

PR 1118.1

Landfill Perspective

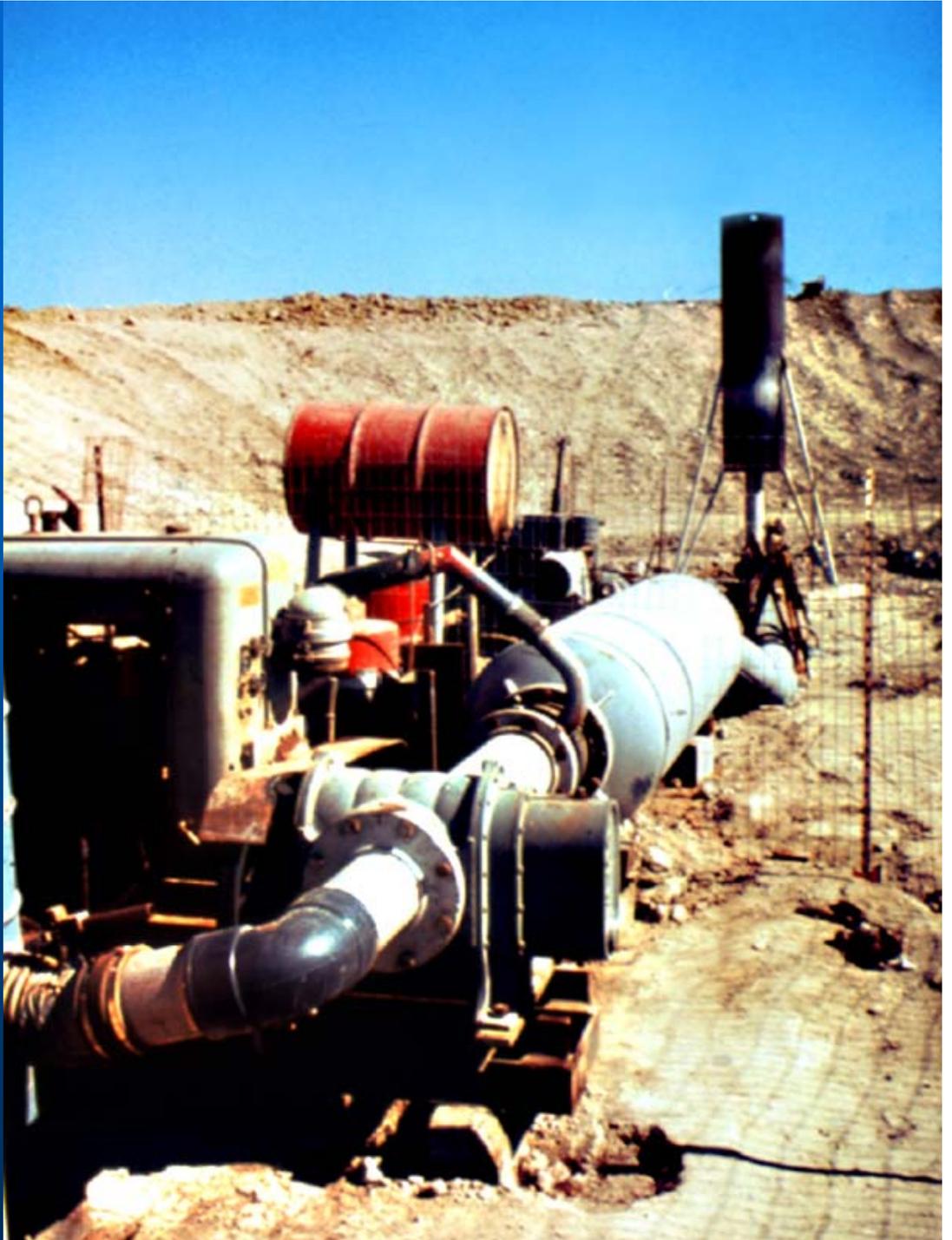
Frank R. Caponi
SCAQMD – March 8, 2018

SANITATION DISTRICTS OF LOS ANGELES COUNTY



**BRIEF HISTORY:
Landfill Industry
were the Pioneers**

Early
Flare (1973)
& LFG
Fueled
Engine





THE BEGINNINGS OF RULE 1150.1

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

LANDFILL GAS: CONTROL AND ENERGY SOURCE

Arthur B. Netzley
Robert C. Murray
George Ames

Tuesday, March 24, 1981

Robert C. Murray

Calif. License Ch. 2567, Chemical Engineer
Principal Engineer
South Coast Air Quality Management District
Permit Services Division
9150 Flair Drive
El Monte, CA 91731

Arthur B. Netzley

Calif. License Ch. 2471, Chemical Engineer
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South Coast Air Quality Management District
Permit Services Division
9150 Flair Drive
El Monte, CA 91731

George Ames

Calif. License Ch. 3447, Chemical Engineer
Air Quality Engineer II
South Coast Air Quality Management District
Permit Services Division
9150 Flair Drive
El Monte, CA 91731

NGR Nu Fuels - 1985



LACSD 1986 FLARE DEVELOPMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY
CALIFORNIA

FLARE DEVELOPMENT PROJECT
REPORT

by
Linman O. Bjerken
Moon S. Chung
Project Engineers

III. CONCLUSIONS

- A. Emissions from landfill gas flares can be minimized by improved burner design and stable operating conditions. The burner should be designed to provide high turbulence gas injection and uniform air/fuel mixture across the entire burner. Gas flowrates should be within the optimum design capacity and air/fuel ratio should be carefully adjusted to maintain high flame temperature.
- B. The hexagon burner design gives the lowest overall emissions and the highest destruction rates of toxic compounds over a wide range of landfill gas flowrates.
- C. Emissions from well designed and operated flares are in the range of:
- | | |
|-----------------|----------------------|
| NO _x | 10 - 20 ppm |
| CO | 15 - 100 ppm |
| CH ₄ | 4 - 15 ppm |
| TSP | 0.007 - 0.01 gr/dscf |
- D. Well designed and operated flares can destroy over 99 percent of toxic organic compounds in the inlet gas, and do not cause any detrimental impacts to the surrounding air qualities.

EARLY LACSD CUSTOM FLARES

REPORT OF STACK TESTING AT
LOS ANGELES COUNTY SANITATION DISTRICT
PUENTE HILLS LANDFILL

Conducted on

Flare #23
November 25, 1986

Submitted to

LOS ANGELES COUNTY SANITATION DISTRICT
Whittier, California

SUMMARY OF GASEOUS PARAMETERS
SANITATION DISTRICTS OF LOS ANGELES COUNTY
Puente Hills Landfill

Flare #23

November 25, 1986

Parameter	Results
<u>Flare Outlet</u>	
NO _x	
ppm	15
lbs/hr	1.22
CO	
ppm	324
lbs/hr	16.04
CH ₄	
ppm	4.5
lbs/hr	0.13
NMHC	
ppm	<1
lbs/hr	<0.03

LACSD FLARE DEVELOPMENT



1955 Workman Mill Road, Whittier, CA 90601-4998
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (213) 699-7411, (213) 685-5217
Fax: (213) 695-6139

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

CHARLES W.
Chief Engineer and General Manager

November 2, 1990
File No. 31R-109.10

Gentlemen:

Request for Proposal **Emissions Testing at the Research Flare at Puente Hills Landfill**

The County Sanitation District No.2 of Los Angeles County (LACSD) hereby requests a proposal for the performance of emissions sampling and laboratory analysis work for the Research Flare at the Puente Hills Landfill. The primary purpose of the emissions testing is to satisfy Condition No. 17 of South Coast Air Quality Management District (SCAQMD) Permit to Construct No. 194330 (copy attached). A copy of the Test Plan providing the necessary details of this test is attached. This Test Plan has been submitted to SCAQMD for their review and approval. In addition to this compliance testing, additional particulate testing shall be performed as part of the Sanitation Districts research activities.

The dimensions of the research flare are 60 ft. tall and 16 ft. in diameter (see Figure 1). At full load, the flare combusts approximately 6,800 scfm of landfill gas (with a heating value of approximately 425 BTU/SCF). The major constituents of the landfill gas are methane, carbon dioxide, oxygen, nitrogen, and water. The research flare is located at 2800 S. Workman Mill Road, Whittier, California.



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1994 – EPA LMOP



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Landfill Methane Outreach Program (LMOP)

CONTACT US

SHARE



LMOP Events

- November 2017 – [Proceedings for Webinar on Upgrading LFG>>](#)
- March 2018 – [LMOP Special Session>>](#)



- [Webinars and Events](#)
- [LMOP Listserv](#)
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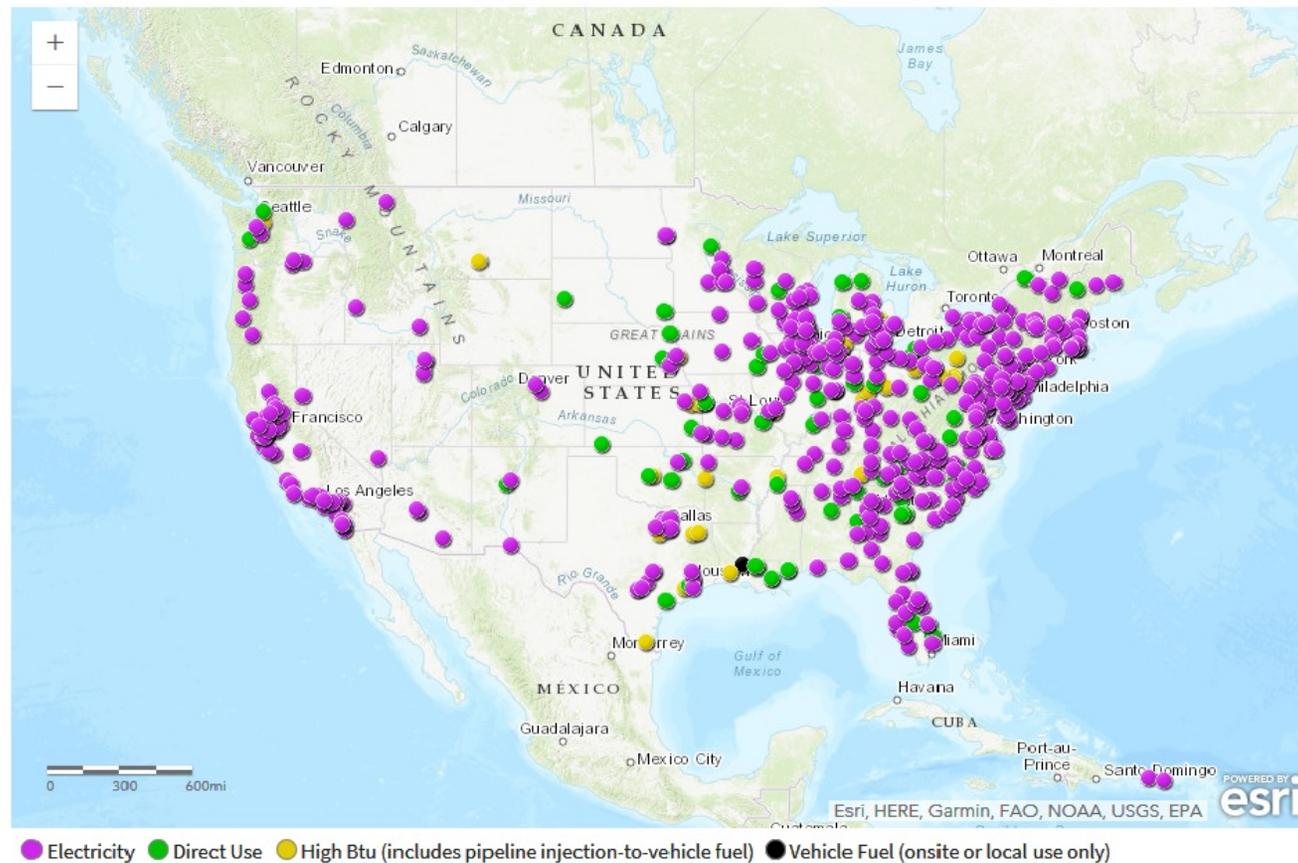


LMOP is a voluntary program that works cooperatively with industry stakeholders and waste officials to reduce or avoid methane emissions from landfills. LMOP encourages the recovery and beneficial use of biogas generated from organic municipal solid waste. [Learn more about LMOP.](#)

LMOP

National Map of LFG Energy Projects

Landfills in 48 states and 1 U.S. territory provide LFG for producing electricity, heat, pipeline-quality gas or vehicle fuel. The interactive map below shows the locations of all currently operational LFG energy projects in the United States. [View a larger version](#) to access the map's full functionality.



LANDFILL REGULATORY DEVELOPMENT (LFG Management)

- **Rule 1150.1 (1985 to present)**
- **Federal New Source Performance Standards (1996 to present)**
- **CARB Landfill Methane Regulation (2010)**

RELEVANT LANDFILL FLARE REQUIREMENTS

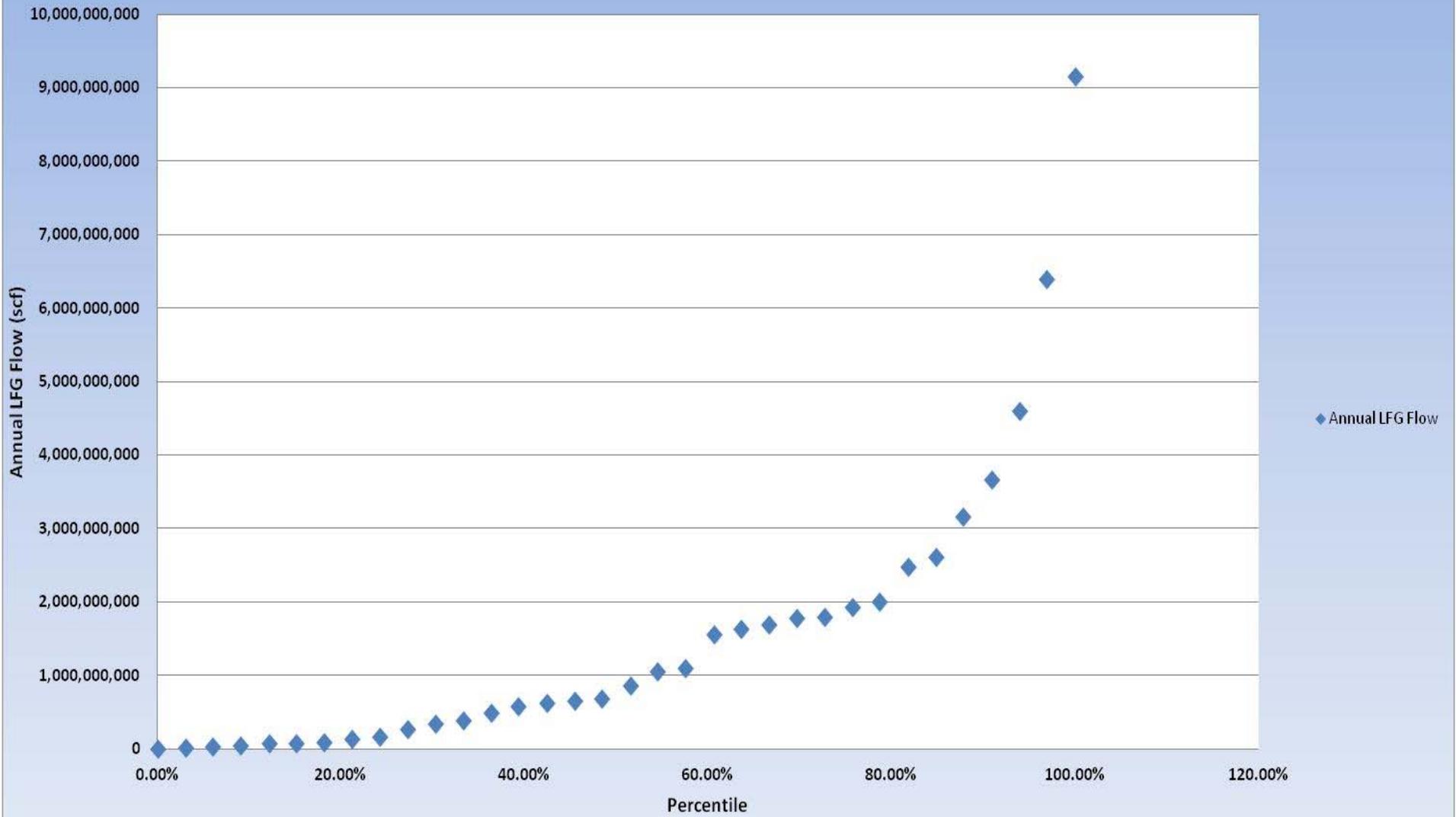
- Landfills regulated down to 450,000 tons on place
- Flares must achieve 98% destruction of toxics
- Flares must achieve 99% destruction of methane
- Existing flares must be at 0.06 lbs NO_x/mmbtu

RELEVANT LANDFILL FLARE REQUIREMENTS

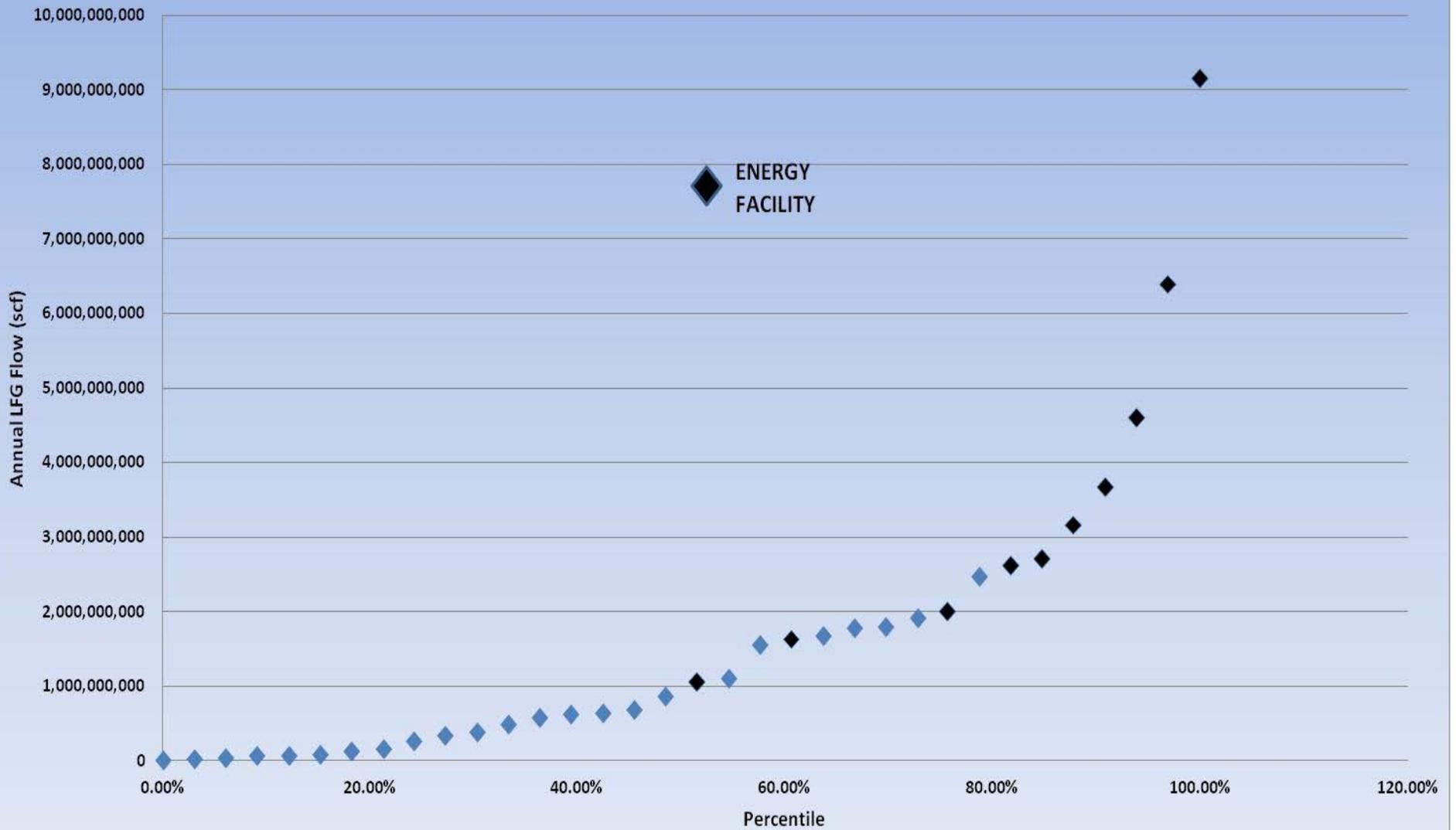
- **New flares must be at 0.025 lbs NO_x/mmbtu**
- **Flares must be enclosed**
- **Flares must meet stringent outlet temperature requirements**
- **Flares must go through annual source testing**

**CURRENT STATE OF
LANDFILL GAS
MANAGEMENT IN
THE SCAQMD**

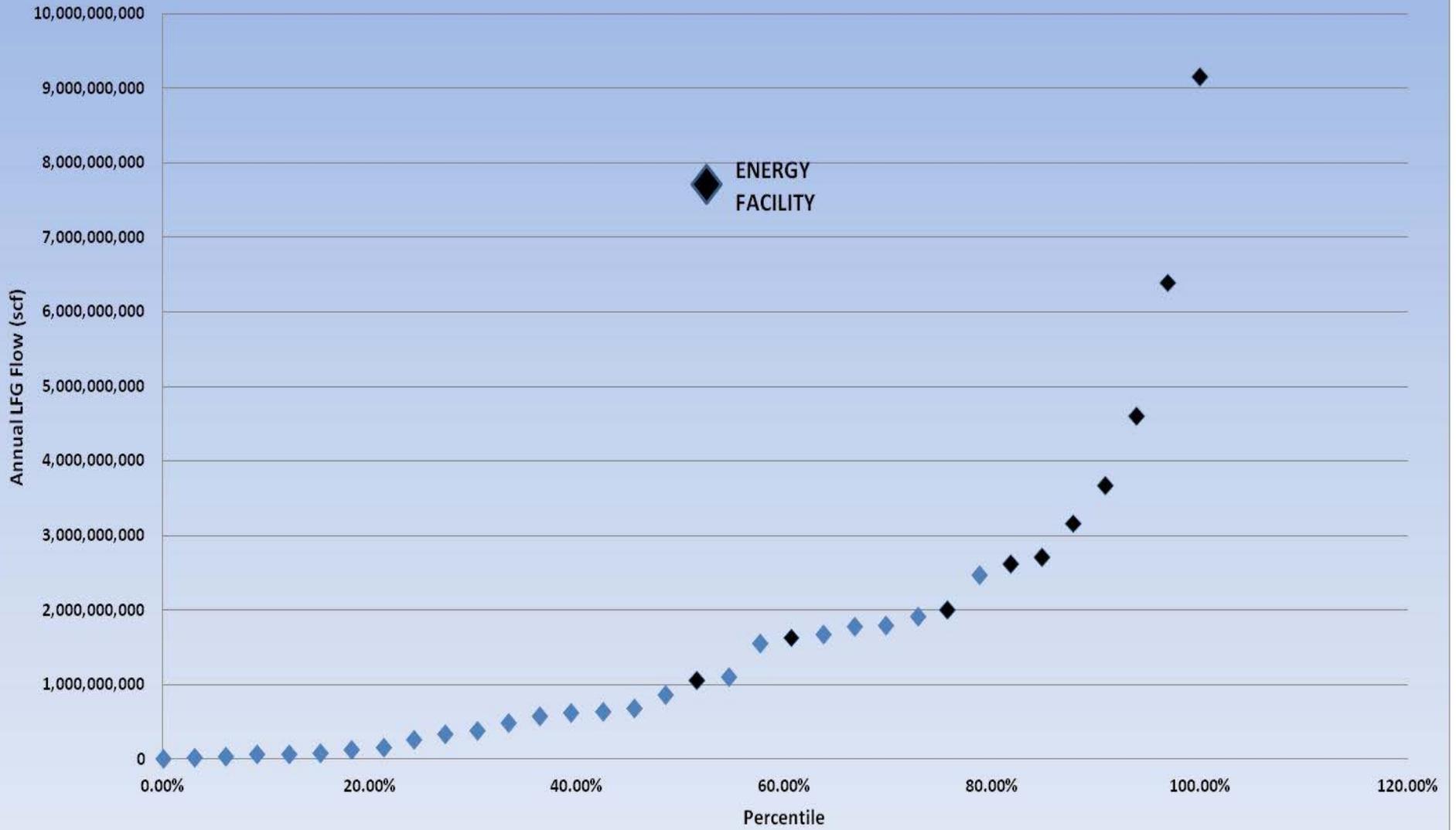
2016 or 2017 Annual LFG Flow - 34 Landfill Sites



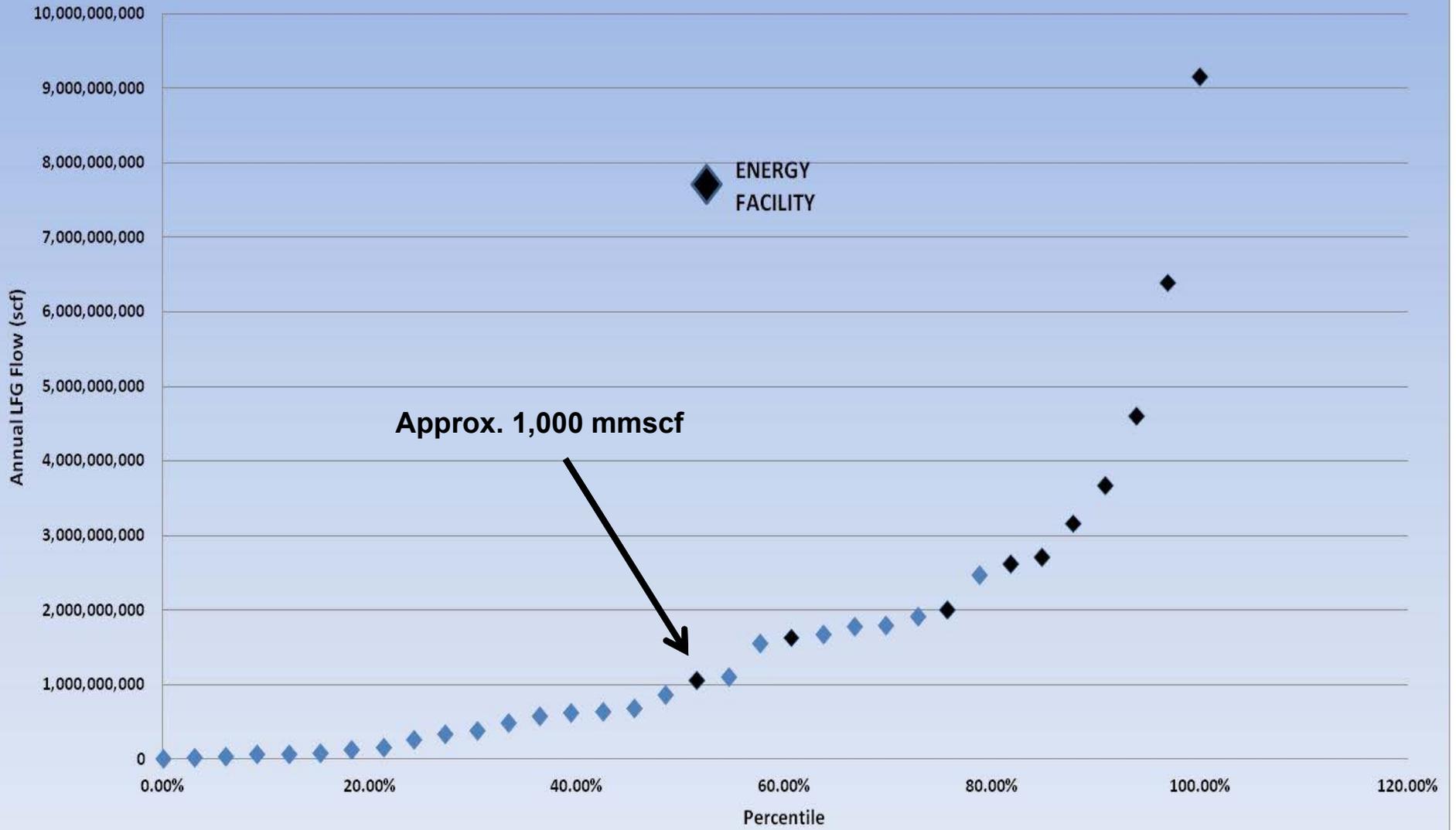
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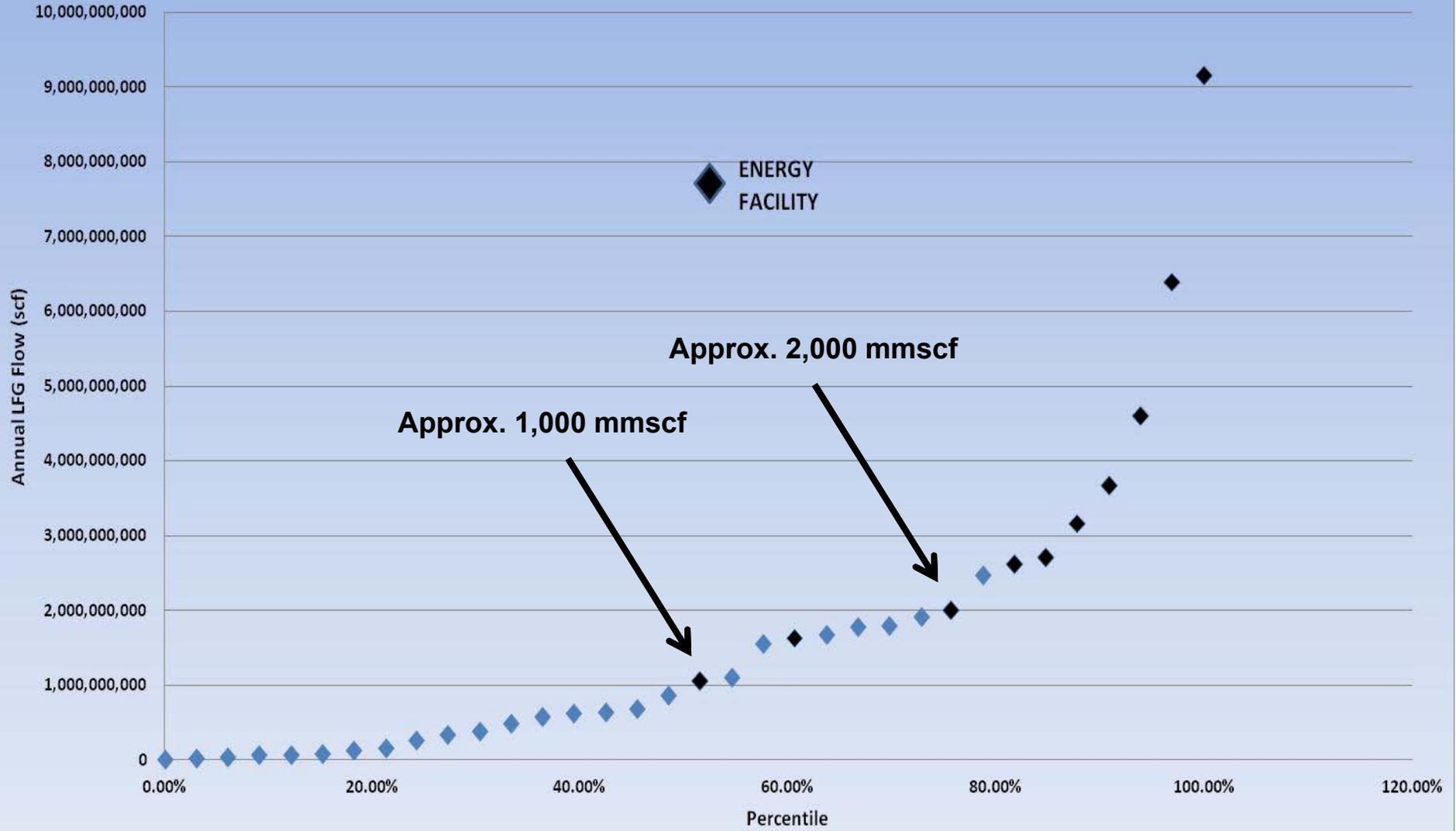
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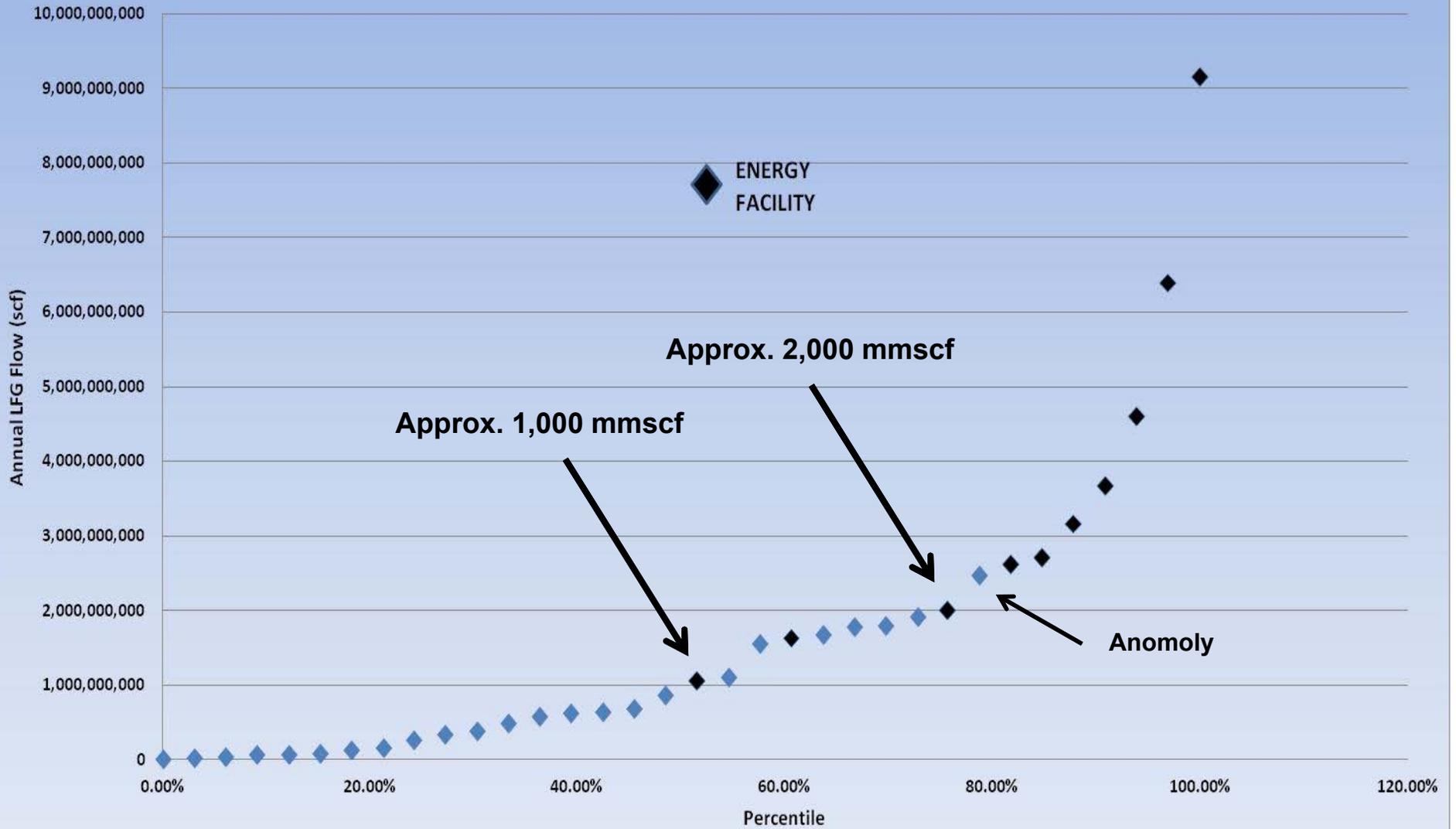
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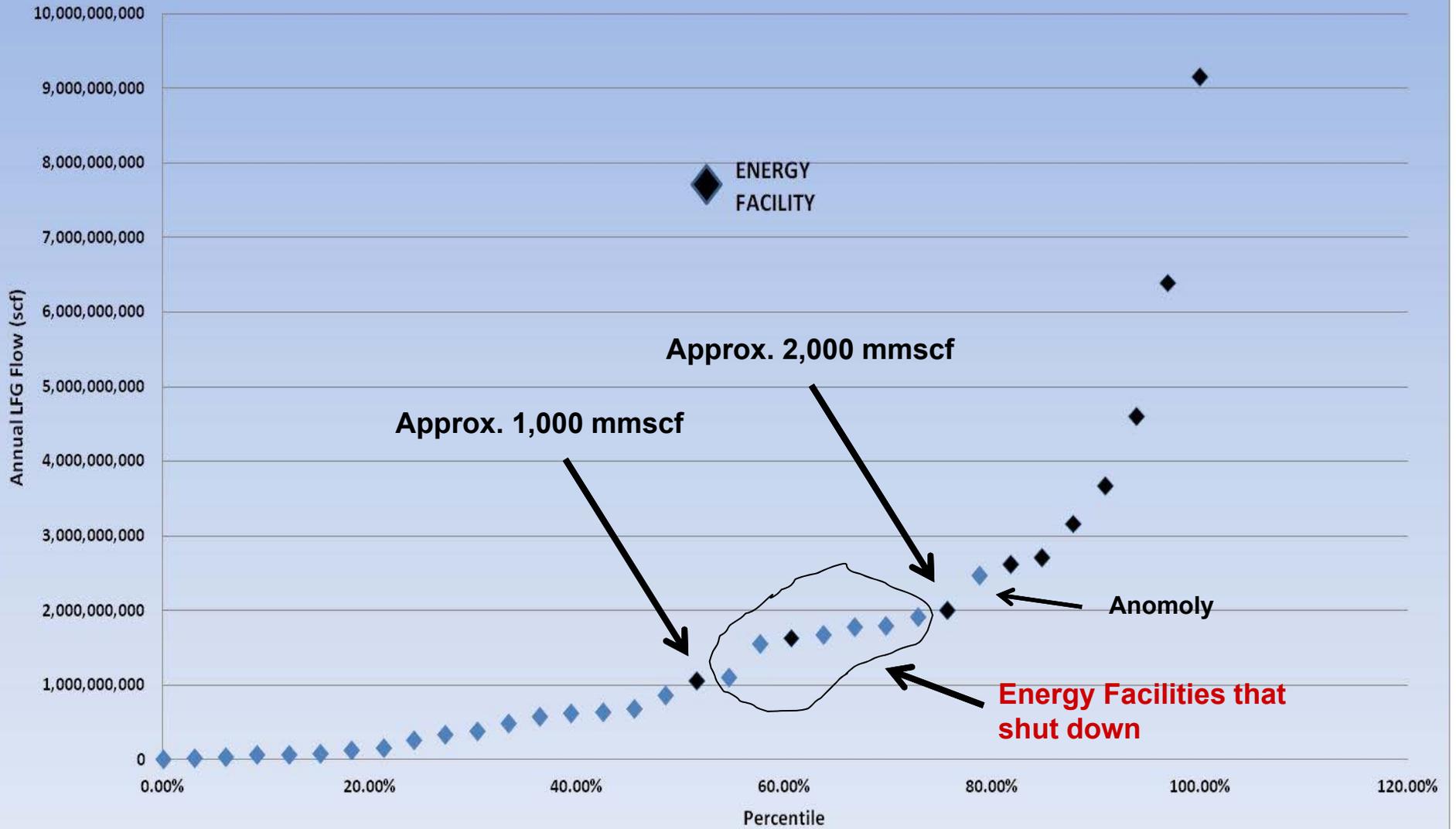
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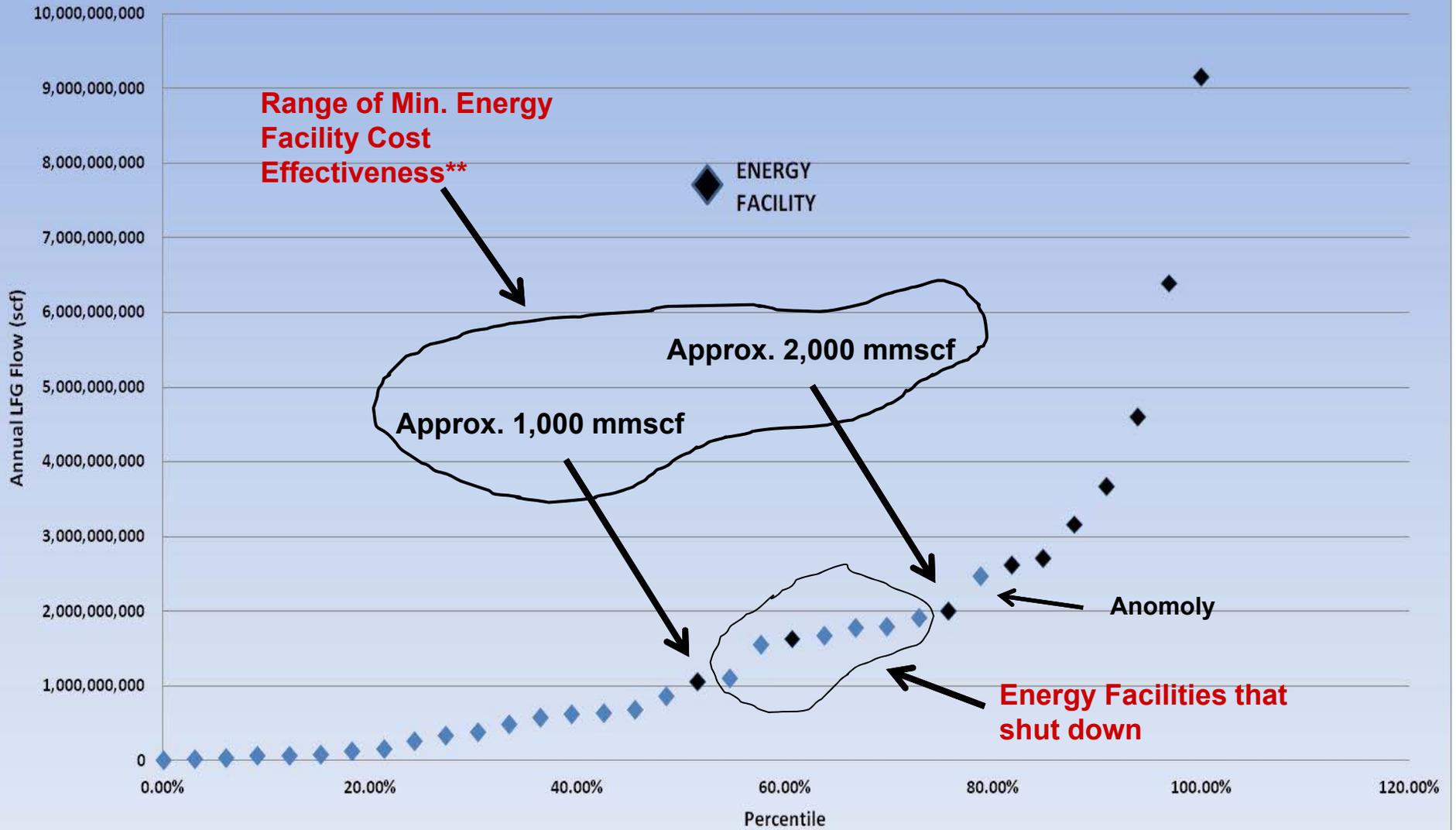
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2016 or 2017 Annual LFG Flow - 34 Landfill Sites



** in the Rule 1110.2 world

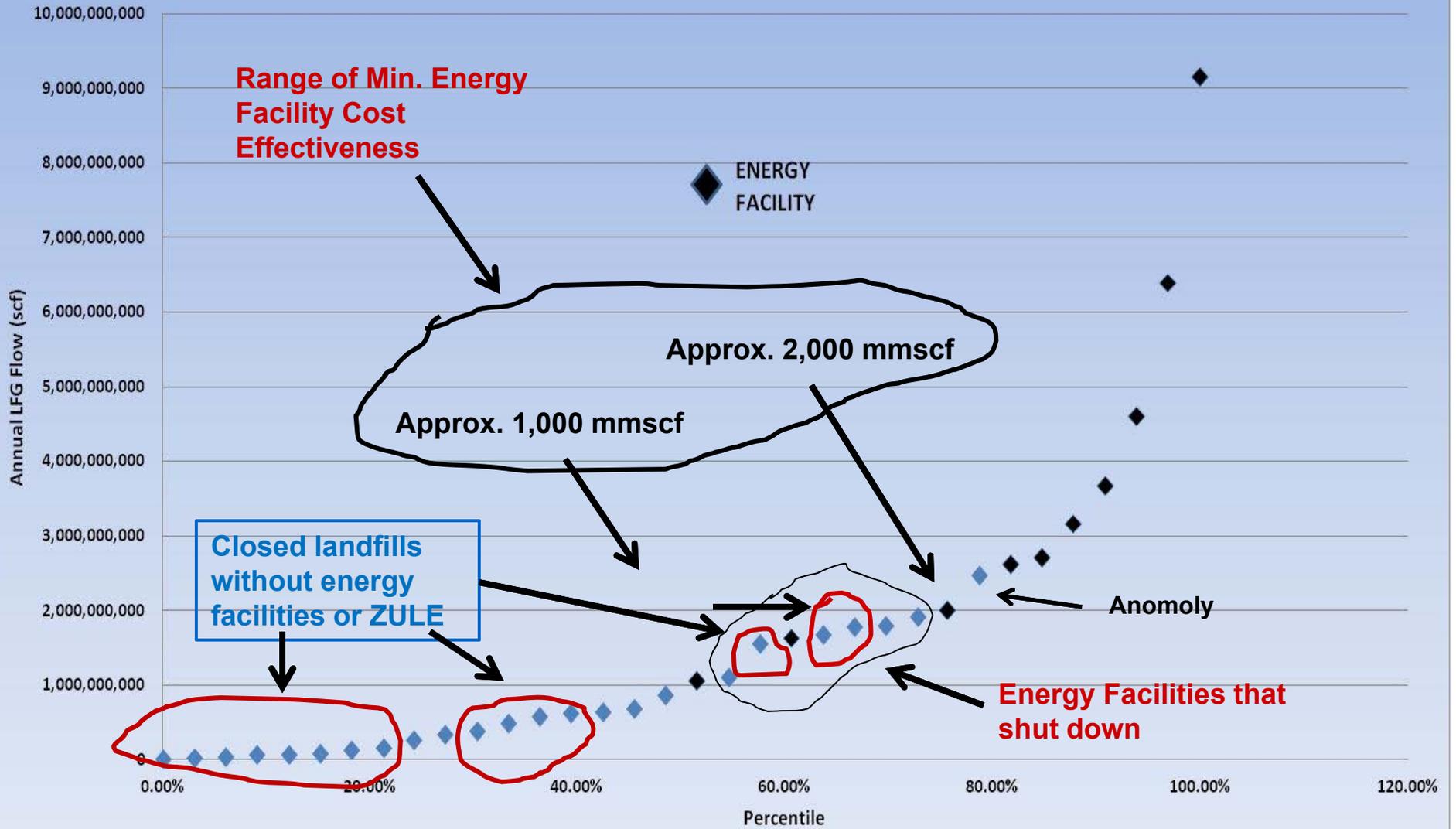
LFG FLOW CHARACTERISTICS OF LANDFILLS WITH ENERGY FACILITIES

	LFG FLOW (mmscf/year)
Total LFG collected by all landfills	54,899
Total LFG to energy production	30,062
LFG to conventional flares associated with energy facilities	3,963
LFG to advanced flares associated with energy facilities	9,134

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LFG to advanced flares associated with energy facilities	9,134
% of total LFG associated with landfills that have energy facilities	78.62%

2016 or 2017 Annual LFG Flow - 34 Landfill Sites



LFG FLOW CHARACTERISTICS OF CLOSED LANDFILLS WITHOUT ENERGY FACILITIES OR ADVANCED FLARE

	Methane LFG FLOW (mmscf/year)
Total Methane collected by all landfills	21,664
Closed landfills methane to conventional flares	2,597**

**** This amount of methane reduces every year – on reduction side of landfill gas generation curve**

LFG FLOW CHARACTERISTICS OF CLOSED LANDFILLS WITHOUT ENERGY FACILITIES OR ADVANCED FLARE

	Methane LFG FLOW (mmscf/year)
Total Methane collected by all landfills	21,664
Closed landfills methane to conventional flares	2,597**
% of total methane managed at conventional flares for closed landfills	12%

**** This amount of methane reduces every year – on reduction side of landfill gas generation curve**

CONCLUSIONS

- **Vast Majority: Almost 79% of LFG collected at all landfills is already associated with energy facilities**
- **Most of the remaining sites are either closed where methane is low and declining every year, or small active sites with very low LFG flow (methane)**
- **An advanced flare replacement at these sites is not cost effective given the low flows and potential short life of the flare**

CONCLUSIONS

- **Additionally, most of the smaller active and closed sites are municipalities that do not have the funds for advanced flare investments**
- **Many energy projects have shut down because of 1110.2 due to increased cost**
- **At least three entities have RFPs for energy projects (if they are cost effective, they will happen)**

CONCLUSIONS

- Finally, increased recycling and aggressive landfill organic diversion regulatory programs by the state will impact LFG generation reducing the need for flaring

RECOMMENDATIONS

- Focus funds and research on technologies for utilizing biogas as a resource, such as biomethane development (e.g., cleanup and pipeline)
- Flares at landfills with energy recovery are backup or for excess LFG that should be considered part of the energy facility package
- Cost effectiveness in our industry is crucial; remember the municipalities
- PLEASE work with us and listen to us!!

**Please contact me with any
questions**

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