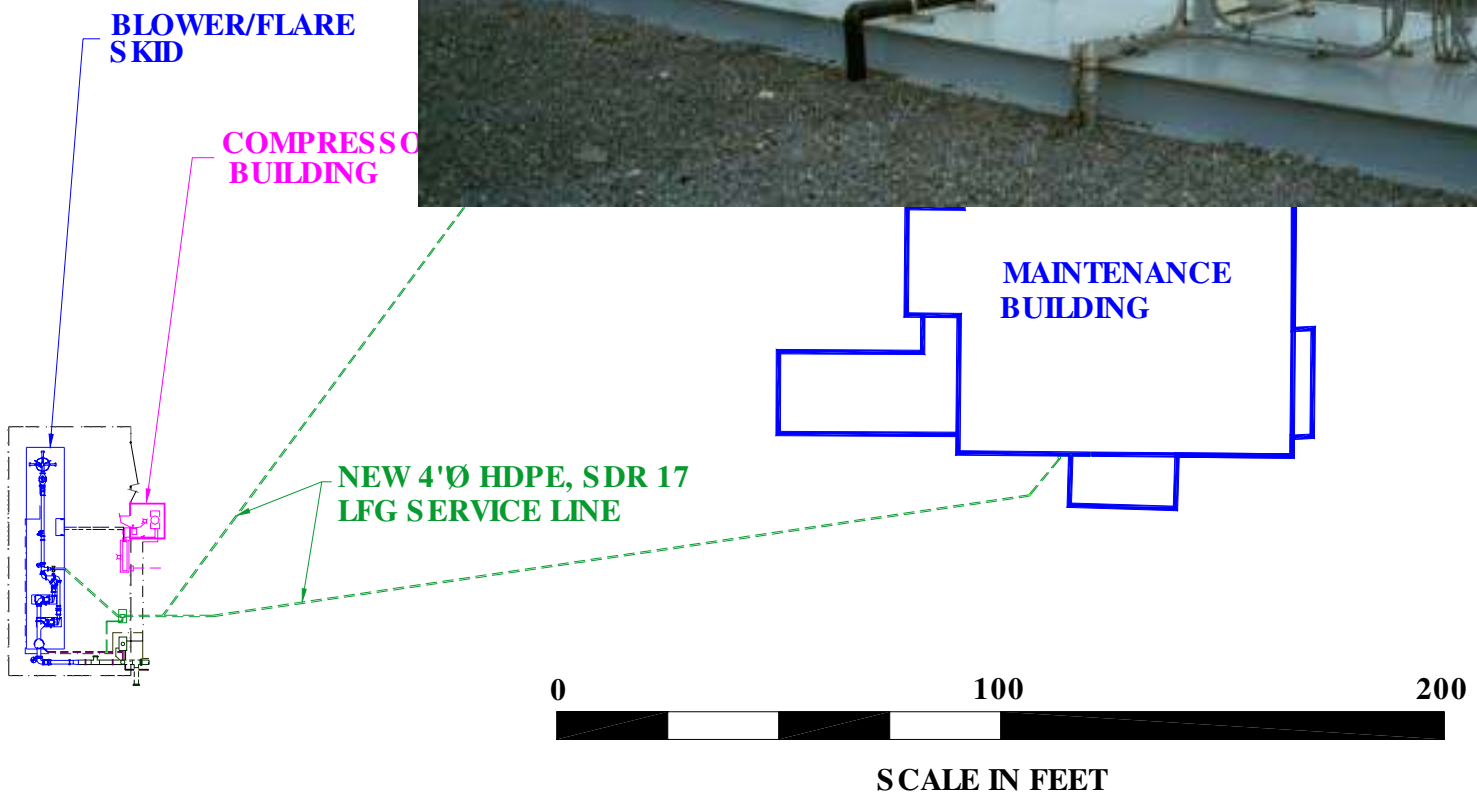
I-95 Landfill

~Waste Footprint

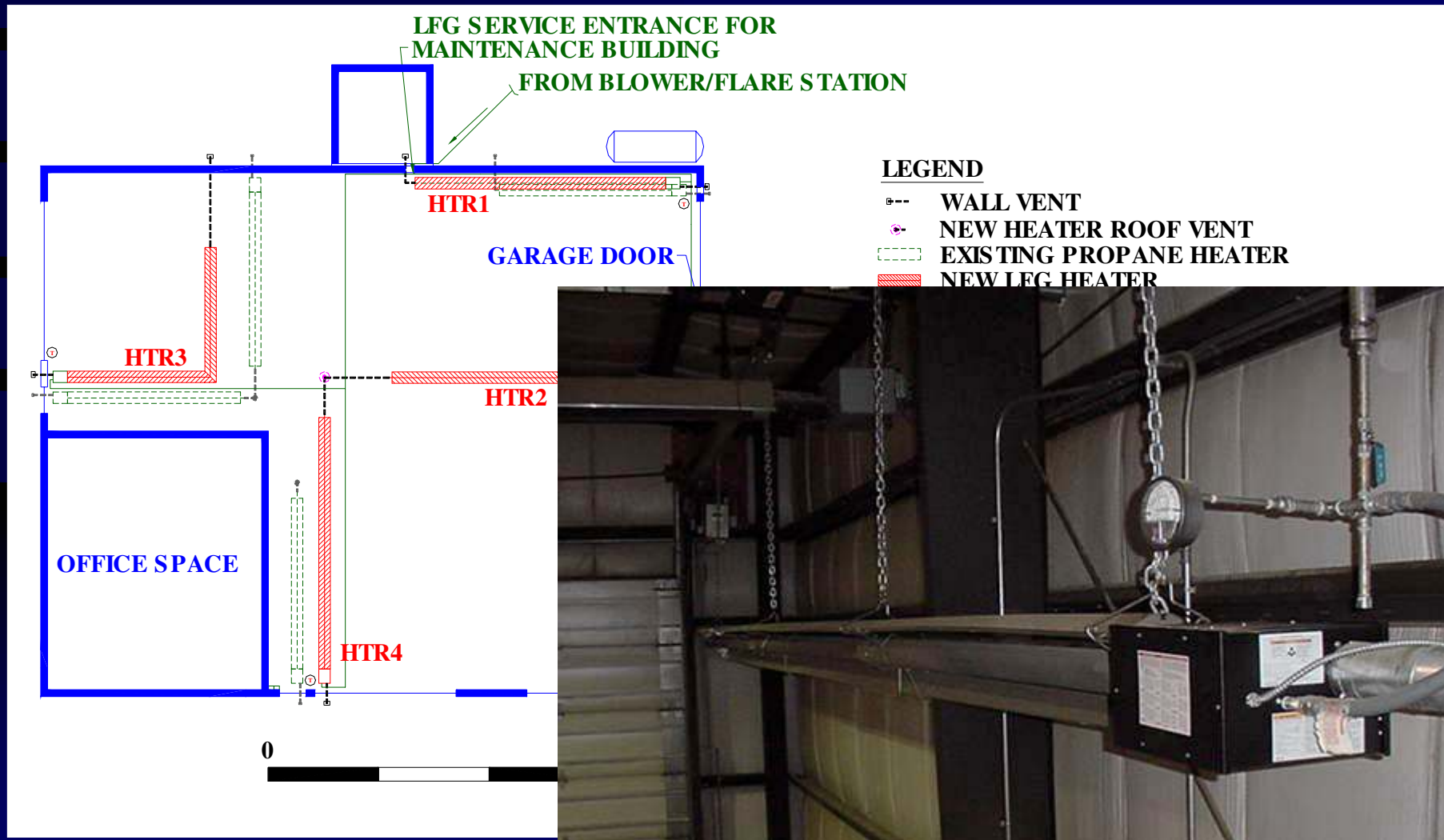
Feasibility Study

- Analyzed various alternatives
- $12K-15K/yr. propane cost
- Recommended
  - New infrared heaters
  - Parallel with existing system
- Payback between 5 and 10 years

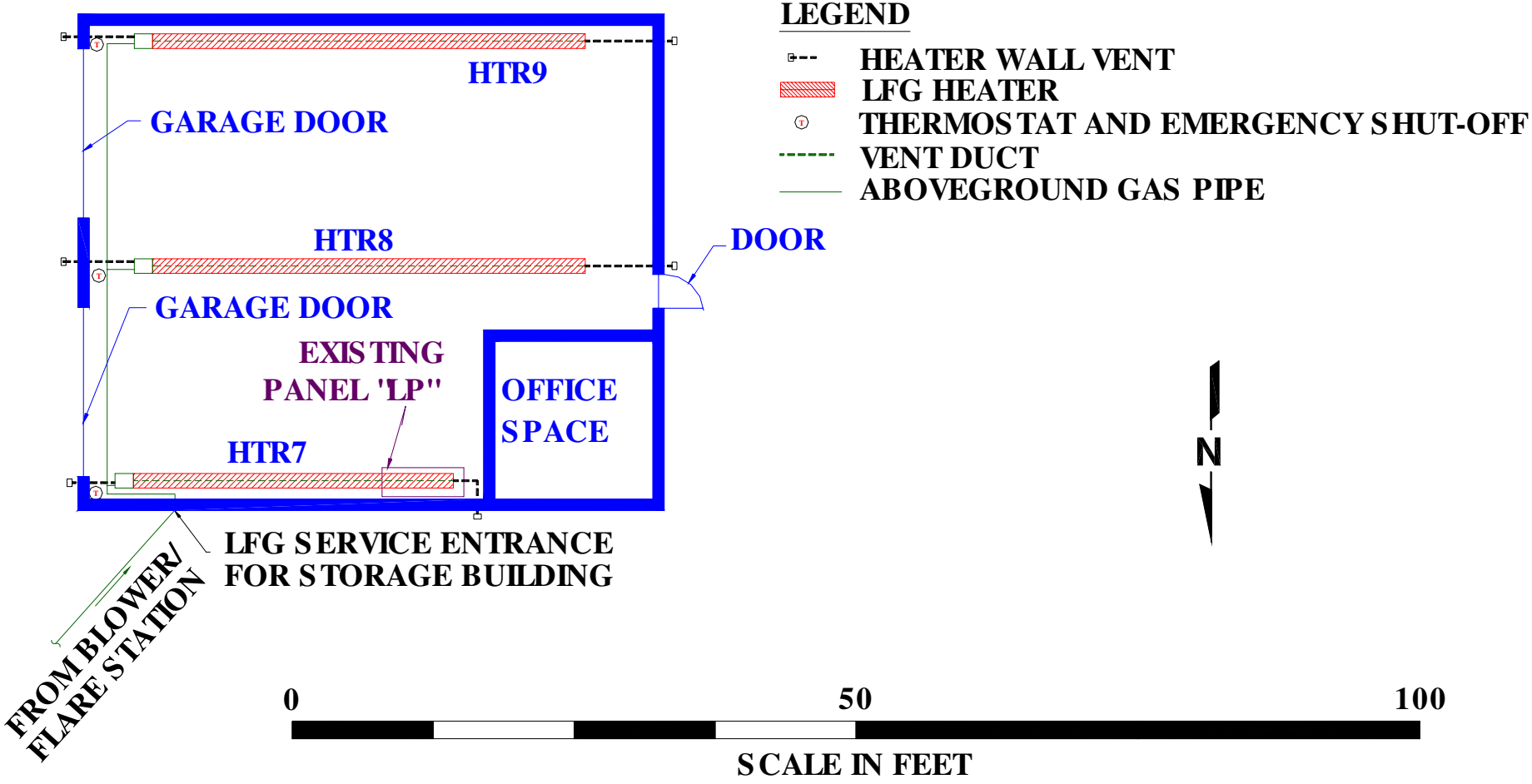
LFG Ser


BLOWER/FLARE
SKID
COMPRESSO
BUILDING
MAINTENANCE
BUILDING
NEW 4'Ø HDPE, SDR 17
LFG SERVICE LINE
0
100
200
SCALE IN FEET

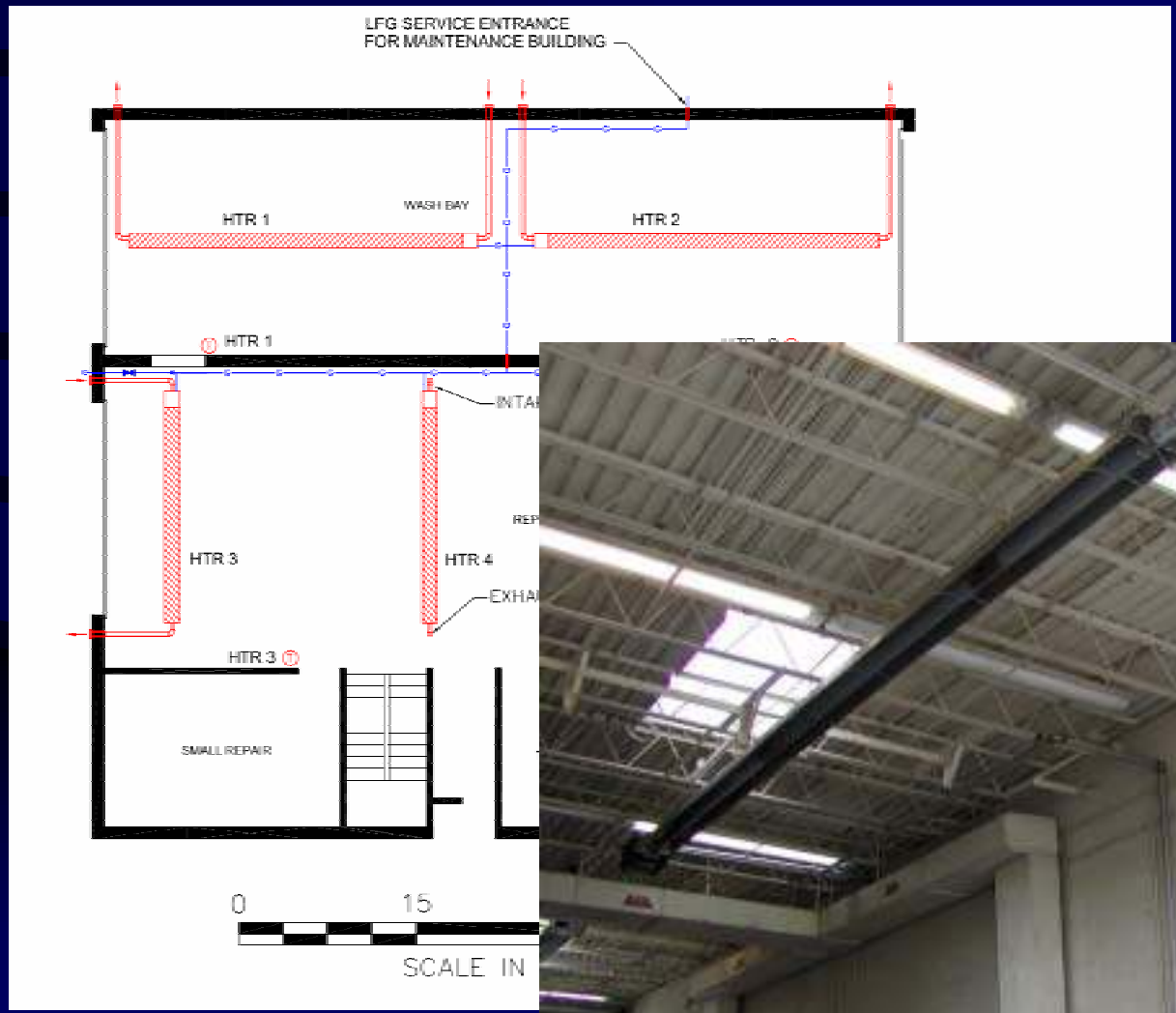
Maintenance Building - Frederick



Storage Building - Frederick



Maintenance Building – I-95



Design/Construction/Operation

- Frederick, < 30 cfm
- I-95, < 15 cfm
- Stainless steel above-grade, HDPE below grade
- Standards heaters - modified for LFG
- Simple controls
- Ordinary mechanical contractor
- Construction time - 3 months, 2/01 to 5/01
- Simple to operate
- Minimal maintenance

Startup/Operation

- Frederick
- Operated
- Problem
- Fixed by
- Carbon-f
- Operatio

Summary

- First LFG infrared heater projects in the US
- Reasonable payback
- Less than 30 cfm LFG needed to heat about 6,500 sf
- Minimal gas treatment
- Low sophistication - simple to operate