ITEM 5
DRAFT

MEMORANDUM

May 6, 2005

TO: Transportation Planning Board
Technical Committee

FROM: Michael Freeman
Daivamani Sivasailam

SUBJECT: Evaluation of VINPOWER - Vehicle Identification Number (VIN) decoding software

MWCOG/DTP staff is testing the usefulness of VINPOWER decoding software in developing estimates of vehicle fleet characteristics used for the Mobile 6 inputs to air quality analyses. This memo documents the progress to date and presents preliminary findings.

Background

- The Vehicle Identification Number (VIN) is a seventeen character identification issued to a vehicle by its manufacturer. It stays with the vehicle all its life, whereas its license plate, fleet number, etc. may change. Since 1980, the format of VINs has been specified by U.S. Federal Regulations.

Position 1-3 World Manufacturer Identifier

Position 4 Restraint System Type
Brake Type and GVWR Class
(Trucks and Vans Only)

Position 5-7 Line, Series, Body Type

Position 8 Engine Type

Position 9	Check Digit
Position 10	Model Year
Position 11	Assembly Plant
Position 12-17	Production Sequence Number

Attributes Decoded by VINPOWER

- ESP Data Solutions has developed a proprietary software / database that can be used to "decode" VINs to determine vehicle characteristics. A sample decoded VIN is provided below with attributes of particular interest to air quality analyses formatted with bold text.

VIN	**JAEDJ58V4T7B02286**
ModelYear	**1996**
Make	**Acura**
Model	**SLX**
BodyType	4 Door Wagon
TrimLevel	Base
EngineType	"V6, 3.2L; SOHC 24V"
Country	JAPAN
AssyPlant	Fujisawa
ProductionSeqNumber	B02286
CheckDigit	4
CabType	N/A
Length	N/A
DriveLineType	4WD
GVWRClass	**"Class D: 5,001-6,000 lb"**
GVWRProdRange	N/A
CurbWeight	N/A
WheelBase	N/A
Manufacturer	Isuzu Motors Limited
FrameType	N/A
RestraintSystem	Dual Air Bag; Seat Belts
Series	1/4 Ton
VehicleType	Multipurpose Vehicle (MPV)
VehicleClass	Full-size MPV
Equipment	N/A
Chassis	N/A
Transmission	4 Speed Automatic
EmissionsCode	N/A

BrakeSystem	Hydraulic
TrailerType	N/A
FuelType	**Gasoline**
Horsepower	N/A
EngineManufacturer	N/A
EngineSeriesCode	N/A
AxleConfiguration	N/A
BodyDimensions	N/A
Mobile6Class	**LDGT2**
MotorcyclesType	N/A
EngineDisplacement	N/A
SalesName	N/A

VIN Decoder Test

- MWCOG/DTP staff is testing the usefulness of VINPOWER VIN decoding software in developing vehicle fleet characteristic estimates such as age and vehicle type distributions for use in air quality analyses.
- A list of VINS (2% Random Sample for DC, Montgomery, and Fairfax) was sent to ESP data for decoding. ESP provided this service for $0.008 / vin. (About $329 for this test.) ESP processed the VINS and transmitted a file to DTP with decoded attributes.
- If a VIN could not be decoded by the software, an error code was issued for the particular VIN describing why it couldn't be decoded. Table 1 lists the total number of VINs that were submitted and the number successfully decoded by ESP. The software was able to decode about 97% of the VINs that were submitted for decoding. It varies by jurisdiction from a low of 93% in DC to a high of 98% in Fairfax County.
- Table 2 is an illustration of successful decodes of Fairfax County VINs by year. From the table it can be inferred that the program decoded 99.5% of vehicles with model years after 1980.
- Table 3 is an illustration of successful decodes of VINs in Montgomery County by year.
- A comparison of decode success rate by year was not possible for the District of Columbia, because the vehicle registration files transmitted to DTP for this test did not include model year.

Table 1.
VIN Decode Rates by Jurisdiction

	Montgomery		Fairfax		DC		Total	
	Count	*%*	Count	*%*	Count	*%*	Count	*%*
Decoded	13,531	*95.9*	15,795	*98.4*	4331	*93.3*	33,657	*96.7*
Not Read	576	*4.1*	258	*1.6*	311	*6.7*	1145	*3.3*
Total	14,107	*100*	16,053	*100*	4642	*100*	34,802	*100*

Table 2.
Fairfax County VIN Decode Statistics by Year

	Decoded		Not Read		Total	
DMV_YEAR	Count	%	Count	%	Count	%
2003	25	0.2%	0	0.0%	25	0.2%
2002	990	6.2%	2	0.0%	992	6.2%
2001	1402	8.7%	1	0.0%	1403	8.7%
2000	1576	9.8%	3	0.0%	1579	9.8%
1999	1338	8.3%	2	0.0%	1340	8.3%
1998	1210	7.5%	3	0.0%	1213	7.6%
1997	1217	7.6%	0	0.0%	1217	7.6%
1996	1026	6.4%	2	0.0%	1028	6.4%
1995	1137	7.1%	2	0.0%	1139	7.1%
1994	978	6.1%	4	0.0%	982	6.1%
1993	889	5.5%	6	0.0%	895	5.6%
1992	699	4.4%	1	0.0%	700	4.4%
1991	638	4.0%	4	0.0%	642	4.0%
1990	604	3.8%	4	0.0%	608	3.8%
1989	498	3.1%	6	0.0%	504	3.1%
1988	433	2.7%	6	0.0%	439	2.7%
1987	352	2.2%	6	0.0%	358	2.2%
1986	268	1.7%	6	0.0%	274	1.7%
1985	195	1.2%	4	0.0%	199	1.2%
1984	123	0.8%	3	0.0%	126	0.8%
1983	68	0.4%	0	0.0%	68	0.4%
1982	41	0.3%	2	0.0%	43	0.3%
1981	23	0.1%	3	0.0%	26	0.2%
1980	5	0.0%	11	0.1%	16	0.1%
1979	9	0.1%	28	0.2%	37	0.2%
<=1978	51	0.3%	149	0.9%	200	1.2%
Total	15795	98.4%	258	1.6%	16053	100.0%

- The information in the Table 2 above is also provided in the chart on the following page.

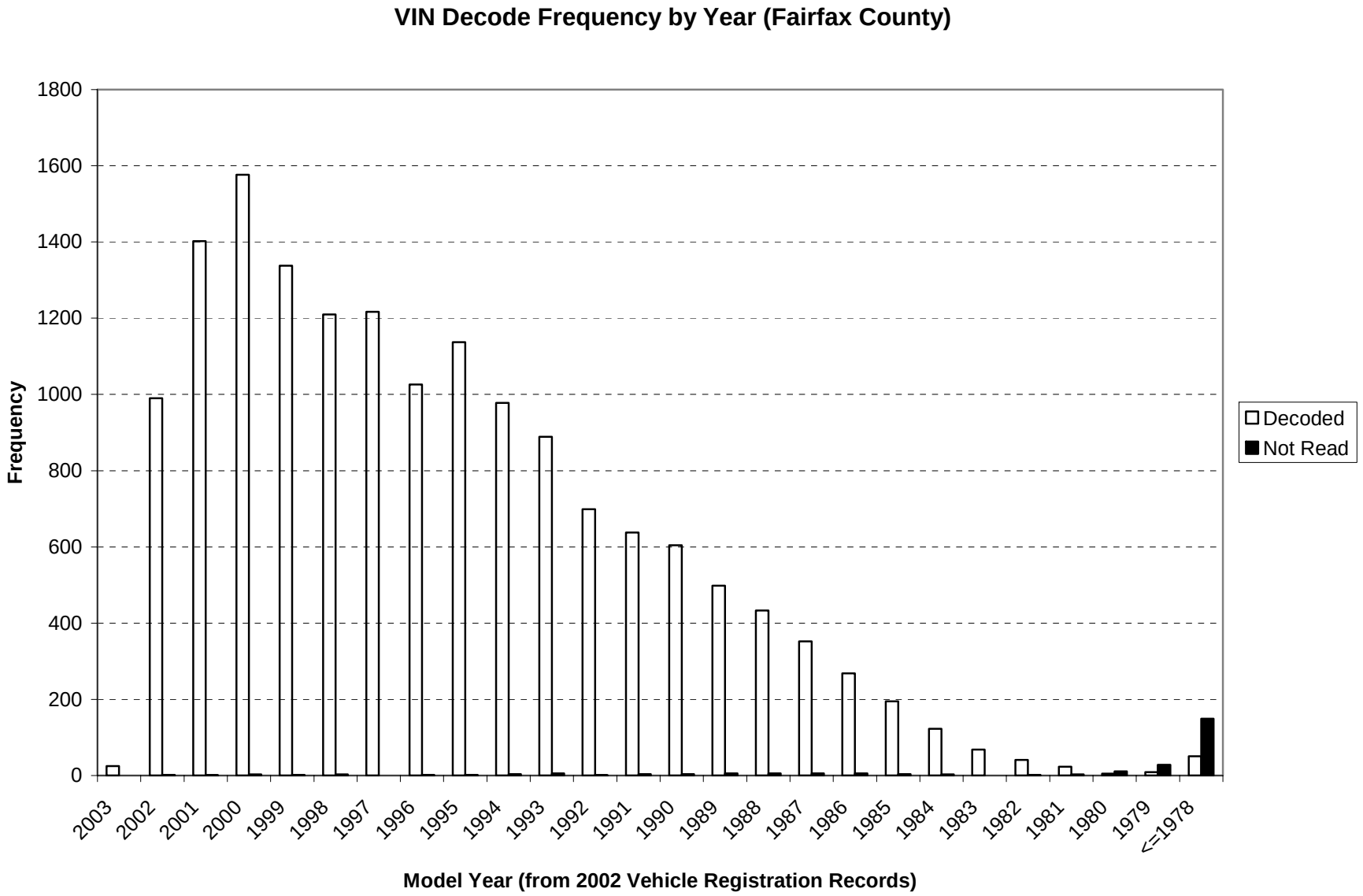
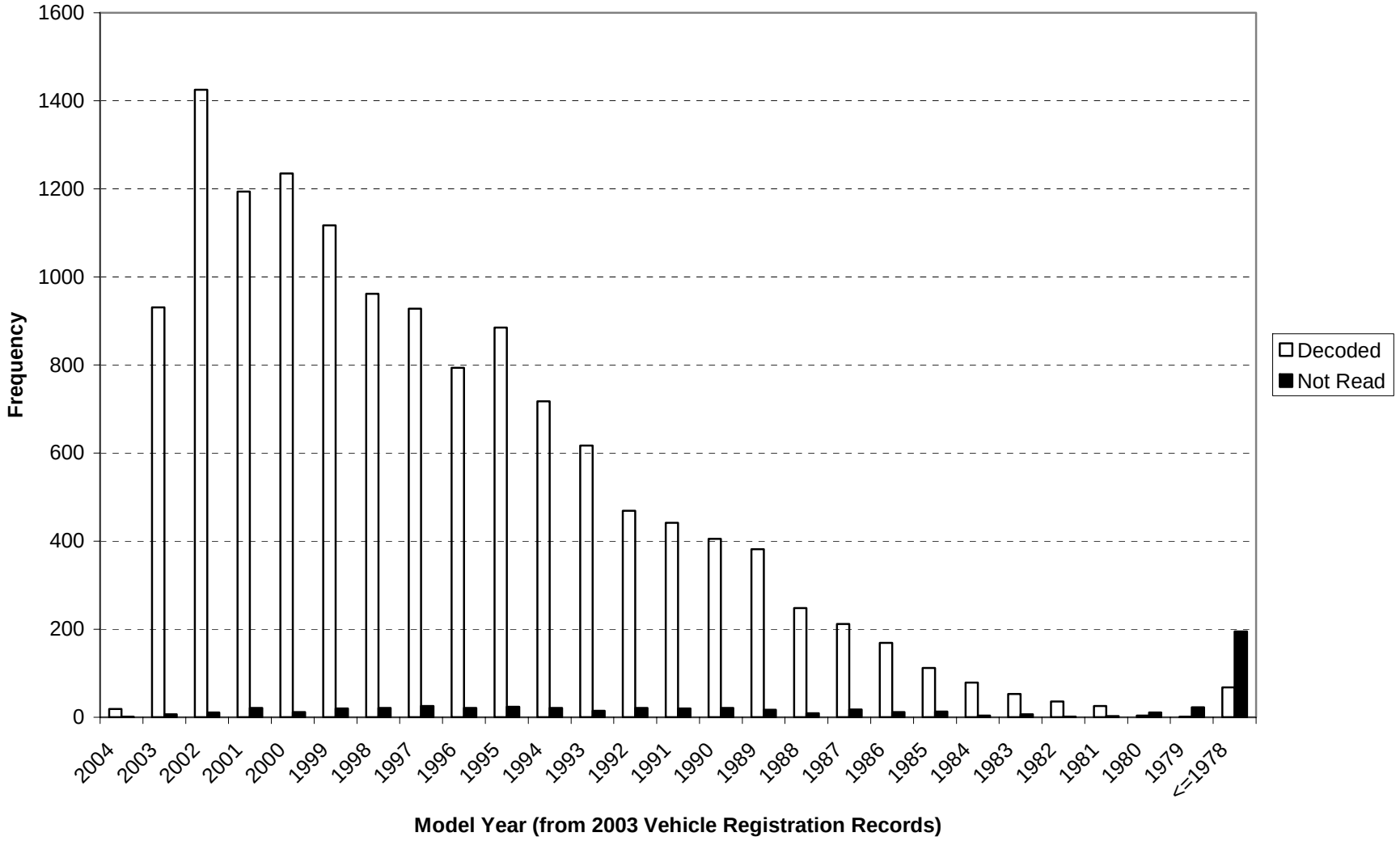

VIN Decode Frequency by Year (Fairfax County)
Frequency
1800
1600
1400
1200
1000
800
600
400
200
0
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979
<=1978
Model Year (from 2002 Vehicle Registration Records)
Decoded
Not Read

Table 3.
Montgomery County VIN Decode Statistics by Year

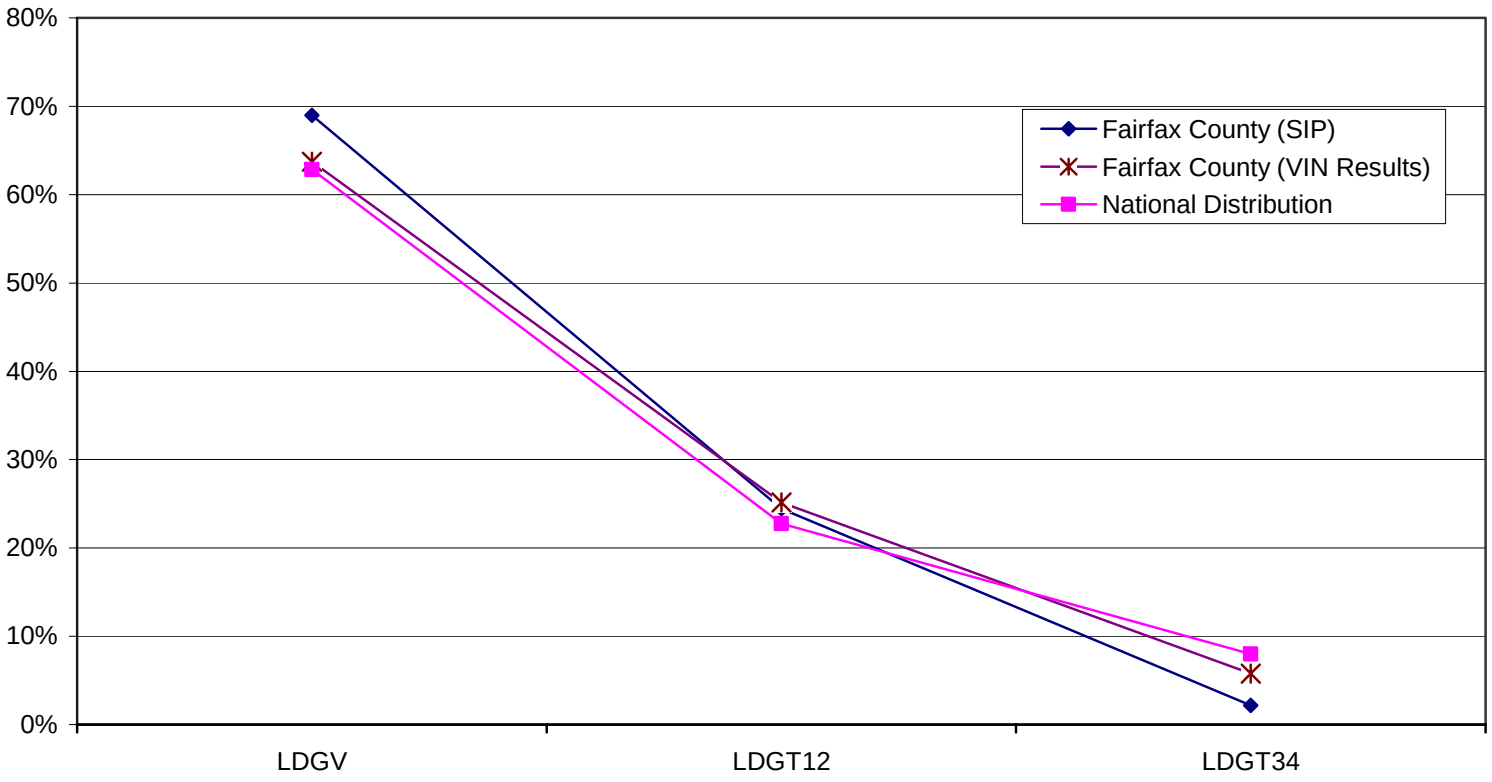
DMV_YEAR	Decoded		Not Read		Total	
	Count	%	Count	%	Count	%
2004	19	0.1%	1	0.0%	20	0.1%
2003	931	6.6%	7	0.0%	938	6.6%
2002	1425	10.1%	11	0.1%	1436	10.2%
2001	1194	8.5%	21	0.1%	1215	8.6%
2000	1235	8.8%	12	0.1%	1247	8.8%
1999	1117	7.9%	20	0.1%	1137	8.1%
1998	962	6.8%	21	0.1%	983	7.0%
1997	928	6.6%	26	0.2%	954	6.8%
1996	794	5.6%	21	0.1%	815	5.8%
1995	885	6.3%	24	0.2%	909	6.4%
1994	718	5.1%	21	0.1%	739	5.2%
1993	617	4.4%	15	0.1%	632	4.5%
1992	469	3.3%	21	0.1%	490	3.5%
1991	442	3.1%	20	0.1%	462	3.3%
1990	405	2.9%	21	0.1%	426	3.0%
1989	382	2.7%	17	0.1%	399	2.8%
1988	248	1.8%	9	0.1%	257	1.8%
1987	212	1.5%	18	0.1%	230	1.6%
1986	169	1.2%	12	0.1%	181	1.3%
1985	112	0.8%	13	0.1%	125	0.9%
1984	79	0.6%	4	0.0%	83	0.6%
1983	53	0.4%	7	0.0%	60	0.4%
1982	36	0.3%	2	0.0%	38	0.3%
1981	26	0.2%	3	0.0%	29	0.2%
1980	4	0.0%	11	0.1%	15	0.1%
1979	1	0.0%	23	0.2%	24	0.2%
<=1978	68	0.5%	195	1.4%	263	1.9%
Total	13531	95.9%	576	4.1%	14107	100.0%

- The information in the Table 3 above is also provided in an attached chart.

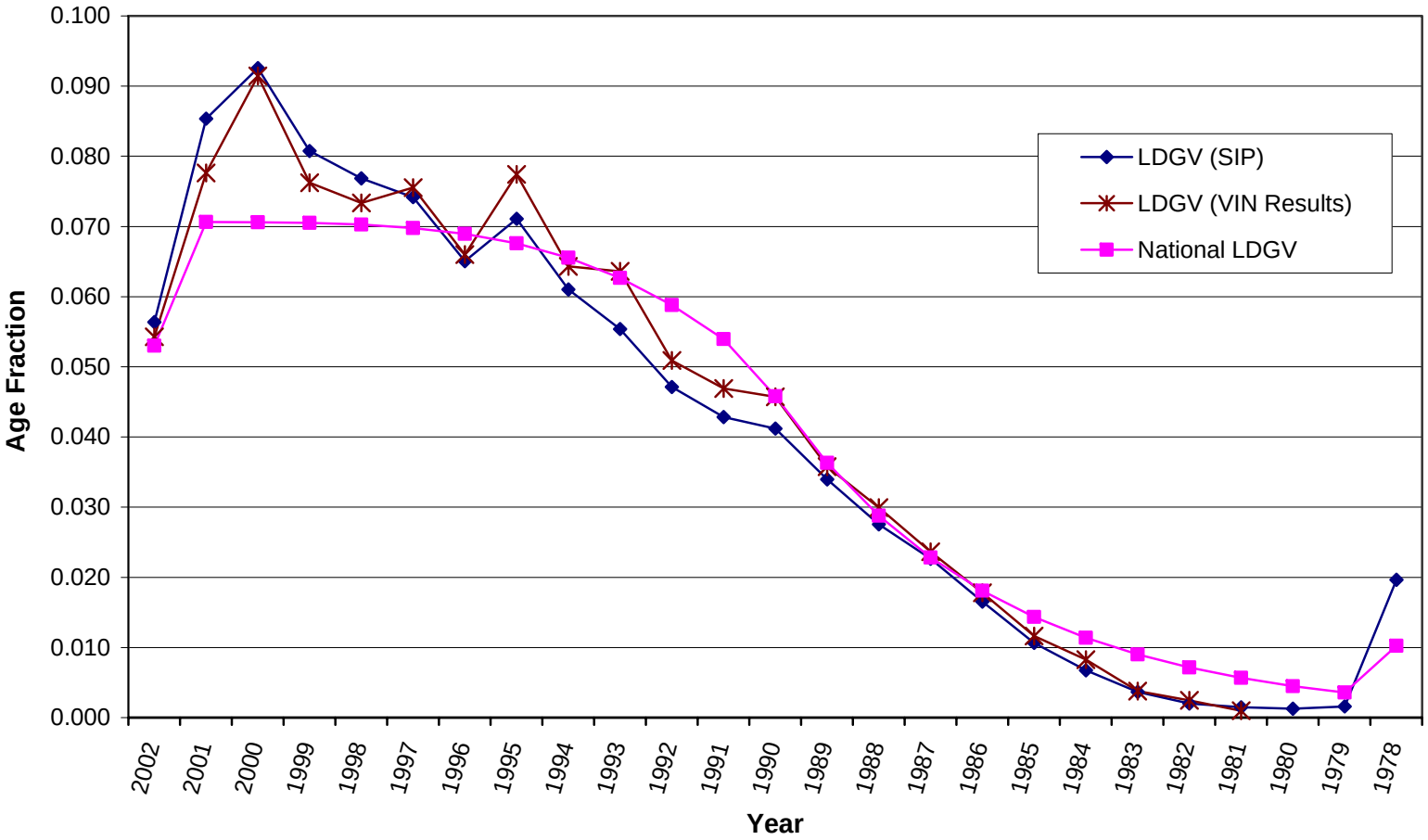
VIN Decode Frequency by Year (Montgomery County)



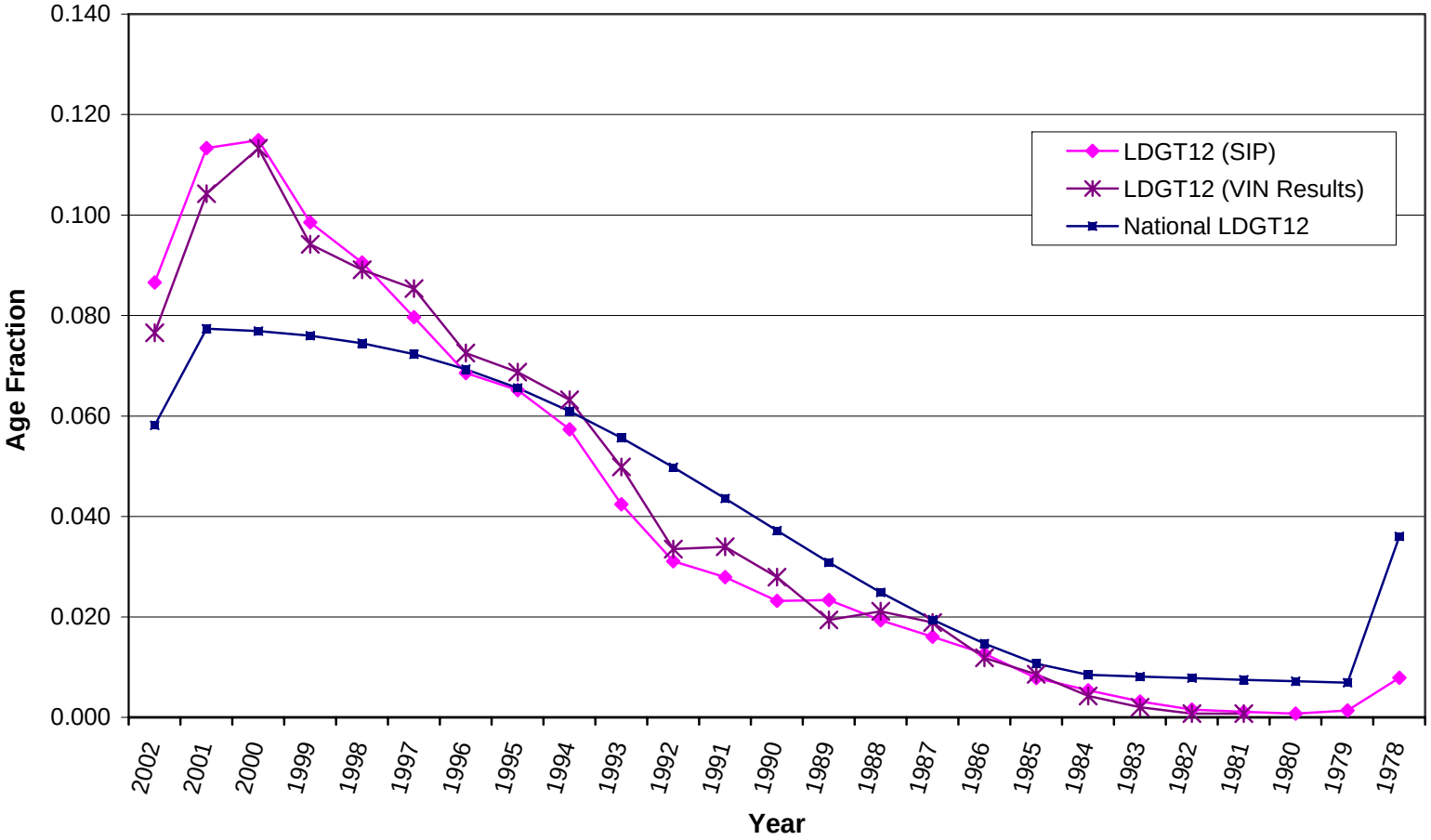
Vehicle Distribution (LDV, LDT12, LDT34)
Fairfax County



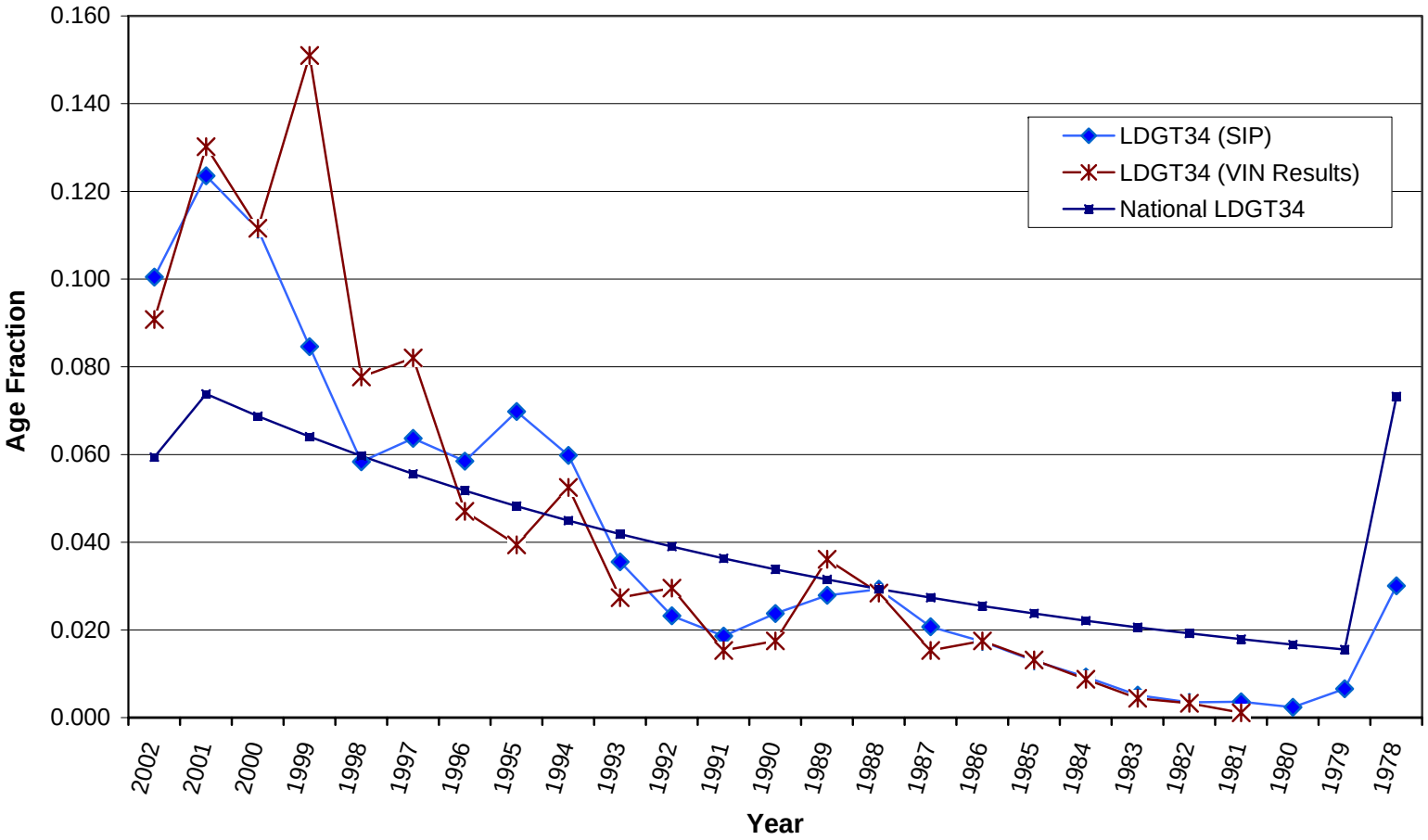
Age Distribution by Light Duty Vehicle Type
Fairfax County



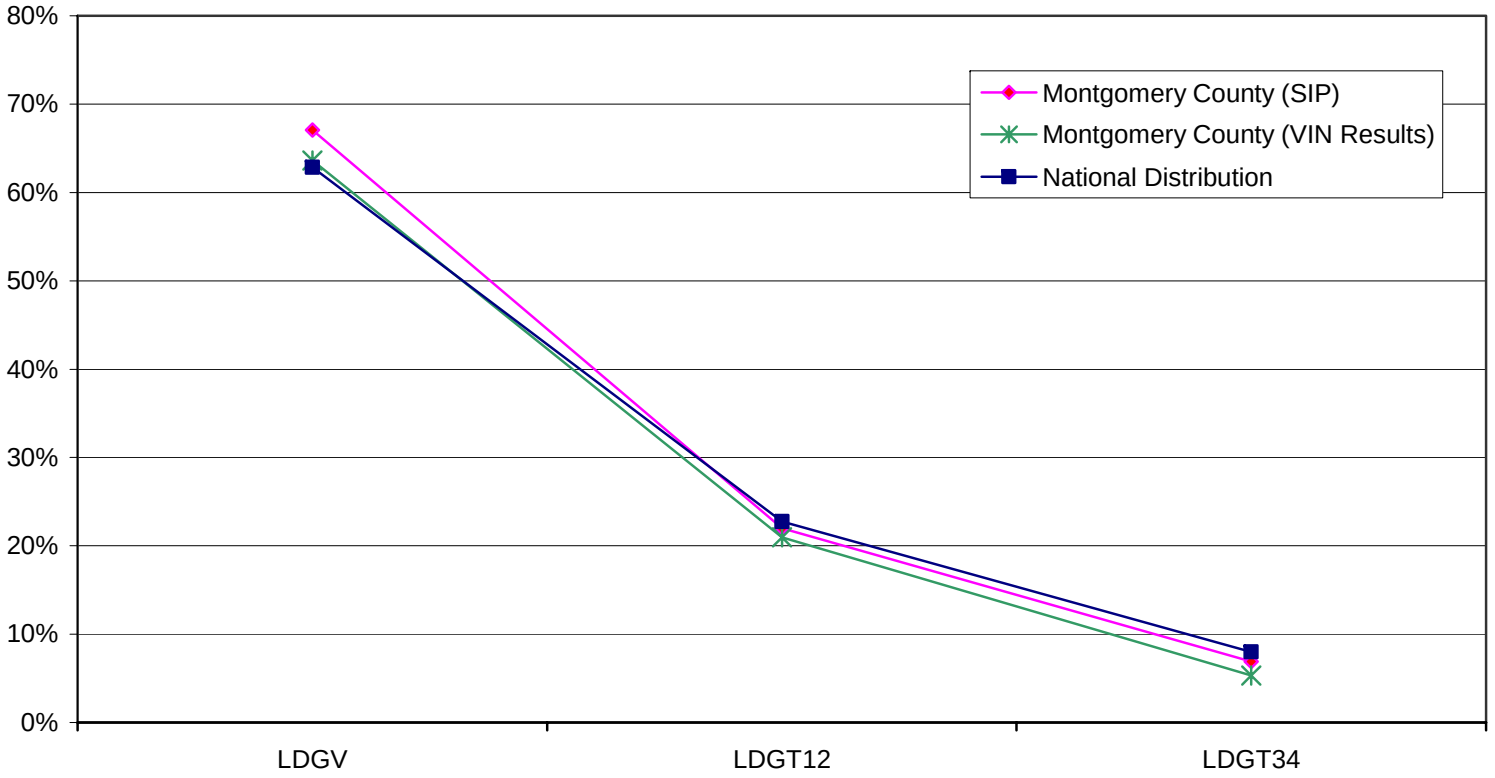
Age Distribution by Light Duty Truck 1,2
Fairfax County

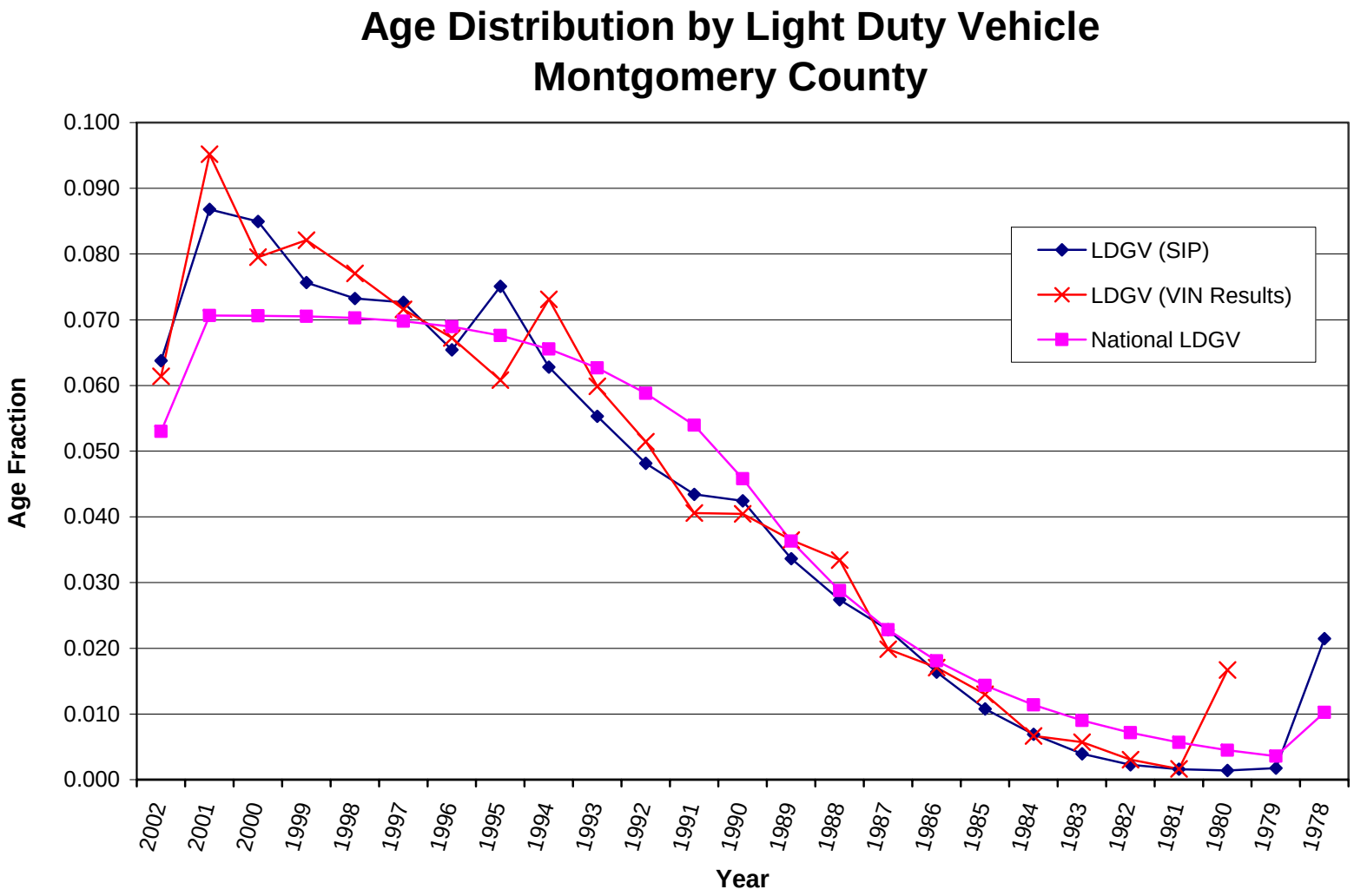


Age Distribution by Light Duty Truck 3,4
Fairfax County

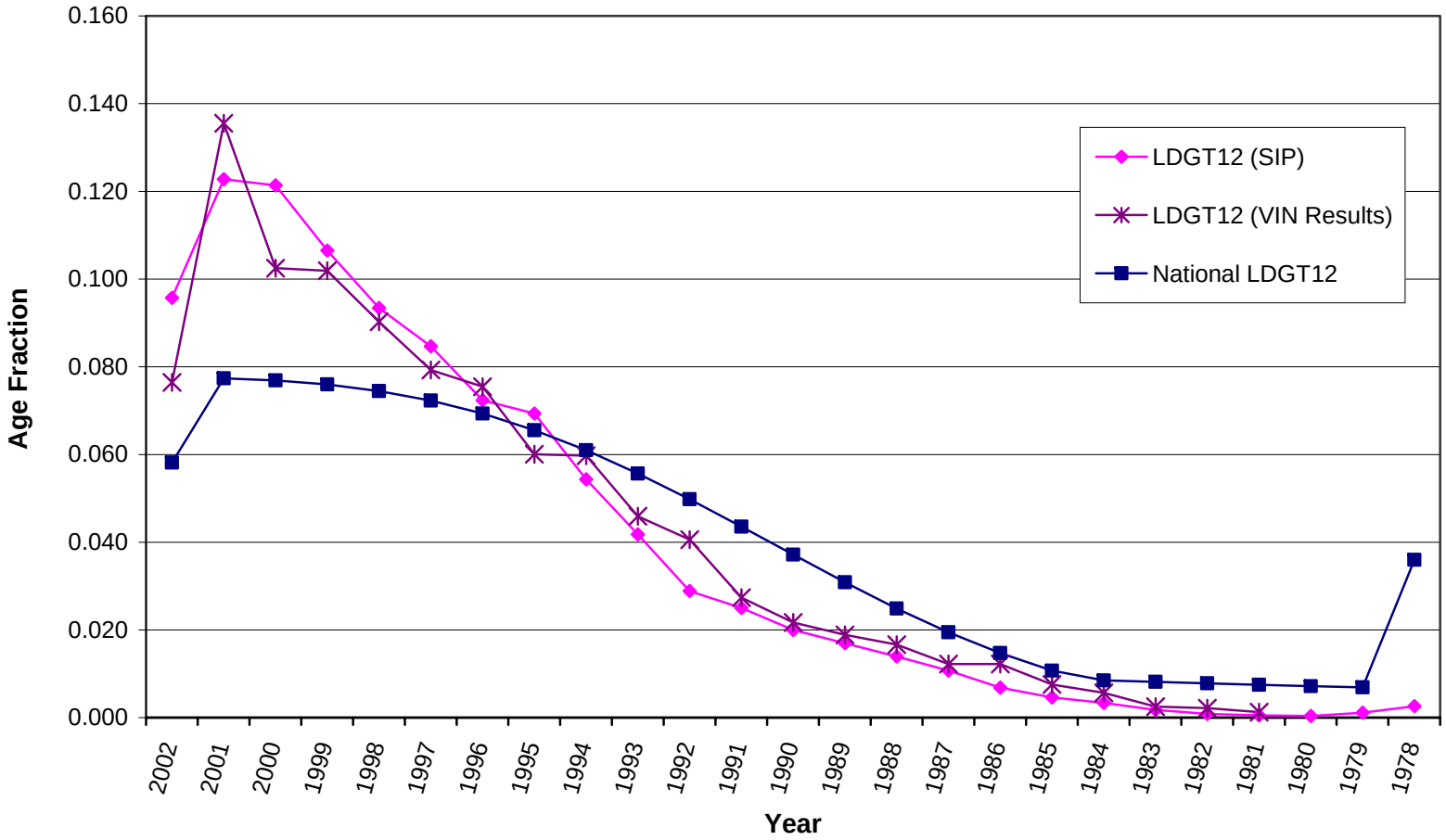


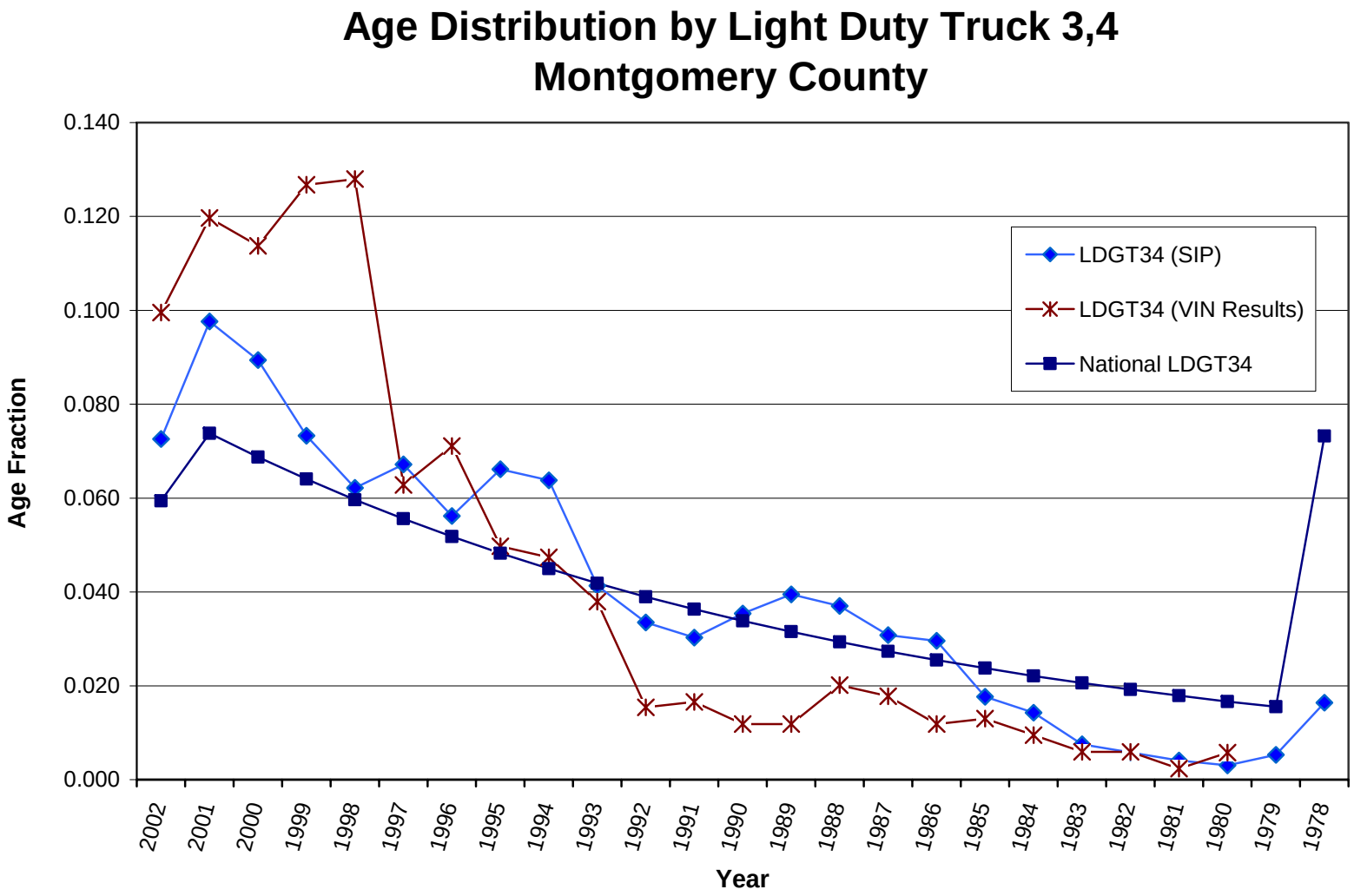
Vehicle Distribution (LDV, LDT12, LDT34)
Montgomery County



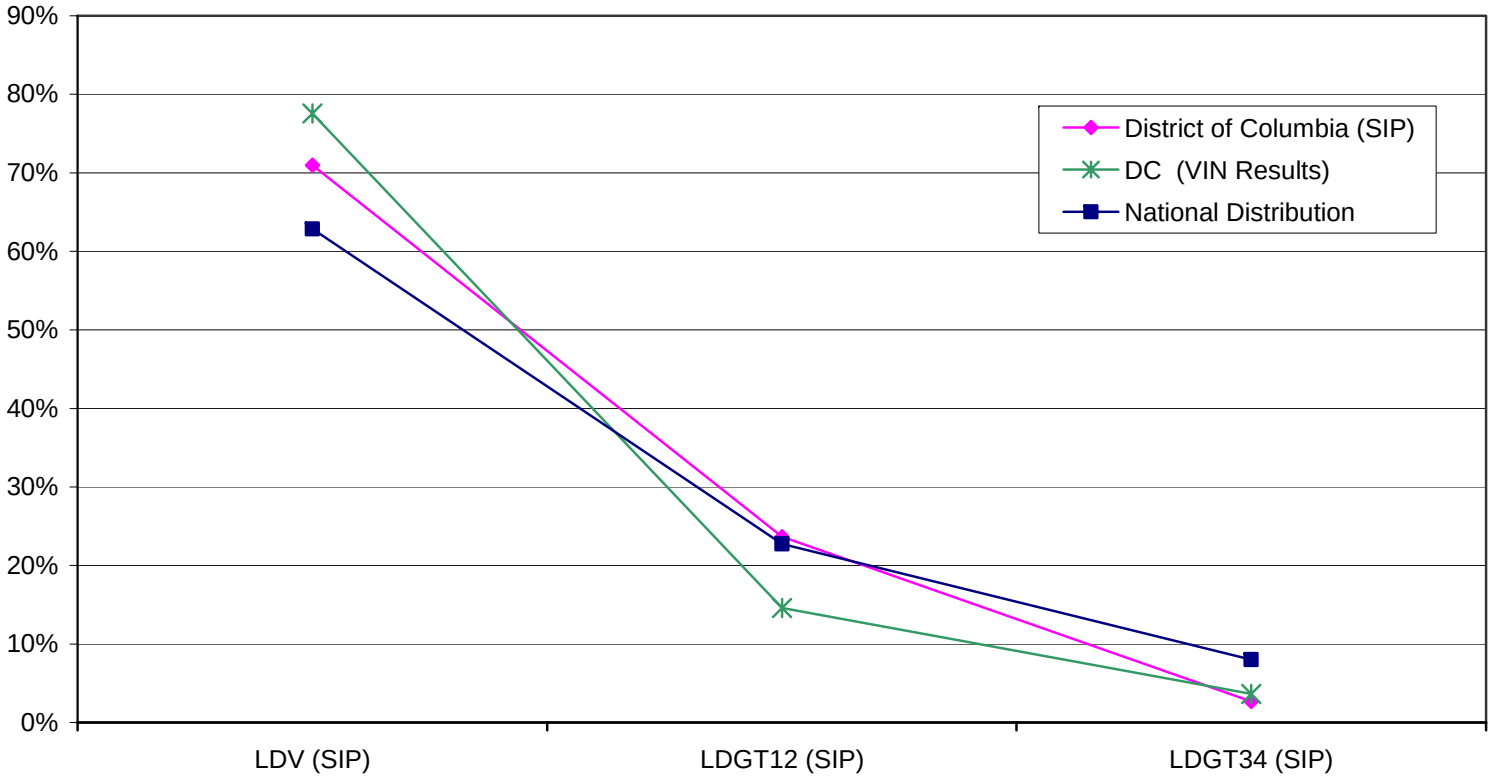

Age Distribution by Light Duty Vehicle
Montgomery County
Age Fraction
0.100
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979
1978
Year
LDGV (SIP)
LDGV (VIN Results)
National LDGV

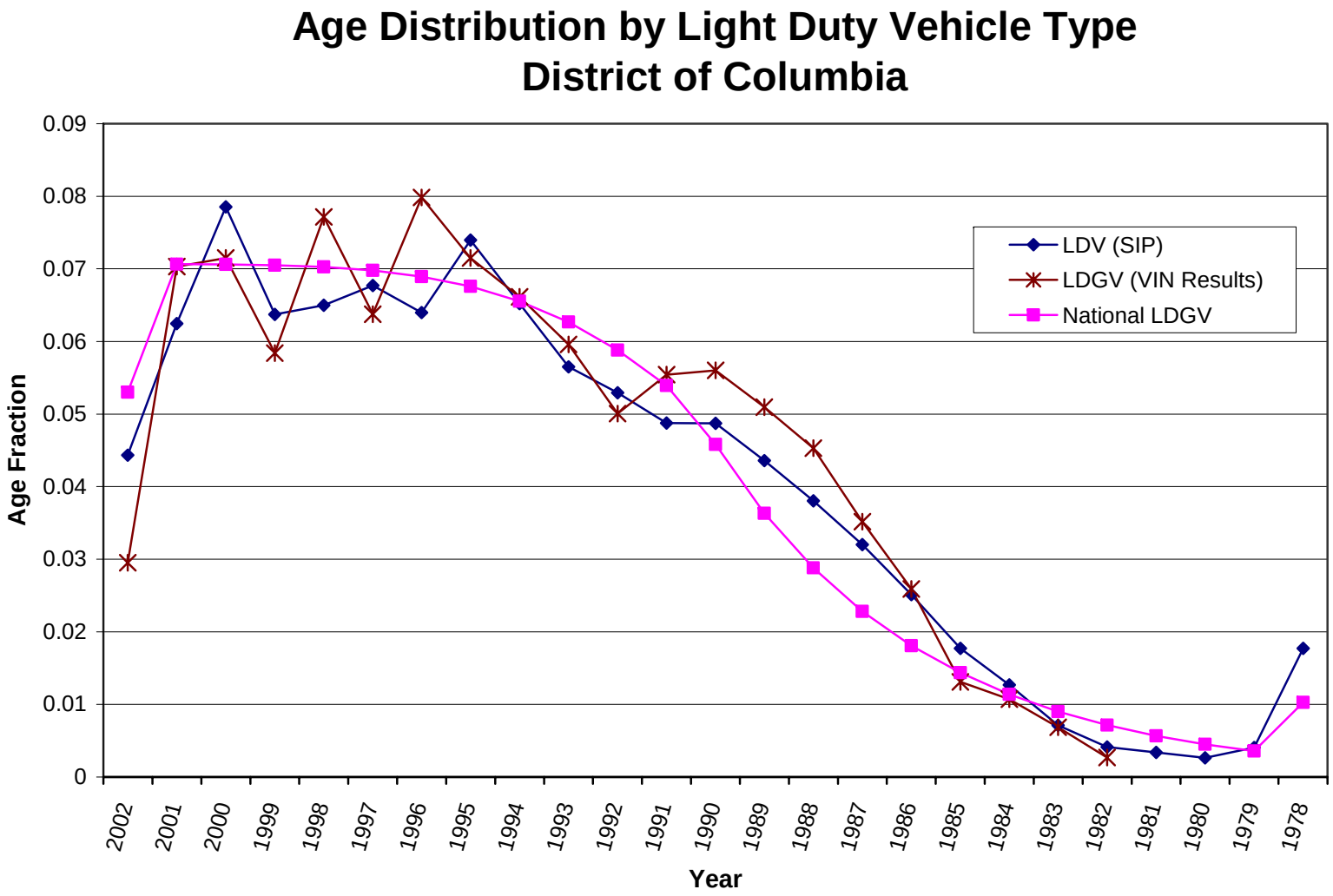
Age Distribution by Light Duty Truck 1,2
Montgomery County



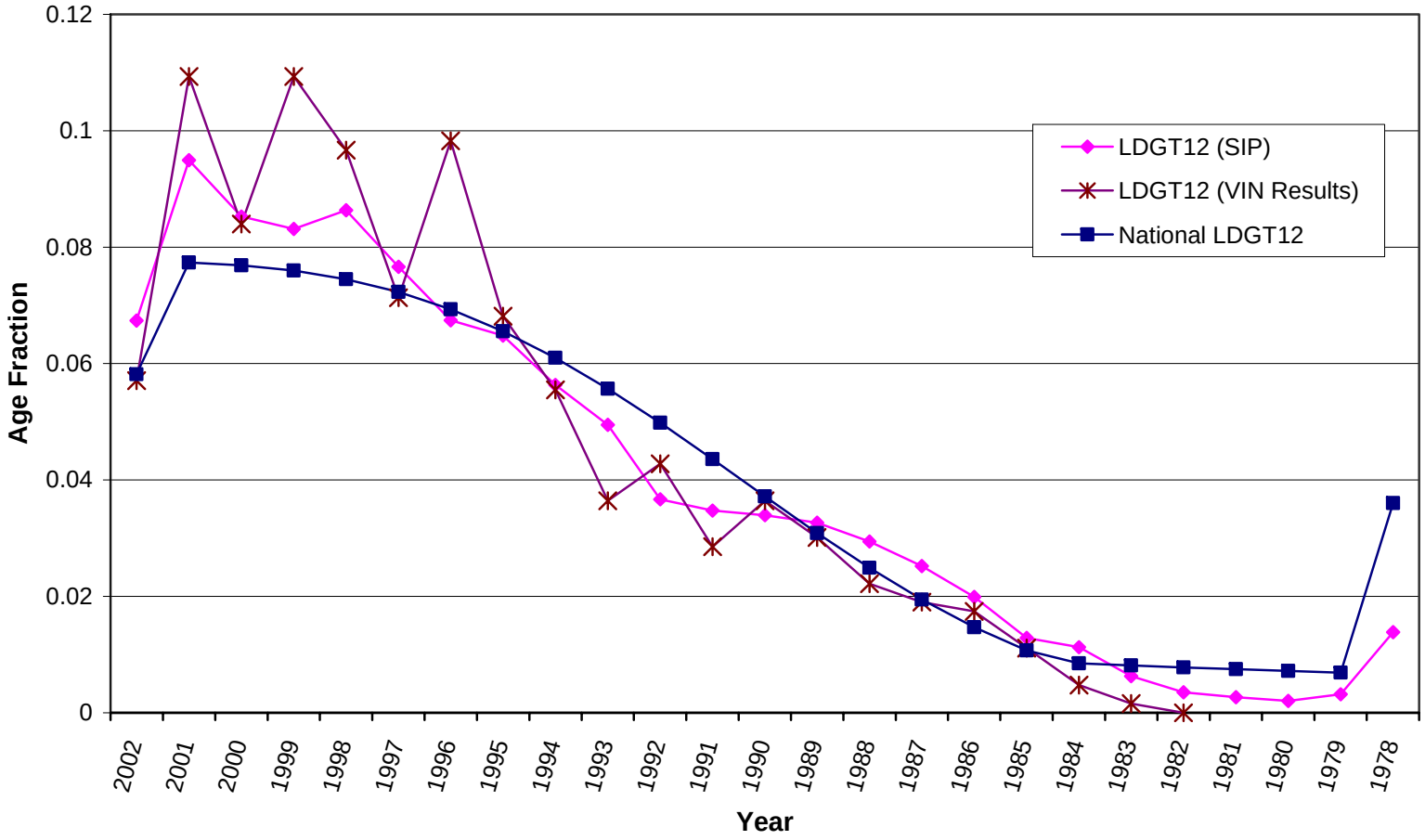

Age Distribution by Light Duty Truck 3,4
Montgomery County
Age Fraction
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979
1978
Year
LDGT34 (SIP)
LDGT34 (VIN Results)
National LDGT34

Vehicle Distribution (LDV, LDT12, LDT34)
District of Columbia

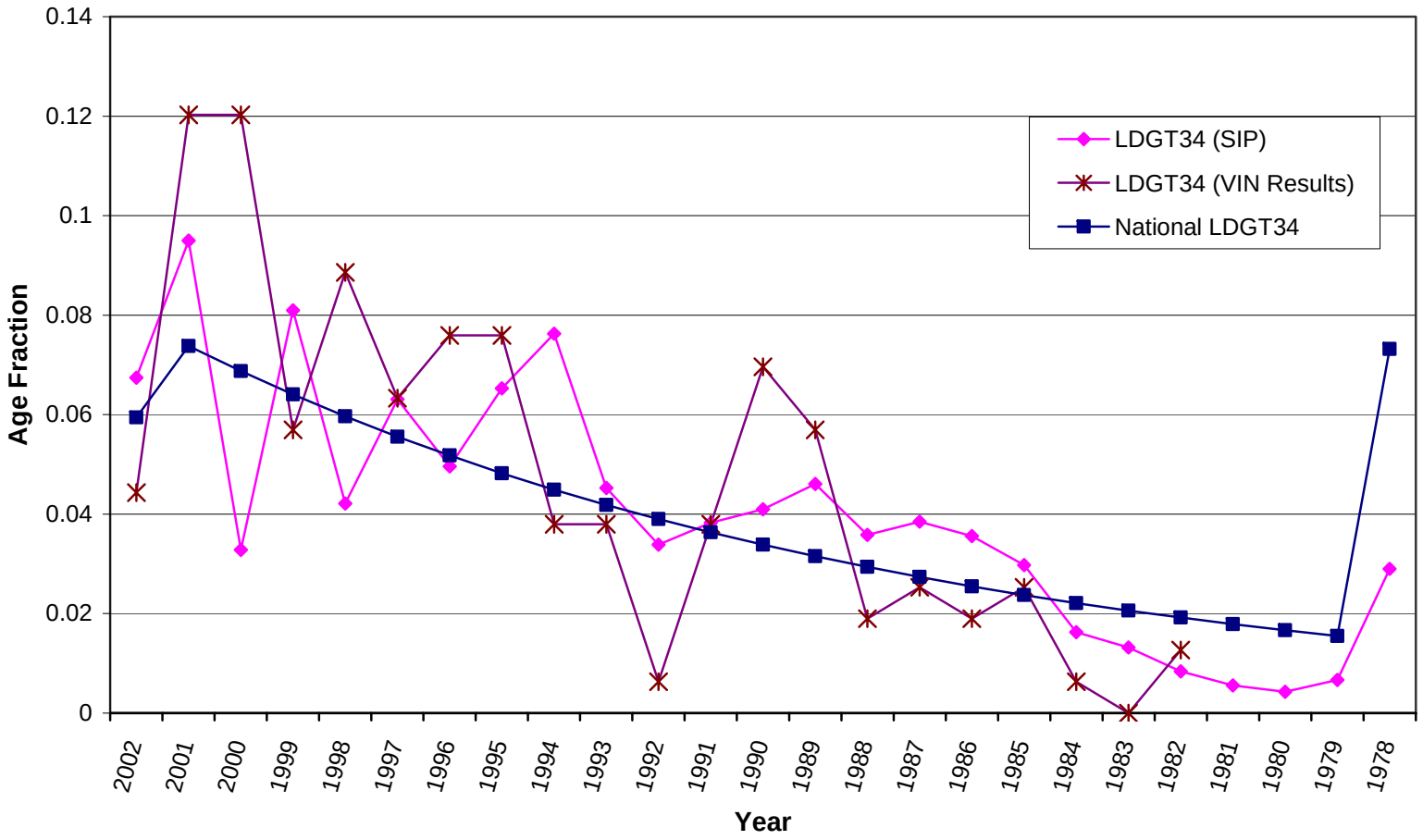



Age Distribution by Light Duty Vehicle Type
District of Columbia
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Age Fraction
LDV (SIP)
LDGV (VIN Results)
National LDGV
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979
1978
Year

Age Distribution by Light Duty Truck 1,2
District of Columbia



Age Distribution by Light Duty Truck 3,4
District of Columbia



VINPOWER Pricing

The following price structure was quoted by ESP Data Solutions:

- VIN Decoding $0.008 per VIN (software not included, decoding performed by ESP Data Solutions).
- 1 to 3 Million VIN's per year is $7,995/yr (includes software and support, decodes performed by MWCOG/DTP staff).
- 3 to 5 Million VIN's per year is $9,995/yr (includes software and support, decodes performed by MWCOG/DTP staff).

Preliminary Findings

- Vin Decode records which could not be read occurred mostly with vehicle model years before 1981.
- Note: Some of the VINs that decoded successfully in this memo did not have all attributes decoded. For example, 1.9% of the "successful" decodes did not have a value for Mobile 6 vehicle type.
- VINPOWER successfully decoded 95% of the VIN numbers of vehicles manufactured after 1980.
- Comparison of VIN-generated vehicle category compares favorably with previous estimates of vehicle category genereated by the state air agencies.
- Age distribution of light duty vehicles does not map well against the distribution used in the one hour attainment SIP.

Next Steps

- Continue analyzing decoded data and developing methodology.
- Update and coordinate with MWAQC regarding test results.
- Coordination with air agencies to obtain July 2005 vehicle registration data.
- Draft final approach and proceed with further testing (sample decode or complete enumeration; smooth age distribution or use raw data?)