

ELVS end of life vehicle solutions

P.O. BOX 3282
Farmington Hills, MI. 48333-3292

September 20, 2006

Mr. Nick Blanchett
BWP Transportation
Branch Chief
One Winter Street
Boston, MA 02108-4747

Dear Mr. Blanchett:

The Mercury Management Plan presented here represents the efforts of the End of Life Vehicle Solutions Corporation (ELVS) to satisfy the requirements of the Massachusetts Chapter 190 of the Acts of 2006 (the "Act"), requiring the removal of mercury switches from end-of-life vehicles. Members of the End-Of-Life Vehicle Solutions Corporation are BMW of North America, LLC; DaimlerChrysler Corporation; Ford Motor Company; General Motors Corporation; International Truck & Engine; Mack Trucks, Inc; Mitsubishi Motors North America, Inc.; Nissan North America, Inc.; Subaru of America, Inc.; Volkswagen of America, Inc.; and Volvo Trucks North America.

Section 6C (n) of the Act requires automobile manufacturers to submit a mercury-added vehicle switch recovery alternate plan to the Massachusetts Department of Environmental Protection (the Department) for review no later than January 1, 2007. ELVS' mercury switch recovery alternate plan is as follows:

The specific requirements detailed in Section 6C (n) of the Act will be met through the following Plan components:

1. Collection and Storage: Upon receipt of a list of Massachusetts vehicle recyclers and scrap recycling facilities identified by the Department, collection buckets, along with education and training materials will be promptly sent to all facilities on the list. Mercury switches will be stored at the vehicle recyclers and scrap recycling facilities as Universal Waste. The container will include a Universal Waste label. The vehicle recycler or scrap recycling facility is to indicate on the label the date when the first mercury switch is placed in the container ("start date"). Specific instruction will indicate that containers may not be stored on or used at the location beyond one year from the start date indicated by the vehicle recycler or scrap recycling facility. Mercury switches will be stored and shipped in a 3.5 gallon container (other container sizes may be used as well) with a sufficiently tight, sealable lid. The containers are designed to meet the shipping requirements of the Department of Transportation (DOT), the contracted recycler and the carrier selected to transport mercury switches to the recycling facility. ELVS will provide these storage containers at no cost to the program participants.
2. ELVS' present contractor for the program is The Environmental Quality Company (EQ), a certified waste contractor. The point of contact for Massachusetts recyclers is Judie Zaborowski (734/547-2511).

3. Transportation: A recycler whose container is nearly full of mercury switches or who has a container with a retention period that is about to expire under universal waste rules will notify the ELVS contractor. The ELVS contractor will ship an empty container to the recycler as well as provide for the transportation of the full container.
4. Education Program: ELVS' program is a multi-media approach for education and training of the safe and environmentally sound removal of mercury switches from end-of-life vehicles. The following education and training materials, which includes information on mercury hazards and handling, are included with the shipment of collection buckets to vehicle recyclers and scrap recycling facilities:
 - a. A cover letter introducing the program and welcoming recyclers and scrap facilities to the program.
 - b. A brochure that identifies why mercury switches should be removed, where they can be found in automobiles, how to properly collect and manage them, and how to contact the administrators of the program should questions arise.
 - c. A DVD that provides an overview of automotive mercury collection and methods of mercury switch removal.
 - d. A website link (www.elvsolutions.org) that provides an overview and the specifics of the Massachusetts Program and links to other related sites.
 - e. Detailed instructions for shipping the collection containers for recycling of the switches.
 - f. A list of vehicles that may contain mercury convenience light switches and a list of ABS G-Force sensors including removal instructions.
 - g. Additionally, ELVS will make these materials available to the Department for use in any education or outreach programs they may conduct.
5. Capture Rate: Under current Massachusetts law, dismantlers are required to remove all mercury containing switches. If this requirement is enforced capture rates will approach 100% in the first year of operation or shortly thereafter.
6. Program Costs: All program costs related to the collection, transportation and recycling of automotive mercury switches from automakers who are members of ELVS will be paid by ELVS.

Additional Elements of the Alternate Plan:

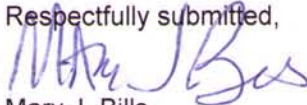
- A designated waste manager will maintain all appropriate records. These records will be maintained in a database and made available to the agency upon request.
- As additional vehicle and scrap recyclers are identified throughout program implementation, a collection bucket and educational materials will be sent to them as well. Recyclers can also self-elect participation through the website or by contacting our contractor.
- All mercury switches will be recycled.
- ELVS will track the following performance measures:
 - a. The number of participating vehicle recyclers and scrap recycling facilities, including their contact information.
 - b. When collection containers are received at the ELVS contractor by each participant.
 - c. The number of mercury switches submitted by each participant.
 - d. The total number of mercury switches collected in Massachusetts.
 - e. The amount of mercury recovered.
 - f. The above information will be available via a website.

- Procedures for Implementing the Alternate Plan:
 - a. Submit the Mercury Minimization Plan to the Department.
 - b. Receive the list of vehicle recyclers and scrap recycling facilities from the Department.
 - c. The Department will send letter to recyclers to make them aware of the program and to advise them that they will be shipped collection containers
 - d. Ship the collection containers and educational materials.

ELVS is committed to working with stakeholders and making adjustments to this plan in order to coordinate efforts of the national mercury collection program agreement.

In addition, the Act called for automobile manufacturers to provide the number of end of life vehicles with mercury-added vehicle switches in the Commonwealth in calendar year 2005 and projected numbers until 2030. Attached in spreadsheet form is ELVS' estimation of the number of mercury-added switches.

Respectfully submitted,



Mary J. Bills
Executive Director

Model for Estimating Population of Hg Convenience Light Switches

Model Overview

This spreadsheet contains estimates of mercury switches in end of life vehicles over time. As additional data is gathered from switch collection programs, the inputs to the spreadsheet can be revised.

Data Used in Model

- 1) Michigan Switch Study data on percentage of switches found in end of life vehicles (see <http://www.deq.state.mi.us/documents/deq-ess-p2-mercury-michiganswitchstudy.pdf> for report). This study includes 1,474 pieces of data (see <http://www.deq.state.mi.us/documents/deq-ess-p2-mercury-michiganswitchstudydata.xls> for data in excel format).
- 2) SAE study (paper 1999-01-0987) which includes vehicle model year distribution in scrap yards located throughout the U.S. This study contains 334,530 pieces of data.
- 3) Car park data and market share data from Ward's Motor Vehicle Facts & Figures.
- 4) Data from Ford, GM, and Chrysler regarding which models from the 1997 MY and forward contain ball bearing type switches (see second to the last sheet in this workbook entitled "Hg Switch per Veh Est" for details).
- 5) 5.81% annual scrap rate based on a 10 year average of Ward's Motor Vehicle Facts & Figure data (see the last sheet in this workbook entitled "Scrap Rate" for the calculation).
- 6) 1 million vehicles per year being stolen or lost from vehicle stock. See "Motor Vehicle Stocks, Scrappage, and Sales", Alan Greenspan and Darrel Cohen, Oct. 30, 1996, p. 9 (report is available at <http://www.federalreserve.gov/Pubs/feds/1996/199640/199640pap.pdf>). The last sheet entitled "Scrap Rate" uses this number to determine the % reduction for lost or stolen vehicles used in the model.
- 7) Each switches was conservatively assumed to contain 1 gram of mercury (see SAE paper #960409).

How the Model Works

The model combines the SAE study data of the age distribution of scrap vehicles; with the Michigan study data on which vehicles used mercury switches by year and manufacture; and the market share of Ford, GM, and Chrysler of the total car park by using 1992 market share data (1992 is used because it is more representative of market shares during the years of peak switch usage -- using a newer number would understate the number of switches) to estimate the number of convenience light switches in end of life vehicles. All of the brands owned by the parent companies are included in the respective Ford, GM, and Chrysler data to the extent that these vehicles were part of the scrap population. For example, all Volvo and Mazda switches would be reflected in the Ford number. The estimate of light switches is then reduced by the percentage of vehicles lost or stolen from vehicle stock.

Future Refinements

- 1) Michigan switch program data is limited for pre-1985 vehicles. The model assumes that late 1980s data approximates switch usage in pre-1985 vehicles. The model would be more robust if switch usage data by model and year were available from other programs. However, the impact of any revision in this regard will be small due to the fact that these vehicles represent a less than 25% of the scrap population as they are now 20 years old or older.
- 2) Only GM, Ford and Chrysler brands are incorporated simply because these vehicles dominate the Michigan fleet which was the basis of the Michigan study. Other manufactures used some mercury switches in older vehicles, prior to the 1993. These vehicles represent a small percentage of the scrap population because of their age and more limited market share.

How to Change Data in the Model

Items marked in blue are the data inputs which can be changed as additional data becomes available.

Hg Convenience Light Switches Massachusetts Estimates

Michigan Switch Study*				SAE Study**		Estimated Number of Hg Switches per Calendar Year																											
Model Year	Switches / vehicle			% Scrp by age	# Scrp cars by MY																												
	GM	Ford	DCX			2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030		
2002	0.16	0	0	0.19	608	211	293	376	441	559	628	834	992	1011	1087	1036	933	635	570	550	540	514	456	335	245	158	161	131	100	69	58		
2001	0.14	0.17	0	0.72	2,259	541	695	815	1031	1160	1541	1831	1867	2007	1913	1723	1172	1052	1016	997	948	842	618	452	291	298	241	185	127	107	90		
2000	0.15	0.00	0	1.60	4,983	370	435	550	618	822	977	995	1070	1020	919	625	561	542	532	506	449	329	241	155	159	129	99	68	57	48	37		
1999	0.38	0.05	0	2.21	6,910	1210	1531	1722	2287	2719	2771	2980	2841	2558	1740	1562	1508	1481	1408	1250	917	671	432	442	358	275	188	159	134	103	70		
1998	0.26	0.10	0	2.84	8,871	1212	1363	1810	2152	2193	2359	2249	2025	1377	1237	1194	1172	1114	989	726	531	342	350	283	218	149	126	106	81	55	54		
1997	0.15	0.15	0.06	3.33	10,409	1260	1674	1990	2028	2180	2079	1872	1273	1143	1104	1083	1030	915	671	491	316	324	262	201	138	116	98	75	51	49	46		
1996	0.40	0.14	0.24	4.22	13,168	3396	4037	4114	4424	4217	3797	2583	2320	2240	2198	2090	1856	1362	996	641	657	532	409	280	236	199	152	104	100	93	71		
1995	0.29	0.50	0.13	4.74	14,810	5025	5121	5507	5250	4727	3215	2887	2788	2736	2602	2310	1695	1240	798	817	662	509	348	294	247	190	129	125	116	88	56		
1994	0.49	0.81	0.37	6.30	19,672	8890	9559	9113	8205	5581	5012	4839	4750	4516	4010	2943	2152	1385	1419	1149	883	604	510	429	330	224	217	201	153	97	67		
1993	0.59	0.59	0.27	7.49	23,386	8630	8227	7408	5039	4525	4369	4288	4077	3620	2657	1943	1251	1281	1037	797	545	460	387	297	203	196	182	138	88	60	39		
1992	0.61	0.70	0.28	7.63	23,834	9001	8104	5513	4950	4780	4691	4461	3961	2906	2125	1368	1401	1135	872	597	503	424	325	222	214	199	151	96	66	43	34		
1991	0.88	0.76	0.72	8.20	25,629	11246	7650	6869	6632	6510	6190	5496	4033	2949	1899	1944	1574	1210	828	698	588	452	307	297	276	209	133	91	59	47	21		
1990	0.83	0.72	0.83	7.82	24,433	7539	6769	6536	6415	6100	5416	3974	2907	1871	1916	1552	1193	816	688	580	445	303	293	272	206	131	90	58	46	20			
1989	1.17	0.82	0.73	7.04	21,999	8142	7861	7716	7337	6514	4780	3496	2250	2305	1866	1434	981	828	697	535	364	353	327	248	158	108	70	55	24				
1988	1.02	0.62	0.60	4.79	14,964	6500	5401	6066	5386	3953	2891	1861	1906	1543	1186	811	685	576	443	301	291	270	205	131	89	58	46	20					
1987	1.20	0.88	0.42	4.30	13,437	7478	7111	6313	4633	3388	2181	2234	1809	1390	951	802	676	519	353	342	317	240	153	105	68	54	24						
1986	1.26	0.73	0.89	4.15	12,974	7603	6751	4954	3623	2332	2388	1934	1486	1017	858	722	555	378	365	339	257	164	112	73	57	25							
1985	1.15	0.60	0.66	4.08	12,734	5795	4253	3110	2002	2050	1660	1276	873	736	620	476	324	314	291	220	140	96	62	49	22								
1984	1.17	0.76	0.66	3.88	12,108	4586	3354	2159	2211	1790	1376	941	794	669	514	350	338	314	238	151	104	67	53	23									
1983	1.20	0.76	0.66	3.44	10,751	3406	2193	2246	1818	1398	956	807	679	522	355	343	319	241	154	105	68	54	24										
1982	1.16	0.76	0.66	2.53	7,889	2156	2208	1788	1374	940	793	668	513	349	338	313	237	151	104	67	53	23											
1981	1.16	0.76	0.66	1.85	5,769	2208	1788	1374	940	793	668	513	349	338	313	237	151	104	67	53	23												
1980	1.16	0.76	0.66	1.19	3,714	1789	1375	941	794	668	513	349	338	314	238	151	104	67	53	23													
1979	1.16	0.76	0.66	1.22	3,804	1375	941	794	668	513	349	338	314	238	151	104	67	53	23														
1978	1.16	0.76	0.66	0.99	3,080	941	794	668	513	349	338	314	238	151	104	67	53	23															
1977	1.16	0.76	0.66	0.76	2,367	794	668	513	349	338	314	238	151	104	67	53	23																
1976	1.16	0.76	0.66	0.52	1,619	668	513	349	338	314	238	151	104	67	53	23																	
1975	1.16	0.76	0.66	0.44	1,366	513	349	338	314	238	151	104	67	53	23																		
1974	1.16	0.76	0.66	0.37	1,151	349	338	314	238	151	104	67	53	23																			
1973	1.16	0.76	0.66	0.28	883	338	314	238	151	104	67	53	23																				
1972	1.16	0.76	0.66	0.19	601	314	238	151	104	67	53	23																					
1971	1.16	0.76	0.66	0.19	582	238	151	104	67	53	23																						
1970	1.16	0.76	0.66	0.17	540	151	104	67	53	23																							
				0.13	409																												
				0.08	261																												
				0.06	178																												
				0.04	116																												
				0.03	92																												
				0.01	40																												
				# of light switches		113,877	102,162	92,527	82,388	72,050	62,889	54,656	46,849	39,774	33,043	27,263	22,012	17,735	14,612	11,937	9,603	7,571	5,875	4,588	3,514	2,717	2,107	1,612	1,203	879	641		
				Estimated 10% uplift for ABS switches		125,265	112,379	101,780	90,627	79,255	69,178	60,121	51,534	43,751	36,348	29,989	24,213	19,508	16,073	13,131	10,564	8,329	6,462	5,046	3,865	2,989	2,318	1,774	1,323	967	705		
				Pounds of Hg		276	248	224	200	175	153	133	114	96	80	66	53	43	35	29	23	18	14	11	9	7	5	4	3	2	2		
				8.36% reduction for lost/stolen vehicles***																													
				# of Hg switches		114,792	102,982	93,270	83,050	72,629	63,393	55,095	47,225	40,093	33,308	27,481	22,188	17,877	14,729	12,033	9,680	7,632	5,922	4,625	3,542	2,739	2,124	1,625	1,212	886	646		
				Pounds of Hg		253	227	206	183	160	140	121	104	88	73	61	49	39	32	27	21	17	13	10	8	6	5	4	3	2	2		

* Estimated switch per vehicle for older models by averaging 1986 - 1989 data where MY volumes were significant.
1997+ switch rate corrected for ball bearing switches.

** SAE Paper #1999-01-0987 recorded the age of 334,530 vehicles at 48 dismantlers across the nation.

Ward's Motor Vehicle Facts and Figures Data

	GM	Ford	DCX
92 new reg (000s)	272.92	74.08	64.74
Market Share	27%	24%	13%
02 car park	5,377,019		
Annual scrap rate	5.81%		

Figures in blue are inputs and can be changed.

Michigan Switch Study

Hg Switches per GM / Ford/ Chrysler Vehicles by MY

MY	GM			Ford			DCX		
	Num cars	Num All Swtch	Num Hg Swtch	Num cars	Num All Swtch	Num Hg Swtch	Num cars	Num All Swtch	Num Hg Swtch
2003			0			0			0
2002	32	19	5	2	0	0	0	0	0
2001	21	3	3	6	3	1	7	1	0
2000	26	4	4	11	1	0	7	3	0
1999	39	15	15	20	5	1	7	3	0
1998	43	11	11	21	3	2	22	6	0
1997	66	10	10	33	10	5	16	1	1
1996	35	14	14	21	3	3	17	4	4
1995	48	14	14	32	16	16	15	2	2

MY	Hg Containing Switches GM/Ford/DCX			ALL Switches GM/Ford/DCX		
	Num cars	Num Swtch	Switch Vehicle	Num cars	Num Swtch	Switch Vehicle
2003			0.00			
2002	34	5	0.15	34	19	0.56
2001	34	4	0.12	34	16	0.47
2000	44	4	0.09	44	14	0.32
1999	66	16	0.24	66	23	0.35
1998	86	13	0.15	86	20	0.23
1997	115	16	0.14	115	21	0.18
1996	73	21	0.29	73	21	0.29
1995	95	32	0.34	95	32	0.34
1994	93	51	0.55	93	51	0.55
1993	97	54	0.56	97	54	0.56
1992	81	46	0.57	81	46	0.57
1991	97	78	0.80	97	78	0.80
1990	85	68	0.80	85	68	0.80
1989	101	97	0.96	101	97	0.96
1988	88	72	0.82	88	72	0.82
1987	55	46	0.84	55	46	0.84
1986	51	55	1.08	51	55	1.08
1985	29	27	0.93	29	27	0.93
1984	13	7	0.54	13	7	0.54
1983	11	8	0.73	11	8	0.73
1982	7	8	1.14	7	8	1.14
1981	3	1	0.33	3	1	0.33
1980	4	2	0.50	4	2	0.50
1979	1	0	0.00	1	0	0.00
1978	3	1	0.33	3	1	0.33
1977	1	2	2.00	1	2	2.00
1976	3	1	0.33	3	1	0.33

Num cars	Num Swtch	Switch Vehicle
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Totals

1370	735	0.54
Big 3 Hg Switches		

1370	790	0.58
Big 3 All Switches		

1474	801	0.54
Total Michigan Study Sample		

Scrap Rates Ward's Motor Vehicles

<u>Year</u>	<u>Vehicles in Operation</u>	<u>Vehicles Retired from use</u>	<u>Scrap Rate</u>	
2003	226,062,300	12,090,000	5.35%	<u>'93 to '03 avg. scrap rate</u> 5.81%
2002	221,027,121	13,296,000	6.02%	
2001	216,682,937	14,122,000	6.52%	
2000	213,299,313	14,299,000	6.70%	
1999	209,509,161	11,663,000	5.57%	<u>'93 to '03 avg. vehicles retired</u> 11960000
1998	205,042,639	11,665,000	5.69%	
1997	201,070,397	12,509,000	6.22%	
1996	198,293,459	10,811,000	5.45%	Apply 1 mill reduction for <u>lost/stolen vehicles</u> 8.36%
1995	193,440,393	10,322,000	5.34%	
1994	188,713,997	12,369,000	6.55%	
1993	186,315,464	8,414,000	4.52%	

Data from 2004 Ward's Motor Vehicle Facts and Figures, p. 57

MassDEP has considered both the environmental impact of the ELVS plan and the economic impact on Massachusetts businesses. The ELVS plan will have a positive environmental impact in Massachusetts by collecting and recycling a significant source of mercury that would otherwise contaminate scrap steel, and that could be released into the air when the scrap steel is re-refined. While there will be some economic impact on Massachusetts vehicle recyclers and scrap recycling facilities due to the time it will take to remove mercury-added vehicle switches, their full costs for complying with the provisions of MGL c. 21H, Section 6C will be mitigated by the Plan, since ELVS will absorb the costs related to the collection, transportation and recycling of the switches. Vehicle recyclers who do not choose to participate in ELVS's program will need to pay for these costs themselves.

ELVS's September submittal also included an estimate of the number of mercury switches that are expected to be available for collection and recycling in Massachusetts between 2007 and 2030, in compliance with the requirement of MGL c. 21H, Section 6C (l). As noted in several stakeholder discussions, MassDEP is planning to propose to use ELVS's 2007 estimate in calculating the "capture rate" of mercury vehicle switches removed for recycling in Massachusetts in that calendar year. This capture rate will be included in a draft regulation for the auto switch recovery program that the Department expects to propose for public comment early in 2007.

MassDEP is also planning to adopt a methodology that is now being developed under the aegis of the National Vehicle Switch Recovery Program for estimating the number of mercury switches that are expected to be available for collection and recycling in Massachusetts in subsequent years. We intend to propose this methodology in a package of draft regulations expected to be published for public comment later in 2007.

MassDEP appreciates ELVS's commitment of removing mercury switches from end-of-life vehicles and looks forward to working with ELVS in implementing the Massachusetts statute. If you have any questions, please do not hesitate to contact Richard Blanchet at 617.654.6585 or Richard.blanchet@state.ma.us.

Sincerely,

[SIGNATURE ON ORIGINAL]

James C. Colman
Assistant Commissioner
Bureau of Waste Prevention