

NASA Goddard Space Flight Center

Adapting Equipment to Burn LFG

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Introduction

- Goddard is the first federal facility to direct-burn landfill gas on site
- Sandy Hill Landfill is 5.5 miles away
- Two 40,000-pph boilers were modified to burn landfill gas
 - 100% landfill gas
 - Landfill gas and natural gas mixture
 - Landfill gas and fuel oil mixture
- Landfill gas can presently meet most of NASA's fuel needs except during January – March
- Key concerns were reliability, cost savings, and environmental benefits

Environmental Benefits

- Washington DC is a severe non-attainment area for ground level ozone.
- Conversion to landfill gas will result in removing 1.6 metric tons of CO₂ over 10 years.
 - Equivalent to removing 35,000 cars or planting 47,000 acres of trees
- NO_x emissions have plummeted
 - Previous: 0.1 lb/MMBTU
 - Now: 0.02 lb/MMBTU (landfill gas)
 - 0.05 lb/MMBTU (natural gas, new burners)



From Proposal to Contract

- Seven years from first proposal to light-off
- Toro installed equipment; NASA will buy landfill gas for 10 years
- Issues
 - Would this work on Goddard's boilers?
 - Corrosion
 - Odor
 - Reliability and Safety
 - Contracting beyond congressional budget approval – thinking out of the box
 - Easements and permits
 - Toro's contract with landfill

Sandy Hill Landfill

- Owned by Prince George's County, operated by Waste Management Inc.
- 340 acres of municipal waste, received trash between 1978 and 2000
- 2,300 cfm was being flared at the landfill
- New equipment:
 - Compressor
 - Cooler
 - Controls

Landfill Controls

- Maintain constant negative pressure on landfill
- Remove condensation from landfill gas
- Provide flow and pressure required by boiler plant
- Switch between flare and export pipeline
- Eliminate low-BTU gas slugs in pipeline
- Safety features

Boiler Plant Modifications

- Landfill gas moisture removal
- Metering for billing and control
 - BTU monitoring
 - Daily reports for fuel and steam parameters
- Fuel train mods
- Burner design

Boiler Controls

- PLC Controllers, with high levels of integrity and reliability
 - Dual flame scanners
 - Interlocks between burner management and combustion control PLC's
 - Redundant I/O
- Controls allow boilers to react to changes in landfill gas pressure and energy content.
- Controllers optimize use of landfill gas