



MEMORANDUM

To: Ross Patronsky
From: Claire Bozic
Date: July 1, 2016
Re: Illinois License Plate File MOVES Categories

We received a license plate file from the Illinois Secretary of State's office covering 8 counties of northeastern Illinois. This file is a snapshot of the number of registered vehicles in northeastern Illinois as of February, 2015. It contains 7,207,996 records in the non-attainment area and includes the following variables.

File Variables

#	Variable	Type	Columns
1	Year	Num	1-4
2	Make	Char	5-17
3	Body Type	Char	18-26
4	VIN	Char	27-46
5	Rent/Lease	Char	47-47
6	Registration Type	Char	48-64
7	County	Char	65-76
8	Municipality	Char	77-97
9	Zipcode	Num	98-102
10	(zip)+4	Num	103-106

The file includes registered vehicles (including heavy equipment and trailers) from the seven-county area.

	Registrations	Share
Cook	3,908,004	54.22%
DuPage	1,003,177	13.92%
Grundy	14,844	0.21%
Kane	495,236	6.87%
Kendall	47,098	0.65%
Lake	720,667	10.00%
McHenry	348,302	4.83%
Will	670,668	9.30%
Total	7,207,996	100.00%

The remainder of this memo refers to the attached Excel workbook.

SAS_Summary Tab

The dataset was processed to result in a cross-tabulation of body type by registration type for all records in the file. Added to the table are two calculated fields: MOVES category describing the body type (body_cat) and MOVES category describing the registration type (regi_cat). These fields are filled in by the lookup tables shown on the lookups tabs, discussed in the next section. There are 4,273 observed combinations of registration type/ body type. Some of the combinations don't make sense (for example, listed body type as motorcycle, registration type as auto). There are many inconsistencies in the file which require decisions about how to treat the records.

Lookups Tab

This tab includes 2 lookup tables. The first is a listing of all the body types included in the file, with a list of which of the 13 MOVES categories they likely belong in. The second is a listing of all the registration types with the MOVES categories they likely belong in.

Body Type Lookup

For body type, the auto category was straightforward. Note that passenger vans were included in the auto body category. 58 body types were classified as autos.

Other body types relied on a combination of looking up images of the vehicles where possible, and applying a judgment regarding how they might operate. This process is important because some important MOVES category vehicles are not identifiable by registration types. For example, passenger trucks are registered as automobiles, and other types of trucks are registered in weight categories. A number of body type classes were not considered as part of the vehicle population, such as trailers, construction equipment, and recreational/off road vehicles.

Combination and single unit trucks were identified, and put into two simple categories. For the time being, combination body type trucks were assumed to be long haul and single unit body type trucks were assumed to be short haul trucks. Further refinement of this will take place by evaluating the truck registration categories.

Autos			
2 DOOR	BUGGY	LIMOUSINE	SP.EQUIP.
2C	CABRIOLET	MAXI VAN	SP-CONSTD
2D HACHBK	CONVERTBL	NOTCHBACK	SPORT TRK
2D HARDTP	COUPE	ONE SEAT	SPORT VAN
2D LIFTBK	ELECTRIC	OPERA CP	SPORTTRAC
2D SEDAN	EXT SPTVN	PARK MODL	STN WAGON
4	EXT VAN	PASS CAR	TOURNGCAR
4 DOOR	EXT WINVN	PHAETON	TUDOR
4D HARDTP	FASTBACK	PI	VAN
4D HTCHBK	FWRD CONT	ROADSTER	VAN CAMPR
4D LIFTBK	GLIDERS	ROLLER	VANETTE
4D SEDAN	HARDTOP	RUNABOUT	WAGON
4WHEEL DR	HARDTP CV	SEDAN	WINDOW VN
5D HTCHBK	HATCHBACK	SEDAN DEL	
BS	HEARSE	*SKDSTRDR	

*I recently realized that this must be a skid steer loader. This will be corrected in the future

MOVES Categories with included Vehicle Body types

Combination Long Haul Trucks	Single Unit Short Haul Trucks	Light Commercial Trucks	Refuse Trucks	Passenger Trucks	Motorcycles	Motor Homes
HOPPER POLE/PIPE REEFER TANKER TRACTR TK TRIALS TRL TRUCK DROP FLAT	BEVRG RCK BOTTM DMP DUMP TK FIRE APP FLATBED GRAIN/BOX OPEN BODY PUMPER STAKE/RAK TANDEM	AMBULANCE ARMORD TK AUTO CARY COACH DELIVERY GLASS RAK LUNCH WGN STEP VAN TILT CAB *TILT TAND TOW TRUCK WINCH	CONCR MXR GARBGE TK SNOW RMVL ST SWEEPR	3DR EXTCC 3DR EXTCP 4DR EXTCC 4DR EXTCP 8PAS SPVN CAB CHASS CARGO CARRYALL CNVTR GER CREW PK CREW PKUP INC CHASS INC EXTVN JEEPSTER PANEL PICKUP PICKUP RV REGLR CAB SUPCAB PK SUPERCAB TRAVELALL TRUCK TRUCKSTER UTILITY	ENDURO MINI BIKE MINI CYCL MINI ROAD MOPED MOTO CROS MOTORCYCL MTR SCOOT RACER CYC SIDE CAR TRIKE TWO WHEEL	MOBILE HM MOBLE OFF MOTOR HOM
			Buses			
			BUS CANOPY EX CUTAWAY			

*Recently discovered that this is a trailer and will fix it in the future.

Body Types Not Included in any MOVES Categories

Trailers		Equipment		Off Road
MTRCY TRL	AIR COMP	BACKHOE	FORKLIFT	ALL TERRN
SEMI TLR	BOAT TRLR	BRSH CHPR	GRADER	AMPHIBIAN
SNOWBL TL	DOLLY	CABL REEL	LOADER	ATV
TENT TLR	DUMP TRLR	CNST TRAC	LOW SPEED	CAMPER
TOW DOLLY	GENERATOR	COMBINE	PALLET	CAMPING
TRAILER	GONDOLA	CRANE	SCRAPER	DUNE BUGY
TRAVL TLR	HORSE TLR	FARM EQIP	TRENCHER	PK CAMPER
TRLR JCKY	LIVESTOCK	FARM TRAC	WELL DRIL	ROAD/TRAL
WELDER	LOWBOY	FERTILIZR	WHL LOADR	TRKCAMPER

MOVES Categories with Included Registration Types Lookup

Auto Registrations			
AFGHANISTAN CMPN	EDUCATION	NATIONAL GUARD	SPORTING SERIES
AIR FORCE VETERAN	ELECTRIC	NAVY D.S.C.	STATE HANDICAPPED
ALPHA KAPPA ALPHA	ENVIRONMENTAL	NAVY VETERAN	STATE OF ILLINOIS
ALPHA PHI ALPHA	EXPANDED ANTIQUE	NOTRE DAME	STATE OFFICIALS EL
AMATEUR RADIO	F.O.P.	OMEGA PSI PHI	STATE POLICE
AMERICA REMEMBERS	FLYING CROSS	ORGAN DONOR	STATE POLICE MCY
ANTIQUES	FUNERAL HOME	OVARIAN CANCER	SUPPORT OUR TROOP
ARMED FORCES RET	GOLD STAR	PARATROOPER	SURV SPOUSE-FF
ARMED FORCES RSRV	HEARING IMPAIRED	PARK DIST. YOUTH	SURV SPOUSE-PO
ARMY D.S.C	HONORARY CONSULAR	PASSENGER CAR	TAXI
ARMY VETERAN	HOSPICE	PEARL HARBOR	TINTED WINDOW
AUTISM AWARENESS	HOUSE OF REPRSENT	PET FRIENDLY	U S CONGRESSMAN
BLACKHAWKS	IL POLICE ASSOC	PHI BETA SIGMA	U S SENATORS
BOY SCOUT	IL. FIRE FIGHTER	POLICE MEMORIAL	U.S. VETERAN
BRONZE STAR	ILL SENATORS	POW/MIA	U.S. VETERAN MCY
CHARITABLE VEH	ILL SUPREME COURT	PREVENT VIOLENCE	UNIV. OF CHICAGO
CHI POLICE MEM	ILL-MICH CANAL	PURPLE HEART	US MARINE CORP
CHICAGO BEARS	IRAQ CAMPAIGN	RET SUPREME COURT	USAF D.S.C.
CHICAGO BULLS	KAPPA ALPHA PSI	RETIRED OFFICIAL	VIETNAM VETERAN
CHICAGO CUBS	KOREAN SERVICE	RETIRED REPRESENT	WEST POINT BIC
COLLEGIATE	KOREAN WAR VET	RETIRED SENATOR	WHEELCHAIR
COLLEGIATE PLATE	LIVERY	ROTARY INTRNATL	WHITE SOX
COMMERCE COMM POL	MAMMOGRAM	ROUTE 66	WILDLIFE PRAIRIE
COMMUTER VAN	MASTER MASON	SHARE THE ROAD	WOMEN VETERANS
CONSERVATION	MAYORAL	SHEET METAL WRKR	WORLD WAR II
DELTA SIGMA THETA	MEDAL OF HONOR	SHERIFF	X-PRISONER OF WAR
DISABLED VETERANS	MUNI. HANDICAPPED	SIGMA GAMMA RHO	YOUTH GOLF
DRIVER EDUCATION	MUNICIPAL POLICE	SILVER STAR	ZETA PHI BETA
EAGLE SCOUT	MUNICIPALITY BUS	SPEC OLYMPICS	

*These were mainly van-type vehicles

Passenger Trucks	Motorcycles	Light Commercial Trucks
AGRICULTURE	MCY 150 AND OVER	AMBULANCE
DUCKS UNLIMITED	MCY UNDER 150 CC	FARM 16,000 LBS
FARM TRUCKS	MUNI MOTORCYCLE	MEDICAL CARRIER
FIRE CHIEF	STATE MOTORCYCLE	TOW TRUCK
FLEET		TRUCK 12,000 LBS
FMR MILITARY VEH		TRUCK 16,000 LBS
PUBLIC TRANSPORT		TRUCK 8,000 LBS
REC VEH TRUCK		

Single Unit Trucks, All Trucks Less than 33,000 pounds	
Short Haul	Long Haul
FARM 20,000 LBS	TRUCK 26,000 LBS
FARM 24,000 LBS	TRUCK 28,000 LBS
FARM 28,000 LBS	TRUCK 32,000 LBS
FARM 32,000 LBS	
MILEAG TAX 12,000	
MILEAG TAX 16,000	
MILEAG TAX 20,000	Mileage tax trucks must travel <7000 miles annually
MILEAG TAX 24,000	
MILEAG TAX 28,000	
MILEAG TAX 32,000	

Combination Trucks, assumed to be all trucks over 33,000 pounds	
Short Haul	Long Haul
FARM 36,000 LBS	TRUCK 36,000 LBS
FARM 45,000 LBS	TRUCK 40,000 LBS
FARM 54,999 LBS	TRUCK 45,000 LBS
FARM 64,000 LBS	TRUCK 50,000 LBS
FARM 73,280 LBS	TRUCK 54,999 LBS
FARM 77,000 LBS	TRUCK 59,500 LBS
FARM 80,000 LBS	TRUCK 64,000 LBS
MILEAG TAX 36,000	TRUCK 73,280 LBS
MILEAG TAX 40,000	TRUCK 77,000 LBS
MILEAG TAX 45,000	TRUCK 80,000 LBS
MILEAG TAX 54,999	
MILEAG TAX 59,500	
MILEAG TAX 64,000	Mileage tax trucks must travel < 7000 miles annually
MILEAG TAX 73,280	
MILEAG TAX 77,000	
MILEAG TAX 80,000	

Municipal Other
MUNICIPAL VEHICLE
<i>Municipal vehicles encompassed a too-wide variety to assign them to a MOVES category</i>

School Bus
SCHOOL BUS

<i>Registrations not included in Source Type Population</i>		
Trailers		Equipment
FARM TR 10,000 LB	REC VEH TRAILER	FERTILIZER SPREAD
FARM TR 14,000 LB	TRAILER 3,000 LB	LOW SPEED VEHICLE
FARM TR 20,000 LB	TRAILER 5,000 LB	PERM. MNTED EQUIP
FARM TR 28,000 LB	TRAILER 8,000 LB	
FARM TR 36,000 LB	TRAILER 10,000 LB	
FARM TRAILERS	TRAILER 14,000 LB	
FMR MILITARY TRLR	TRAILER 20,000 LB	
MET 14,000 LBS	TRAILER 32,000 LB	
MFT 20,000 LBS	TRAILER 36,000 LB	
MLT 36,000 LBS	TRAILER 40,000 LB	
MMT 40,000 LBS		

Non-Attainment Area Records

While the 6 counties of northeastern Illinois are included in the non-attainment area (Cook, DuPage, Kane, Lake, McHenry and Will) only small portions of Kendall and Grundy are included. The file we received included all recorded registrations for Kendall and Grundy counties. I performed a frequency on the municipalities listed for Kendall and Grundy records. Interestingly, the file seems to have numerous errors (attachment 1 shows the names). The Secretary of State's office could improve their data quality by using a system of dropdown menus for data entry. Here are the top 30 municipalities included in the file and listed as being in Kendall or Grundy County. The highlighted municipalities will be included as part of the nonattainment area

town	number	percent
OSWEGO	31370	18.18
MORRIS	23052	13.36
YORKVILLE	22583	13.09
MONTGOMERY	19051	11.04
AURORA	14410	8.35
MINOOKA	12636	7.32
PLANO	12003	6.96
COAL CITY	8334	4.83
MAZON	4576	2.65
SANDWICH	4001	2.32
NEWARK	3605	2.09
GARDNER	2678	1.55
PLAINFIELD	2057	1.19
BRISTOL	1709	0.99
BRACEVILLE	1579	0.92
JOLIET	1522	0.88
DIAMOND	1386	0.8
VERONA	976	0.57
SOUTH WILMINGTON	912	0.53
CHANNAHON	903	0.52
MILLINGTON	553	0.32
MILLBROOK	330	0.19
GODLEY	230	0.13
KINSMAN	212	0.12
CARBON HILL	192	0.11
WILMINGTON	164	0.1
DWIGHT	154	0.09

Non-attainment Area File Summary
6-Counties + Oswego, Aurora, Minooka, Channahon,

Body Category	Registration Category													Total
	Auto	Equip ment	Motor cycle	Trailer	Passen ger truck	Light comm ercial truck	Single unit short haul	School bus	Single unit long haul	Combin ation short haul	Combi nation long haul	Muni cipal other	Missing	
Missing	2,857	1	105	2	12	152		3	11	3	6	291	4	3,447
Auto	4,564,148	60	8	47	6,419	57,140	91	312	703	10	60	34,207	145	4,663,350
Equipment	31	82	2	144	26	112	1	6	7	4	14	36	24	489
Motorcycle	5,920		157,611	1	4	38			1		1	93	7	163,676
Off road	87		109	1,817	200	177						59	281	2,730
Trailer	914	27	10	34,265	412	303	23	28	191	55	411	6,080	160,669	203,388
Passenger truck	1,591,042	214	4	694	11,232	427,495	1,564	1,559	16,948	1,157	6,971	34,960	8,791	2,102,631
Light commercial truck	331	30		55	95	3,403	7		371	222	1,262	492	150	6,418
Single unit short haul	361	4	2	1,813	1	908	149		522	99	299	4,583	3,239	11,980
Transit bus	1,295				881	921	13	12,300	218		106	8,453	3	24,190
Refuse truck	7	17		2		31	1		20	99	704	340	10	1,231
School bus	243				154	3,418	2	256	42		4	184		4,303
Combination short haul truck	1			1		1					2	1		6
Combination long haul truck	378	43		950	692	598	148	9	2,240	881	7,276	1,038	95	14,348
Motor home	92			163	5,294	177			26		4	29	24	5,809
Total	6,167,707	478	157,851	39,954	25,422	494,874	1,999	14,473	21,300	2,530	17,120	90,846	173,442	7,207,996

MOVES Categories Registration

Regional Summary	Registrations	How populations were calculated from summary table.
Motorcycles	157,851	Total motorcycles registered, by registration type column total
Passenger Car	4,601,357	cell, auto registration & auto body type
Passenger Truck	2,094,966	row body category passenger truck minus passenger trucks from combination long haul minus trucks registered as trailers
Light Commercial Truck	6,231	Light commercial trucks registered column plus lt commercial trucks from under auto category minus transit buses minus school buses minus auto minus passenger truck
Intercity Bus		can't identify
Transit Bus	2,594	This is from NTD
School Bus	21,367	school bus registration category + transit buses from municipal other category minus passenger truck
Refuse Truck	1,231	refuse truck row
Single Unit Short Haul Truck	6,582	single unit short haul trucks registered + single unit short haul from municipal other category
Single Unit Long Haul Truck	4,352	single unit long haul trucks registered minus passenger truck
Motor Home	5,646	row of motor home body types minus trailers
Combination Short Haul Truck	2,530	combination short haul trucks registered
Combination Long Haul Truck	17,120	combination long haul trucks registered.
Total	6,921,827	

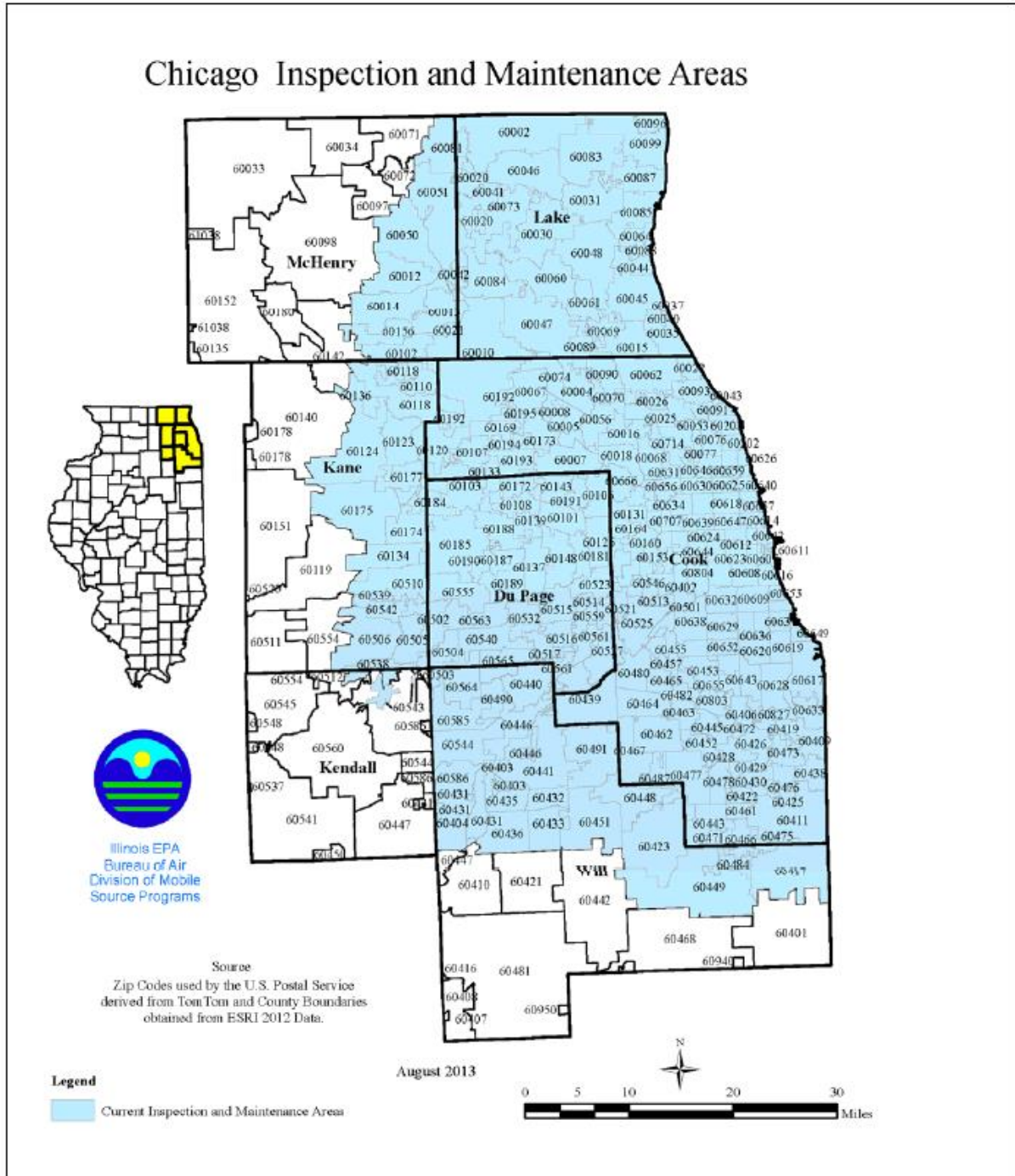
Difference from C12 Q1 Conformity Analysis MOVEAS Input

sourceTypeID	Vehicle	C12Q1 sourceTypePopulation	2015 Registration	Difference from License Plate File	Percent Difference
11	Motorcycle	121,381	157,851	(36,470)	-30%
21	Passenger Car	3,399,467	4,601,357	(1,201,890)	-35%
31	Passenger Truck	537,136	2,094,966	(1,557,830)	-290%
32	Light Commercial Truck	179,448	6,231	173,217	97%
41	Intercity Bus	1,465		1,465	100%
42	Transit Bus	679	2,594	(1,915)	-282%
43	School Bus	9,710	21,367	(11,657)	-120%
51	Refuse Truck	553	1,231	(678)	-123%
52	Single Unit Short-haul Truck	83,012	6,582	76,430	92%
53	Single Unit Long-haul Truck	13,315	4,352	8,963	67%
54	Motor Home	19,862	5,646	14,216	72%
61	Combination Short-haul Truck	15,085	2,530	12,555	83%
62	Combination Long-haul Truck	22,100	17,120	4,980	23%
Total		4,403,213	6,921,827	(2,518,614)	-30%

Inspection and Maintenance (IM) vs. Non IM Populations

Since we are running MOVES for the IM and non IM areas separately, we needed population for both areas. We obtained a map of the two regions, with the areas defined by zipcodes.

STATE OF ILLINOIS INSPECTION AREA MAP OF THE CHICAGO METROPOLITAN AREA



The following zipcodes were identified as non IM zipcodes

Non IM Area Zipcodes			
60071	60180	60548	60416
60072	60142	60544	60950
60097	60140	60560	60407
60034	60178	60537	60408
60098	60151	60541	60442
60033	60119	60447	60468
61038	60511	60586	60940
60152	60554	60410	60401
61038	60520	60421	
60135	60545	60481	

The entire process as previously described was carried out for only the records in the non IM area zipcodes. This identified the non IM population, which was subtracted from the total nonattainment area population to arrive at the IM population.