

Clean Screening Methodologies

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Benefits/Drawbacks of Clean Screen

Benefits:

- * **Improve effectiveness of I/M program by focusing on high-emitting vehicles**
- * **Can use existing RSD program**

Drawbacks:

- * **Some high emitters can be falsely identified as clean**
- * **Evaporative and NOx high-emitters may be missed**

Goal: Develop RSD criteria to maximize clean vehicle exemptions while minimizing falsely identified high-emitters.



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Clean Screen Approaches

- ✦ **Use of RSD**
- ✦ **Low Emitter Profiling (LEP)**
- ✦ **Model Year Exemptions**



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Arizona Clean Screen Model

- ✦ **Conducted pilot RSD study to relate RSD measurements and IM240 results**
- ✦ **Developed Clean Screen Models**

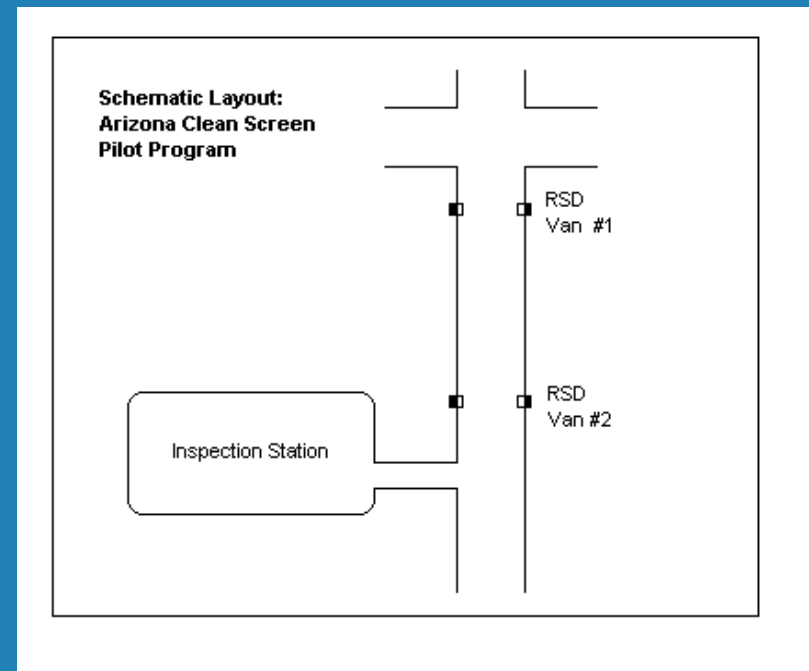


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Pilot Program Description

- ✦ **One month data gathering in Phoenix, Arizona**
- ✦ **Two RSD units set up in proximity to two I/M stations**
- ✦ **Paired IM240 and RSD readings within tight time window (~2,000 pairs)**
- ✦ **“Controlled” test conditions**



Failure Probability (Fprob)

✦ **A statistical measure of failure history for a certain category of vehicle defined by the following parameters:**

- **Vehicle Type**
- **Model Year**
- **Make**
- **Engine Displacement**
- **Air**
- **Catalyst**
- **EGR**
- **O2 Sensor**
- **Carb/FI**

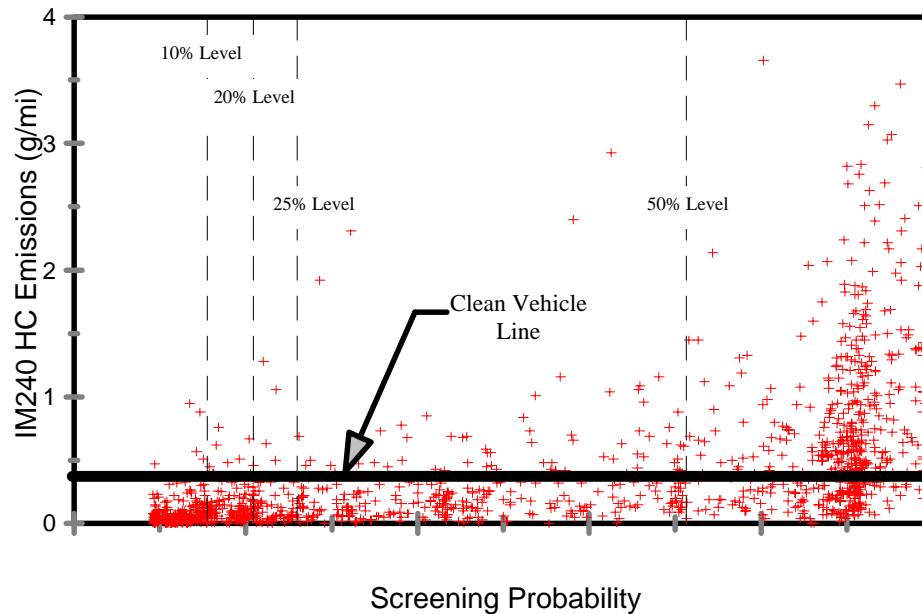


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Graphical Representation of Clean Screen Model

Graphical Representation of Model 4
Using LDVs w/ Clean Vehicle Std = 0.4



Clean Screen Models

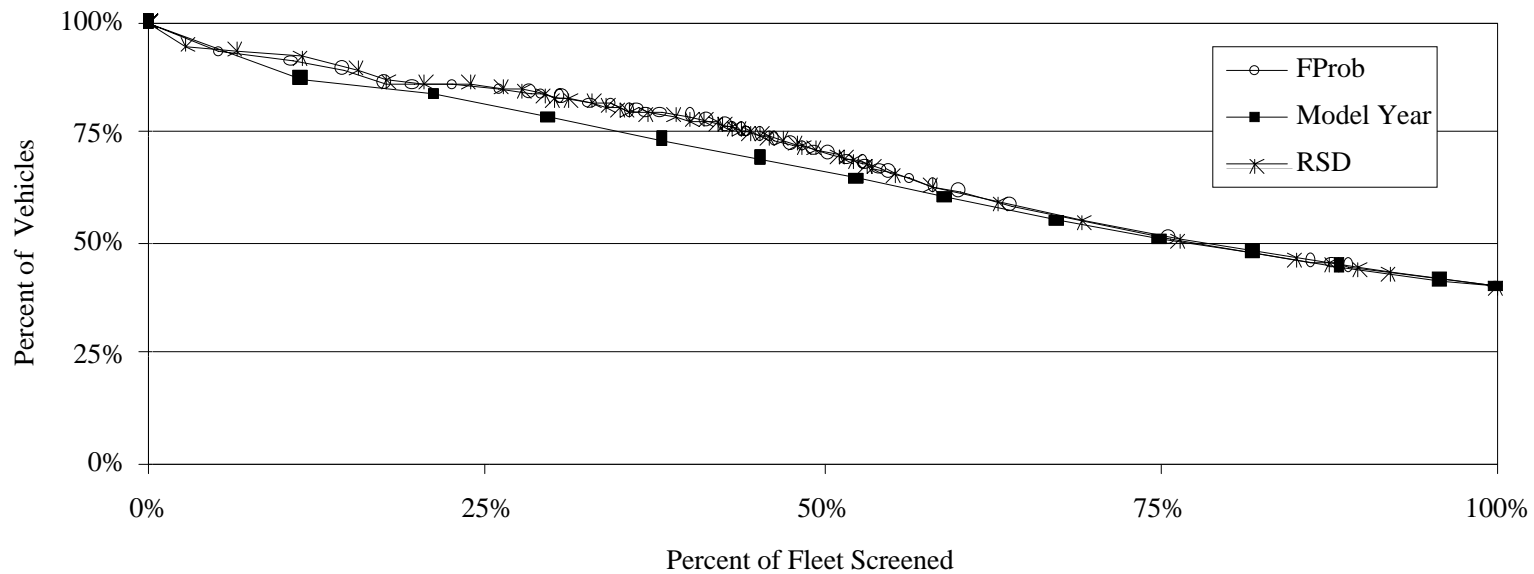
Model	RSDCO	Fprob	Model Year
A	✓	✓	
B		✓	
C			✓



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Percent of Screened Vehicles Which Are Clean
Clean: Vehicle Emissions Less Than 50% of Vehicle Standard



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MODEL PERFORMANCE

Clean: Vehicle Emissions Less Than 50% of Vehicle Standard

Screening Percentage	Percent Excess NOx		
	RSD	Fprob	Model Year
	Model A	Model B	Model C
10	0.29	0.33	1.12
20	1.29	1.14	2.38
30	2.60	2.60	4.84
40	5.49	5.43	8.40
50	10.73	11.95	18.38

Percent Excess HC		
RSD	Fprob	Model Year
Model A	Model B	Model C
0.00	0.00	0.18
0.05	0.24	0.64
0.66	0.66	1.60
1.15	1.72	2.60
2.78	3.13	9.25

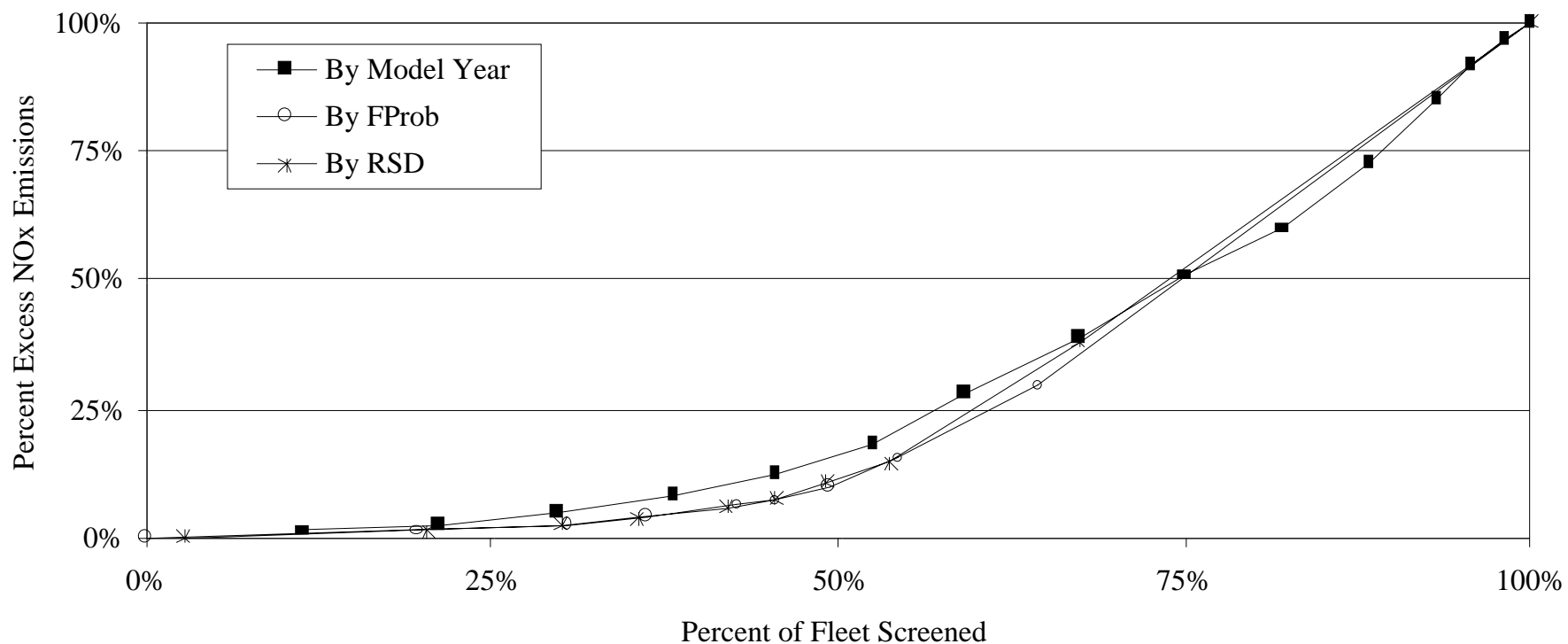


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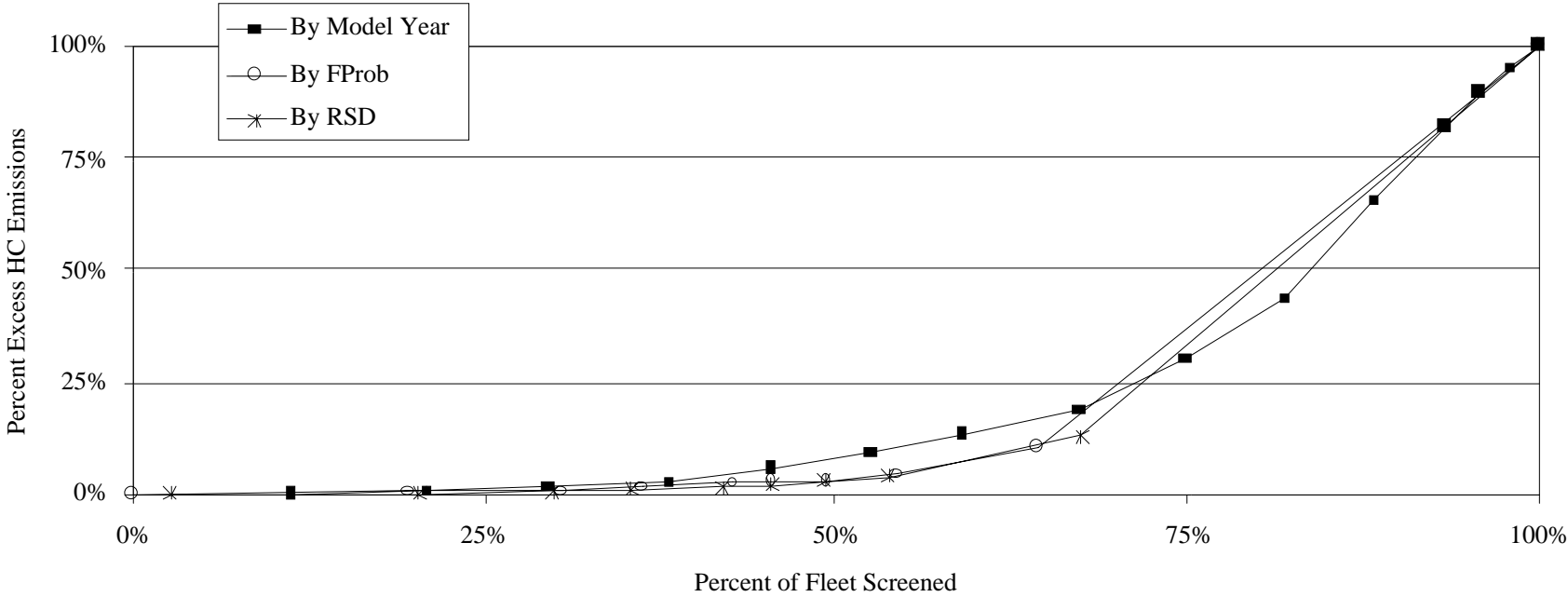
Excess NOx Emissions Predicted By Model Year, Fprob, and RSD
Clean: Vehicles Emissions Less Than 50% of Vehicle Standard



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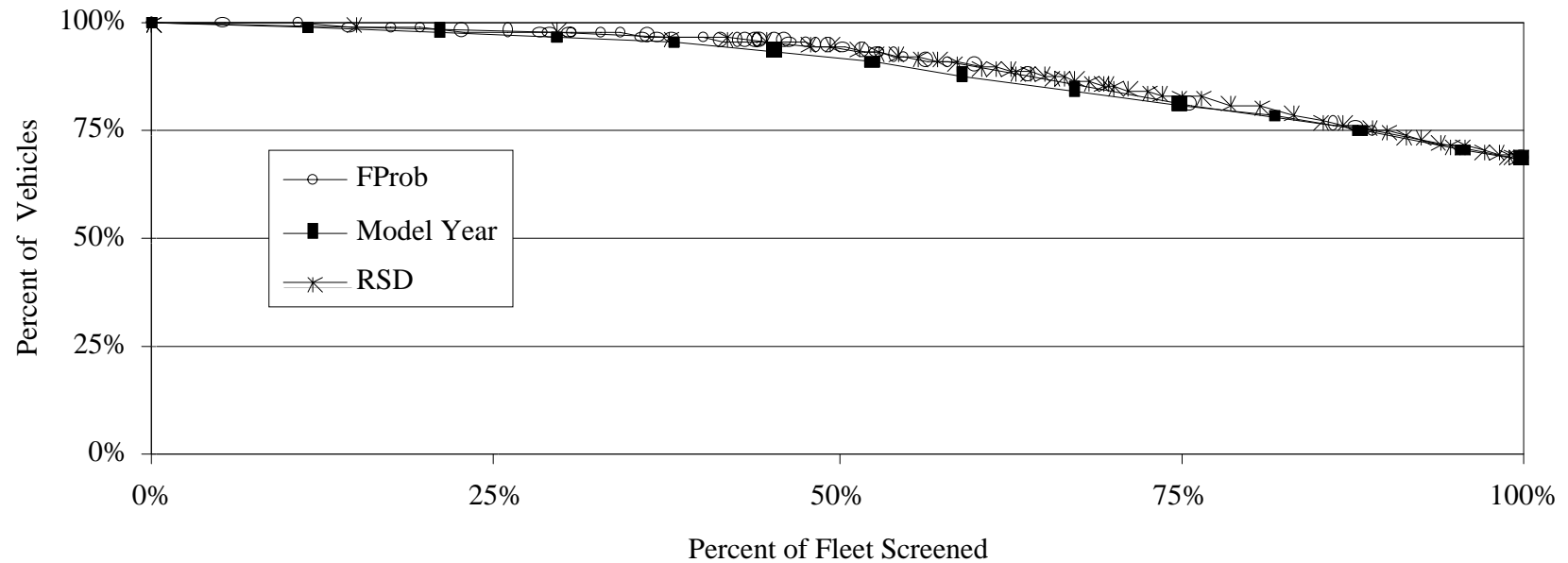
Excess HC Emissions Predicted By Model Year, Fprob, and RSD
Clean: Vehicle Emissions Less Than 50% of Vehicle Standard



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Percent of Screened Vehicles Which Are Clean Clean: Vehicle Emissions Less Than 100% of Vehicle Standard



MODEL PERFORMANCE

Clean: Vehicle Emissions Less Than 100% of Vehicle Standard

Screening Percentage	Percent Excess NOx		
	RSD	Fprob	Model Year
	Model A	Model B	Model C
10	0.00	0.00	0.59
20	0.00	0.89	0.89
30	0.89	1.22	1.25
40	1.71	2.32	3.27
50	2.82	2.87	10.80

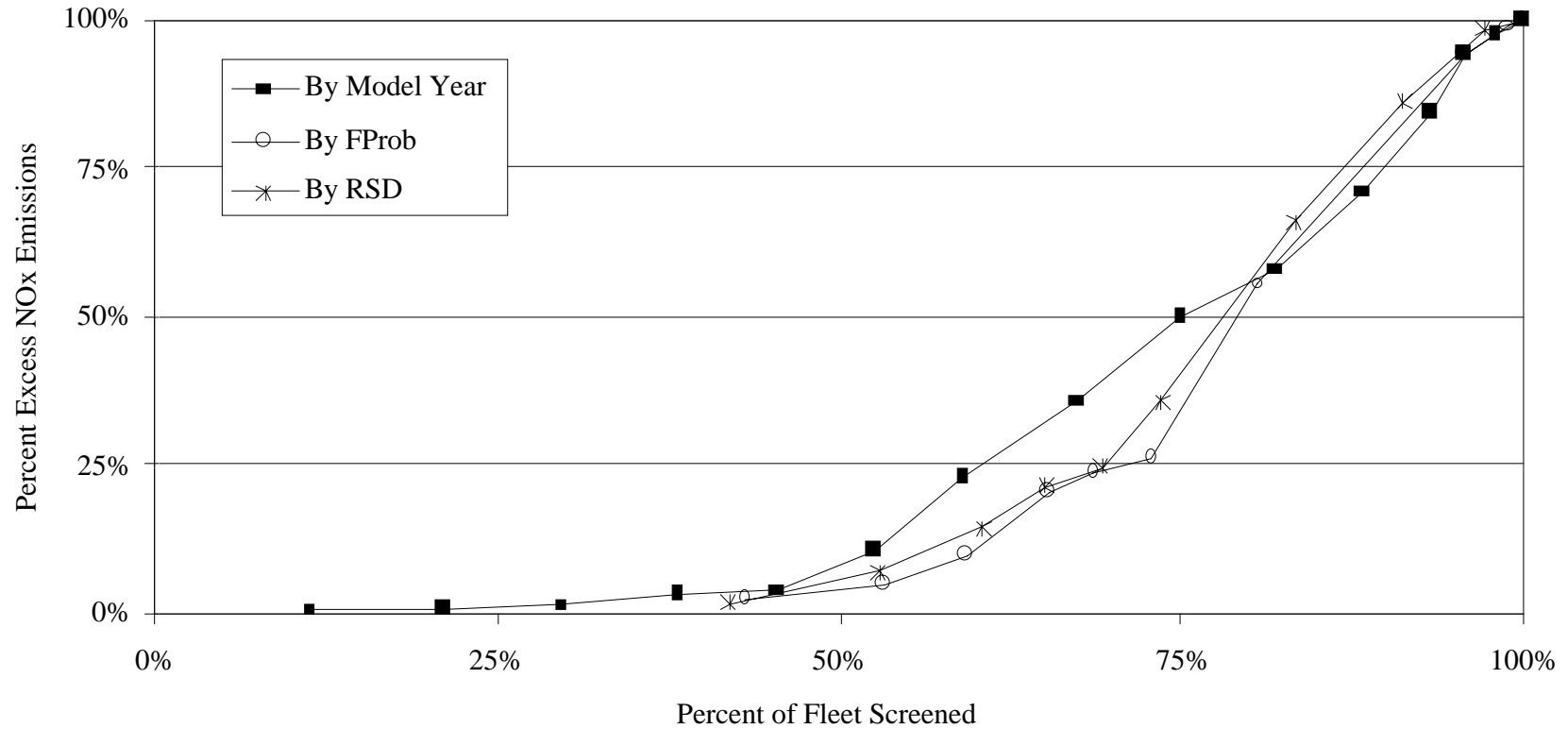
Percent Excess HC		
RSD	Fprob	Model Year
Model A	Model B	Model C
0.00	0.00	0.06
0.00	0.06	0.06
0.22	1.15	1.02
0.28	2.40	1.42
0.28	2.40	9.92



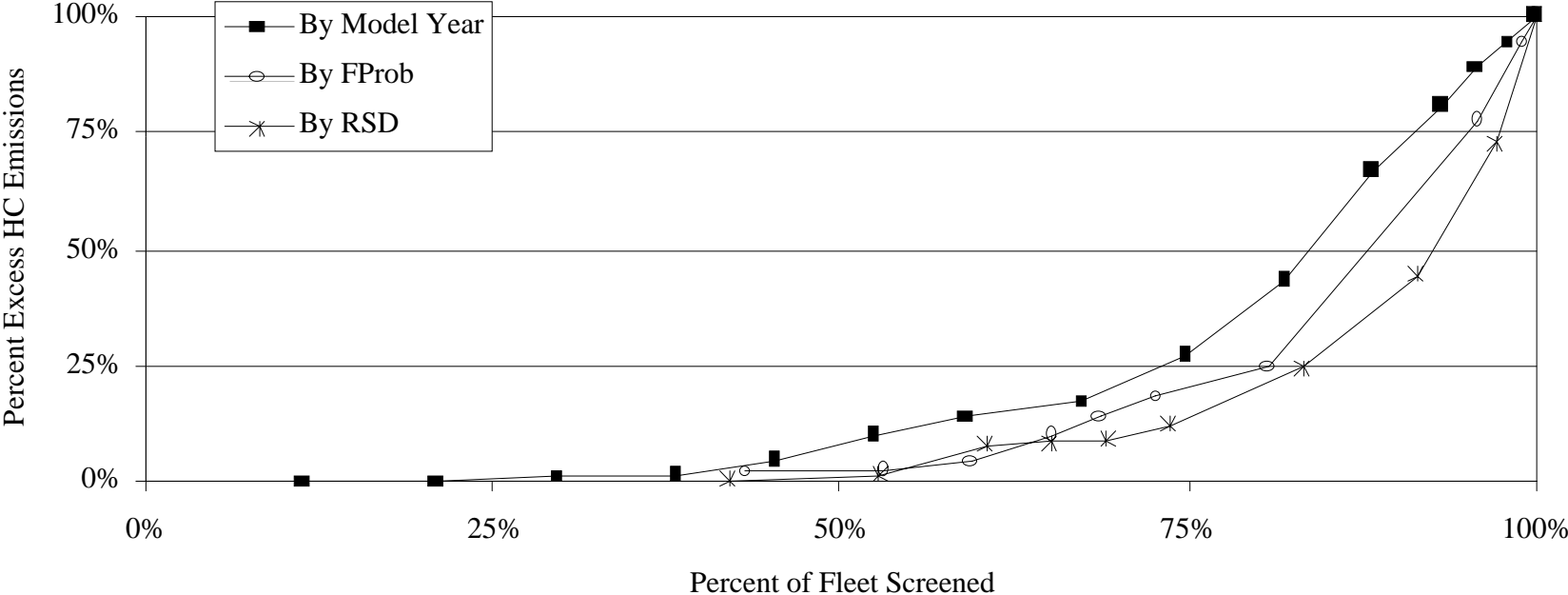
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Excess NOx Emissions Predicted By Model Year, Fprob, and RSD Clean: Vehicle Emissions Less Than 100% of Vehicle Standard



Excess HC Emissions Predicted By Model Year, Fprob, and RSD
Clean: Vehicle Emissions Less Than 100% of Vehicle Standard



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Results and Conclusions

- ✦ **Clean screening can be used to exempt a fairly large percentage of vehicles with minimal impact of emission reductions**
- ✦ **RSD, LEP, and model year exemptions are all useful approaches.**
- ✦ **LEP and model year may be favored due to simplicity.**
- ✦ **Cost-effectiveness analysis may be needed to assess cost and emission tradeoffs.**



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