

Expansion Pitfalls, Permitting and Compliance – A Case Study

Prepared For

USEPA - LANDFILL METHANE OUTREACH PROGRAM - 2015 WORKSHOP

Presented By

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Lorain Power Station

- ▶ Located in Oberlin, Lorain County, Ohio
- ▶ Landfill Gas to Electric Facility owned and operated by Energy Developments, Inc., USA (EDI)
- ▶ Located at the Republic Services, Inc. Lorain County Landfill
- ▶ Landfill consists of two parcels that extract landfill gas by means of vertical and horizontal extraction wells through a network of pipelines to a main blower/flare station
- ▶ Total Landfill Gas (LFG) generation 2013 = 7,550 standard cubic feet per minute (scfm)
- ▶ Lorain Power Facility can accept up to 9,180 scfm @ 50% methane at current configuration, full load

Lorain Power Station - Engine

- ▶ Originally construction 2001
- ▶ Consisted of eight (8) Deutz Model TBG60V16K engine generator sets
- ▶ Rated at 1,364 KW each
- ▶ Require approximately 485 scfm of LFG @ 50% methane for a total of 3,880 scfm
- ▶ 2009 Added Parker System

Lorain Power Station - Engine

- ▶ **Expansion in 2010**
- ▶ **Consisted of ten (10) Caterpillar model G3520C engine generator sets**
- ▶ **Additional siloxane removal equipment**
- ▶ **Rated at 1,600 KW each**
- ▶ **Require approximately 530 scfm of LFG @ 50% Methane for a total of 5,300 scfm**

Lorain Power Station



Lorain Power Station - Treatment

- ▶ **2009 - Filtration system of collected LFG entering into the compressor eliminates particles, liquid slugs and aerosols that could otherwise damage downstream equipment**
- ▶ **Parker System included 2 GES 1500 Siloxane Removal Systems treating LFG for eight (8) Deutz Reciprocating Gas Engines**

Lorain Power Station - Treatment



Lorain Power Station - Treatment

- ▶ **2012 – Additional Parker System for Siloxane Removal Systems treating LFG for the additional ten (10) Caterpillar Reciprocating Gas Engines**
- ▶ **Plus - Two (2) thermal oxidizer units (TOX) installed as part of the siloxane pre-treatment system – removal of siloxanes from the LFG prior to combustion**

Lorain Power Station



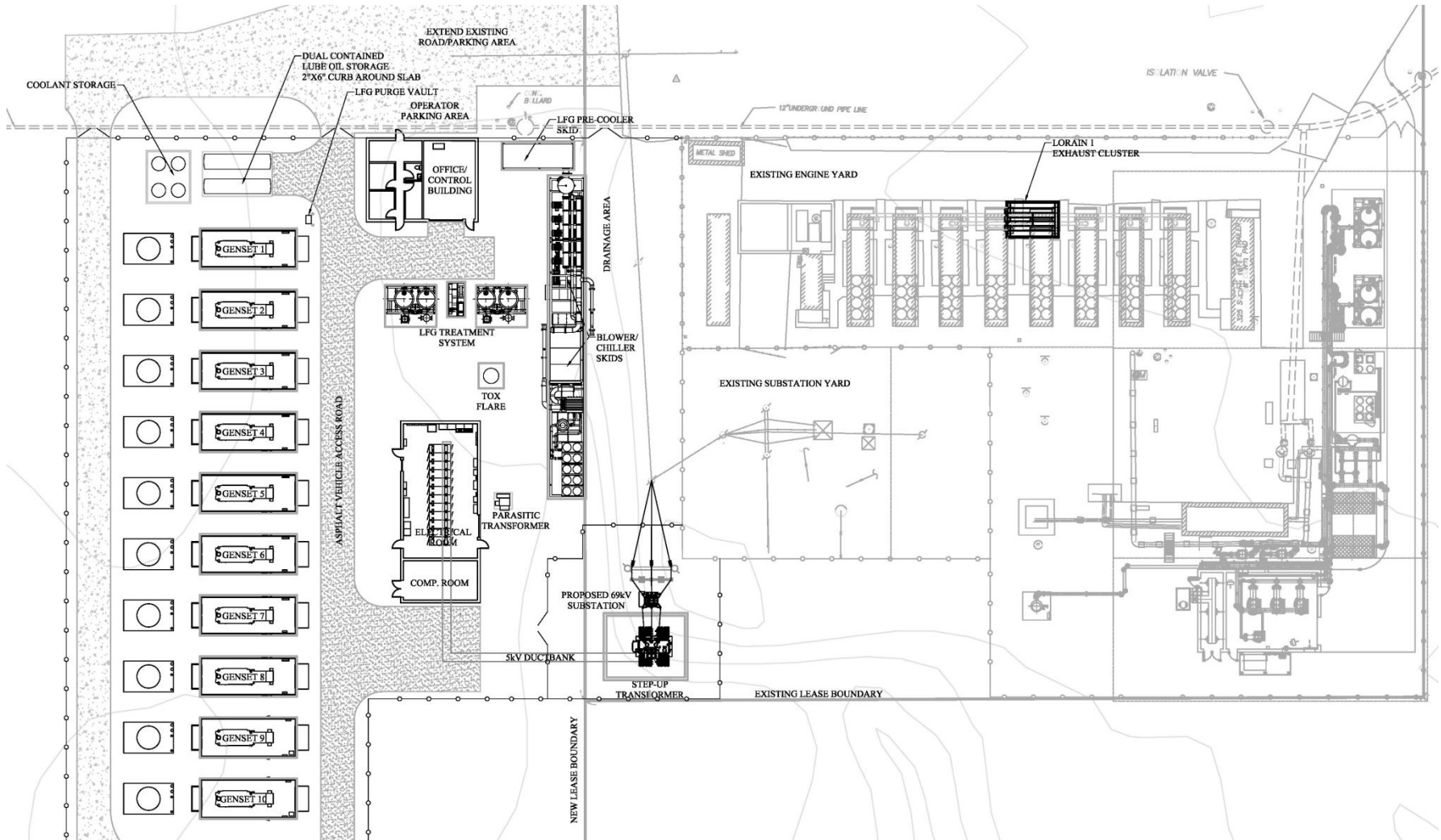
Lorain Power Station - Treatment

- ▶ **Siloxane compounds are attenuated in an adsorption media with the treatment vessel**
- ▶ **Closed system with exhaust vents, the purge off-gas is sent to the TOX to control purge off-gas emissions**
- ▶ **TOX units requires approximately 150 scfm LFG during operations (approximately 12 hours a day)**

Lorain Power Station - Treatment



Lorain Power Station - Present



Power Sales – Ohio

- ▶ EDI had a strong relationship with a long term Power Purchase Agreement (PPA) customer, 10 years
- ▶ The Initial PPA contract was expiring at the time the facility was upgrading with the CAT engines in 2010
- ▶ This allowed EDI to develop a contract structure which fit current market conditions and allowed for future growth
- ▶ Doubling the size of the generation making for a larger more attractive generation source

Power Sales – Ohio

- ▶ **Renegotiated LFG purchase agreement giving the project a much longer life**
- ▶ **Other EDI operating facilities in the State of Ohio providing strategic support for all sites**
- ▶ **Installed new technology (siloxane removal) to provide higher operating capacity and availability**
- ▶ **Availability of Federal, 1603 Grants**
 - The purpose of the 1603 payment is to reimburse eligible applicants for a portion of the cost of installing specified energy property used in a trade or business or for the production of income. A 1603 payment is made after the energy property is placed in service; a 1603 payment is not made prior to or during construction of the energy property.

Power Sales – Ohio

- ▶ **Passage of Senate Bill, 221 in 2008 which established a Renewable Portfolio Standard in Ohio**
 - SB 221 requires 25% of all electricity sold by the utilities to be obtained from “alternative energy resources” by 2025.
 - Of that 25%, at least half (12.5%) must be generated from “renewable energy resources”—such as wind, biomass and geothermal—including one-half of one percent from solar energy.
 - SB 221 allows the Public Utilities Commission of Ohio to levy monetary penalties on utilities that do not comply.
 - Penalties can be avoided by demonstrating that it cannot comply for reasons beyond its control (if, for example, renewable energy resources in the state are too scarce) or if compliance increases its overall energy generation costs by 3% or more.
 - While some utilities were slower to comply than others, to date it appears that all of the state’s utilities have met their targets, reinforcing the law’s practicality and achievability.

Permitting Requirements Internal Combustion Engines

- ▶ **Governed by three provisions of the Clean Air Act (CAA)**
 - New Source Performance Standards (NSPS)/ Emission Guidelines (EG)
 - Nation Emission Standards for Hazardous Air Pollutants (NESHAP)
 - State/Title V Permitting involving variable testing and monitoring requirements based on engine vintage

Permitting Requirements Internal Combustion Engines

▶ Engines

- NSPS Subpart JJJJ – Existing Engines
- NESHAP Subpart ZZZZ - New Engines

▶ New Source Review (NSR)

- Major sources - PSD permitting required

Permitting Requirements Internal Combustion Engines

▶ NESHAP Subpart ZZZZ

- Existing Area Source, ≥ 500 hp
- Change oil and filter every 1,440 hrs
- Inspect spark plugs (often missed)
- Consider oil analysis program as an allowable alternate (most clients will have the basics already in place)

▶ NSPS Subpart JJJJ

- ≥ 500 hp, Landfill/Digester Gas
- NOX, CO and VOC emission standards
- Purchase certified engines

Permitting Pitfalls

▶ New Source Review

- Prevention of Significant Deterioration (PSD) applies to new major sources or major modifications at existing sources for pollutants where the area the source is located is in attainment or unclassifiable with the National Ambient Air Quality Standards (NAAQS)
- With existing facility plus new engines, required additional modeling under PSD

Permitting Pitfalls

▶ Title V Permit Limit Modification

- Existing engines, new engines, treatment system
- Required multiple re-drafts

▶ LFG treatment – Siloxane Removal

- Adding equipment to treat siloxane removal for the facility

▶ Required a long process time

Conclusion

- ▶ **Lorain County Power Station long term commitment to the area as a renewable energy source**
- ▶ **Took advantage of PPA relationship and applicable Ohio state rule SB 221**
- ▶ **Utilized Parker System for filtration and treatment of LFG**
- ▶ **TOX installed as part of the siloxane pre-treatment system and included closed exhaust group**

Conclusion

- ▶ **With old and new Internal Combustion Engines, different permitting requirements made the facility a compliance challenge**
- ▶ **Compliance with Title V incorporating testing on engines and multiple drafts**
- ▶ **A Major Source required modeling under New Source Review**

THANK YOU



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