Preliminary Observations from EPA's SF_6 Equipment Field Study

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Summary Statistics

- The study consisted of Circuit Breakers manufactured between 1998 and 2002
- 3 Utility Participants
- 4 major breaker manufacturers (OEMs) represented
- A total of 1584 breakers included in study
- Data submitted covered the voltage range between 72kV and 550kV

Summary Statistics

- Of those 1584, 74 “reported” leaking
- Average leak rate for all 1584 breakers is estimated to be 0.17% per year
- The 1584 breakers represented a total capacity of approximately 300,000 lbs of SF6
- This leak rate translates into 510 lbs of SF_6 lost per year

Summary of information provided

	Detailed data on leaking breakers	**Detailed data on non-leaking breakers**
Utility A	80% of the data reported	Yes
Utility B	Yes	Rough Estimate
Utility C	Yes	Yes

Data from Utility A

- Exact records of the 297 new breakers purchased in the period 1998-2002 – broken down by manufacturer
- 4 breakers were reported leaking during this period – but this utility has just started tracking leaks in a central database – so they estimated a further 20% of the total population was leaking.
- We hence created:
  - 59 (20% of 293) records of leaking breakers – at a leak rate equal to the average leak rate of the 4 leaking breakers.

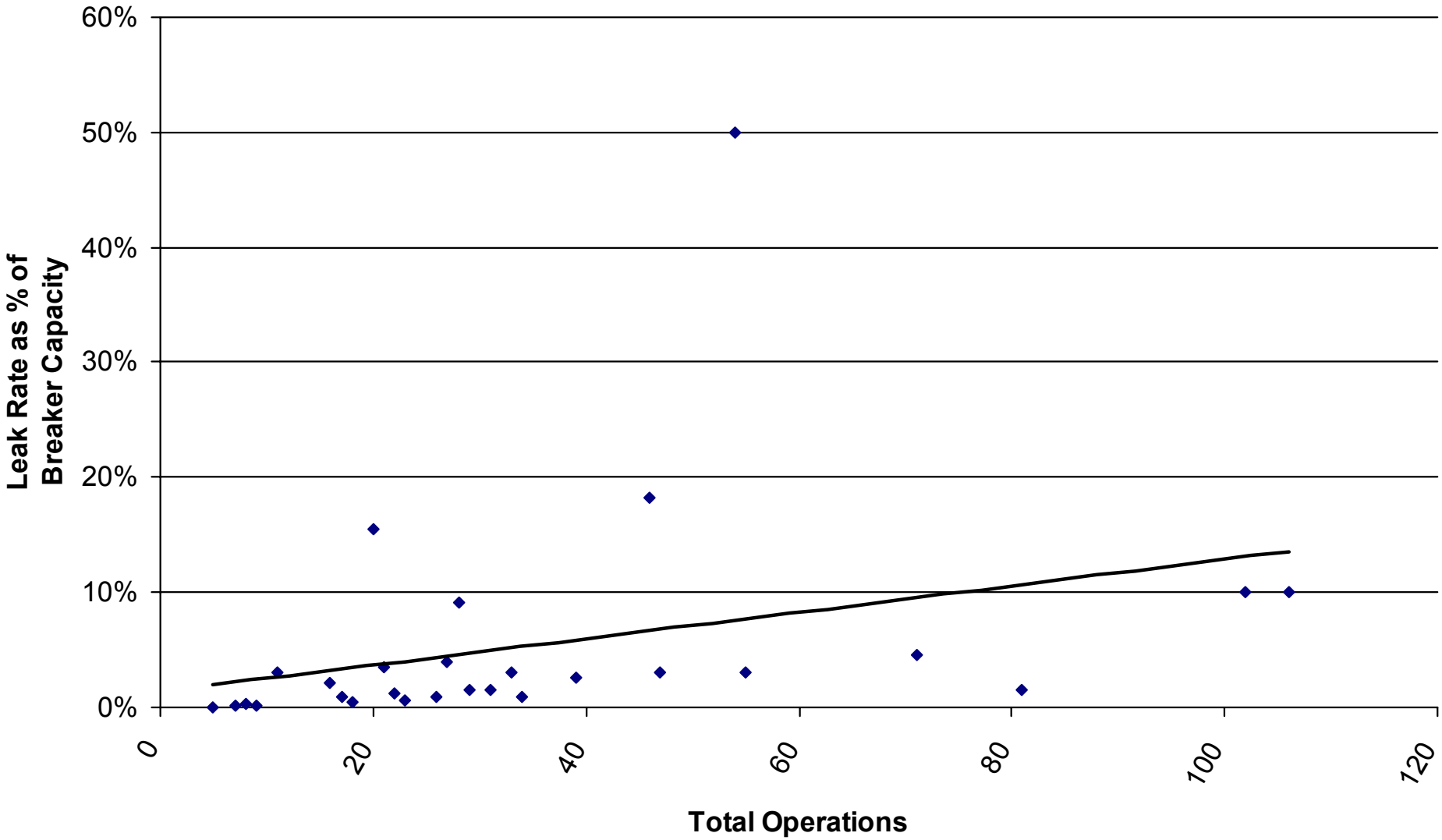
Data from Utility B

- Rough estimate of 750 new breakers purchased in the period 1998-2002 – not broken down by manufacturer
- 29 breakers were reported leaking during this period
- Hence we created 721 (750-29) records of non-leaking breakers – with capacities matching the average of all the reported breaker capacities

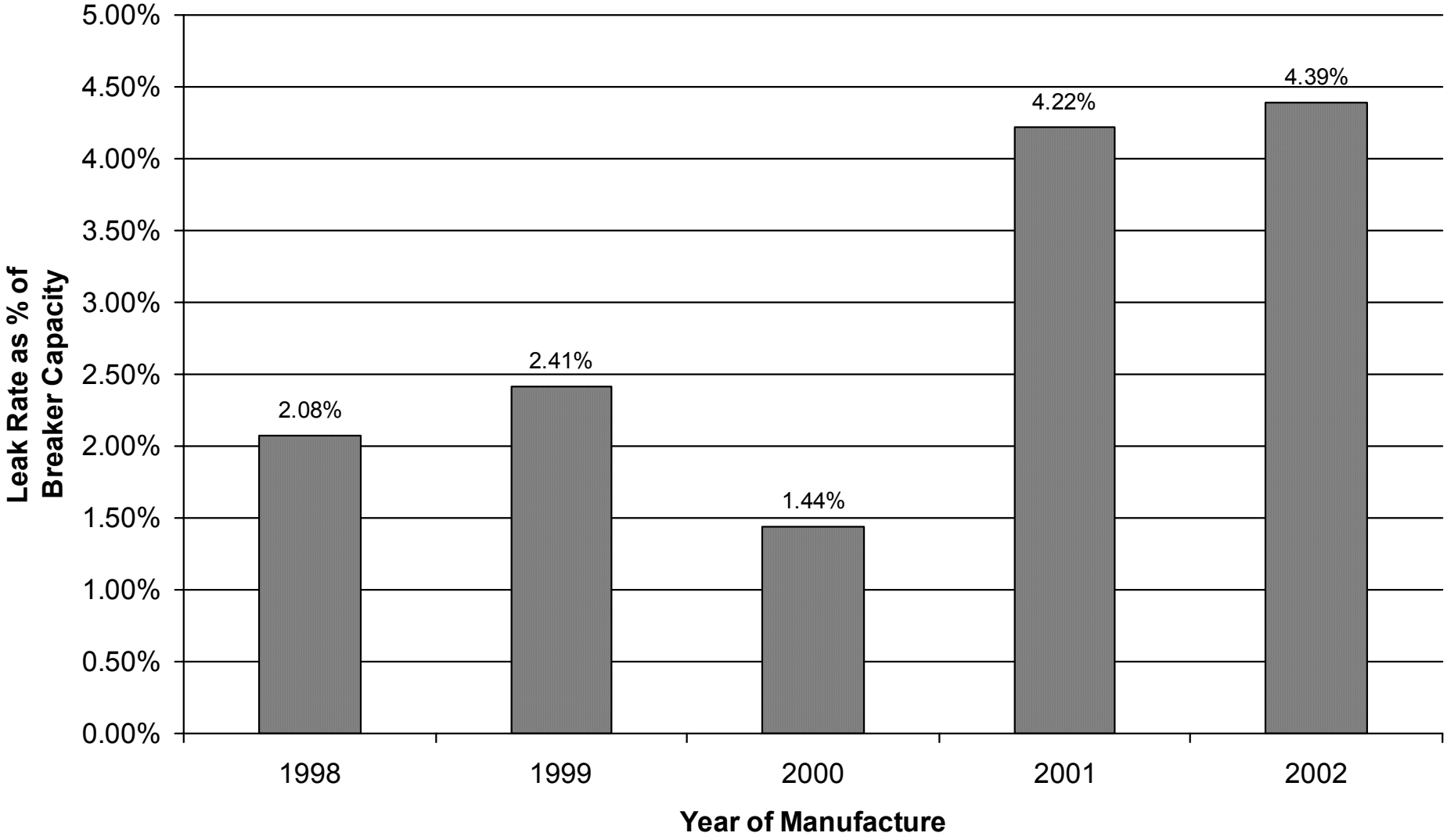
Data from Utility C

- Exact records of the 537 new breakers purchased in the period 1998-2002 – broken down by manufacturer
- 41 breakers were reported leaking during this period.
- Since the model numbers of the non-leaking breakers were reported, no additional data needed to be created for this Utility.

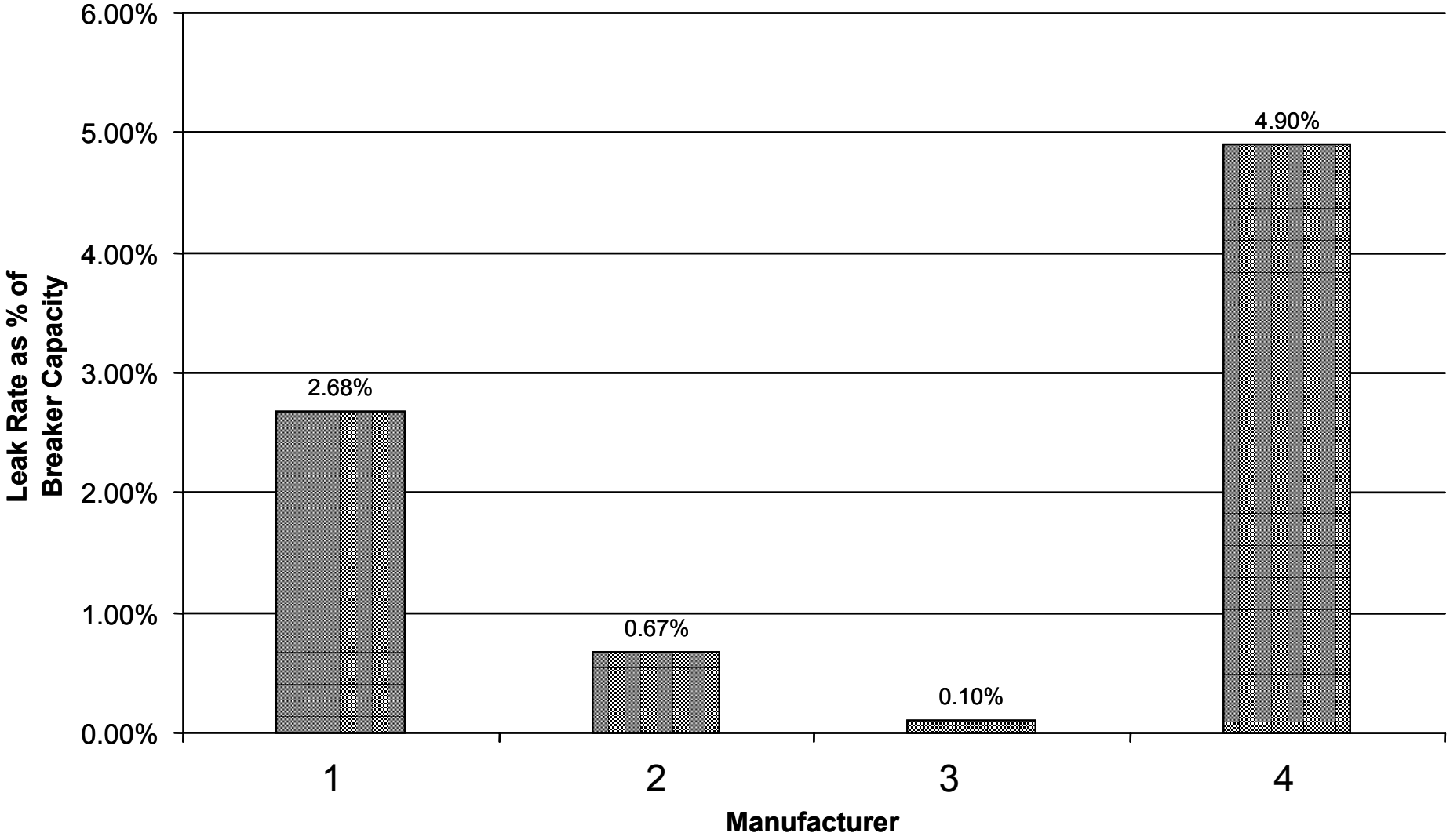
Average Annual Leak Rate of SF6 by Total Operations
(For the 33 breakers where that data was provided)



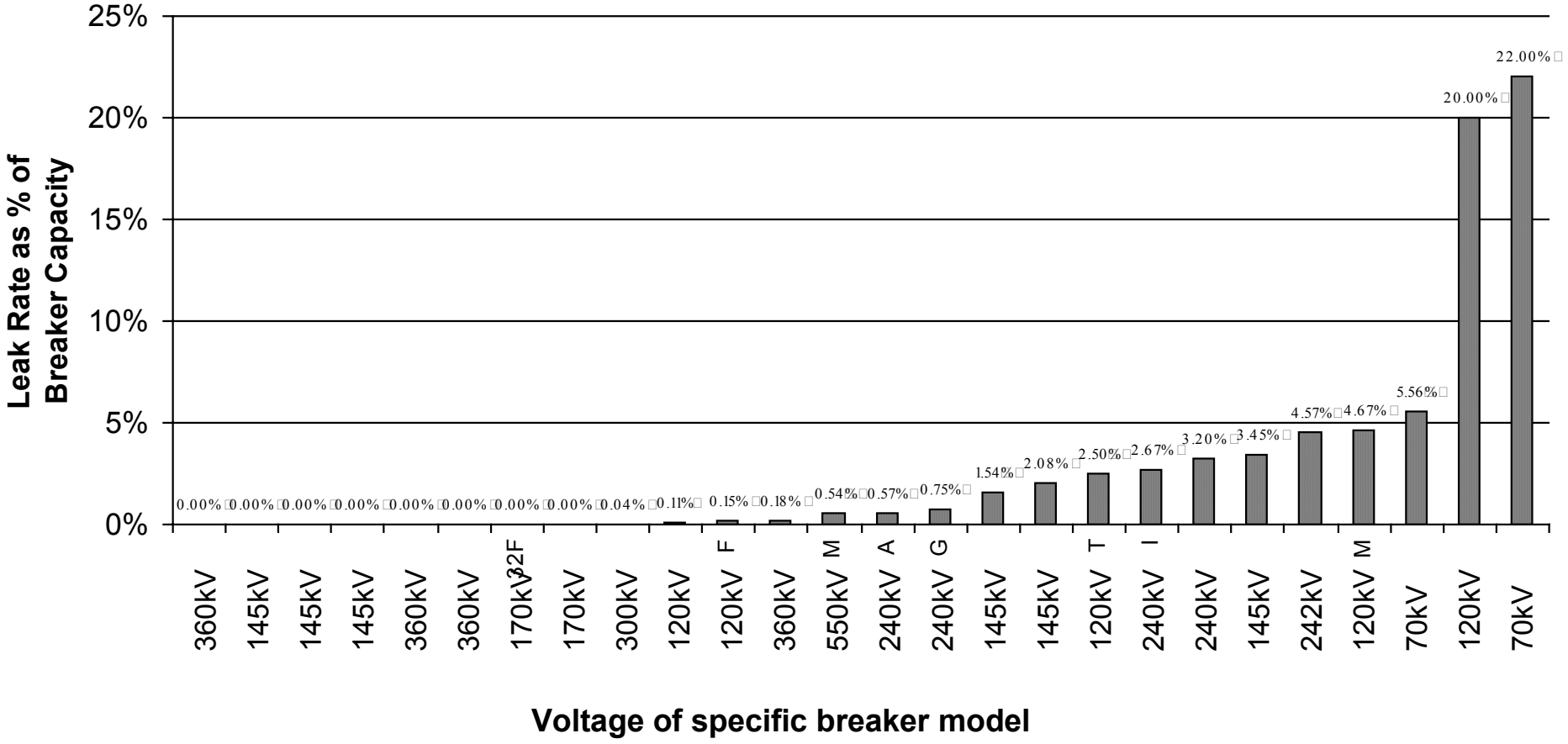
Average Annual Leak Rate of SF6 by Year of Manufacture (For the 74 reported leaking breakers)



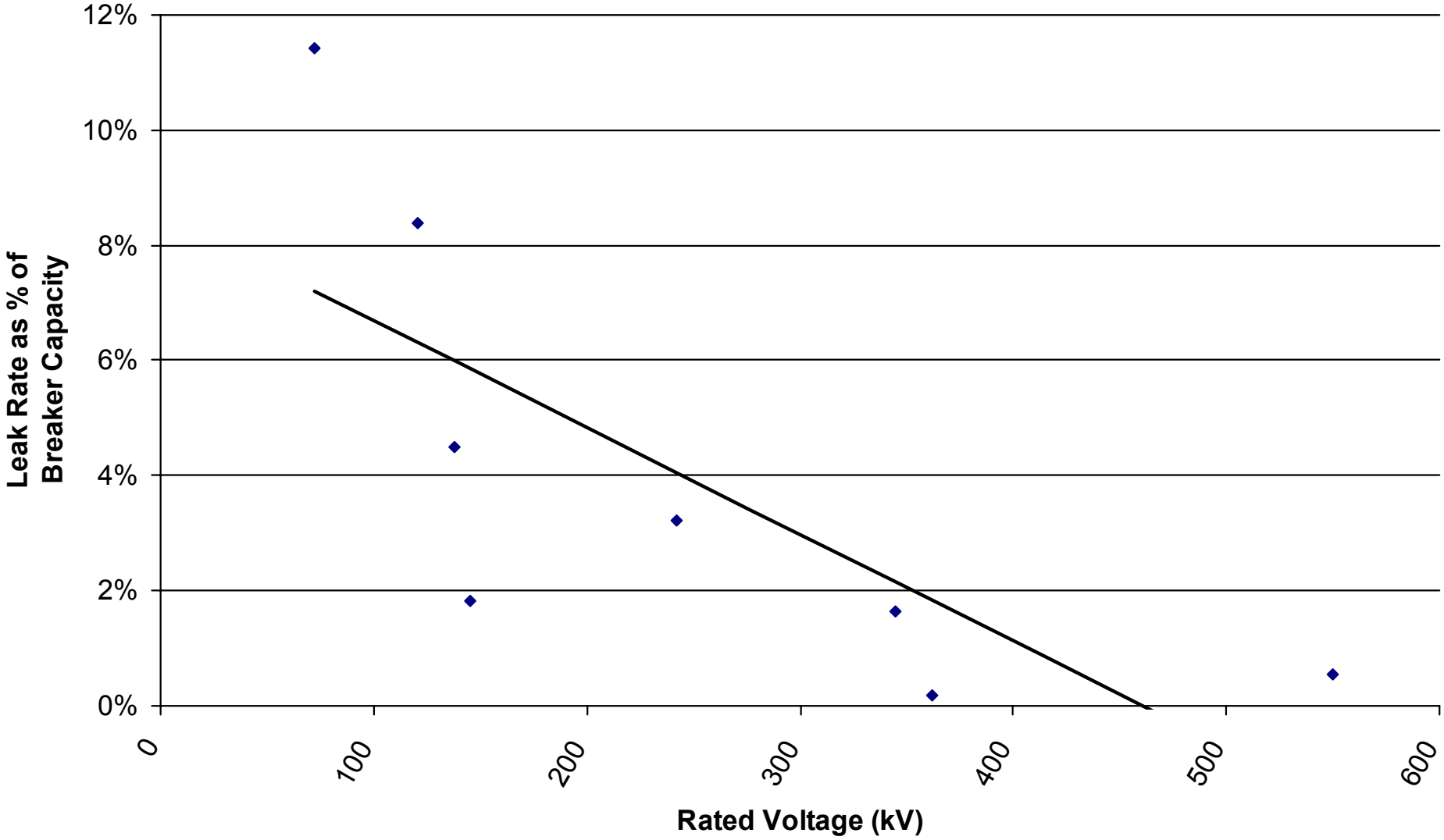
Average Annual Leak Rate of SF6 by Manufacturer
(For the 74 reported leaking breakers)



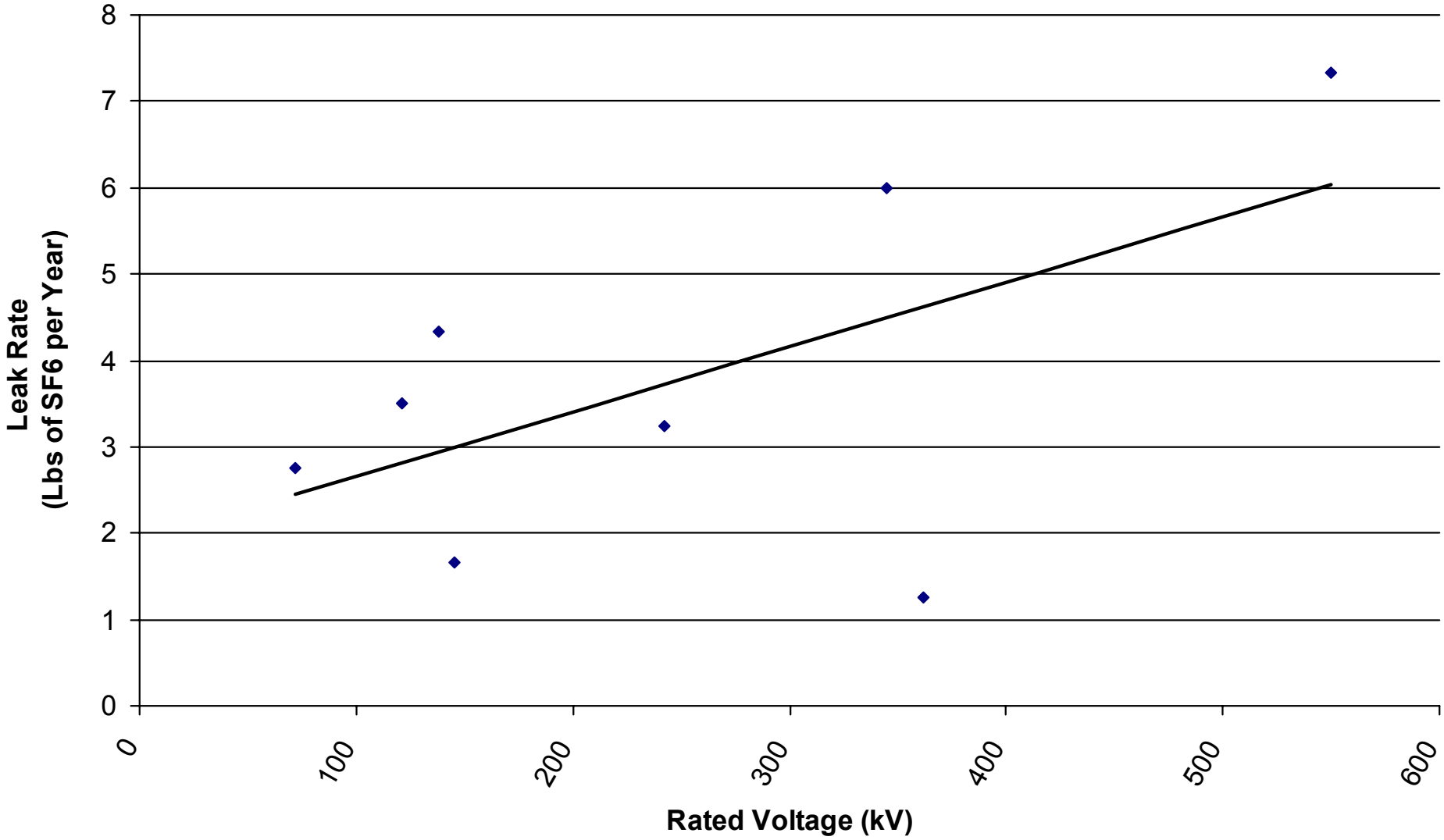
Average Annual Leak Rate of SF6 by Breaker Model
(For the 74 reported leaking breakers)



Average Annual Leak Rate of SF6 by Rated Voltage
(For the 74 reported leaking breakers)



Average Annual Leak Rate of SF6 by Rated Voltage
(For the 74 reported leaking breakers)



Observations from the data

- Study is preliminary – no actions proposed right now
- We need more data – please help
- For the 74 leaking breakers there is a range in leak rates (some as high as 22%) – and the reasons are being explored with the manufacturers and the users
- The overall average leak rate for all 1584 breakers represented in the study is 0.17%
- OEM's report <1%
- We thank those utilities who participated
- Thanks to the valuable support from Robert Carney at ERG