sanitation

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February 23, 2009

Honorable Michael Bloomberg
Mayor, City of New York
City Hall
New York, New York 10007

Honorable Christine Quinn
Speaker, New York City Council
City Hall
New York, New York 10007

Honorable William C. Thompson, Jr.
One Centre Street – Municipal Building
Room 530
New York, New York 10007

Re: Local Law 38 of 2005, Third Annual Report

Dear Mayor Bloomberg, Speaker Quinn, and Comptroller Thompson:

Pursuant to the New York City Administrative Code, I am pleased to submit to you the third annual report required by Local Law 38 of 2005.

Local Law 38 of 2005 added sections 24-163.1 and 24-163.2 to the New York City Administrative Code. Section 24-163.1 requires all City agencies to meet emissions and fuel economy standards for newly purchased light- and medium-duty vehicles. Section 24-163.2 provides that the Commissioner of Sanitation shall: (1) implement a program for testing the mechanical reliability and operational feasibility of alternative fuel street sweeping vehicles, and (2) collect and analyze data to further develop its initiatives for, and assess the feasibility of, incorporating new alternative fuel sanitation vehicles and technology into its fleet.

Section 24-163.2 also requires the Commissioner of Sanitation to report annually to the Mayor, Speaker of the City Council and Comptroller on the Department's alternative fuel street sweeping vehicle pilot project, and all other testing, analyses and assessments regarding its alterative fuel initiatives. The enclosed report is the third annual report on the Department of Sanitation's alternative fuel programs, including the street sweeper pilot program.

The Department of Sanitation is committed to the use of alternative fuels. As the enclosed report indicates, the Department currently has approximately 904 vehicles that operate on various alternative fuels, and will continue to expand its current fleet of alternative fuel vehicles while pursuing research and development of new technologies.

Sincerely,

John J. Doherty

c: Edward Skyler, Deputy Mayor
City Hall

Haeda Mihaltses, Director
Office of Intergovernmental Affairs, City Hall

Encl.

The City of New York
Department of Sanitation

Report to the Mayor, Speaker of the City Council and Comptroller on the use of Alternative Fuel Street Sweepers and Sanitation Vehicles Pursuant to Local Law 38 of 2005

John J. Doherty, Commissioner
February 2009

I. Introduction

While fulfilling its responsibilities to the City of New York, including garbage collection, recycling collection, street cleaning and snow removal, the Department of Sanitation (DSNY) has extensive experience in the use of state-of-the-art technology and alternative fuels for its vehicle fleet. Currently all of the Department's light, medium and heavy-duty diesel vehicles utilize the industry's latest computer-controlled and regulated clean-diesel engines for their respective engine model years. The Department also implemented the use of ultra-low sulfur diesel fuel (ULSD) in its entire fleet over two years in advance of regulatory mandates.[1] The use of ULSD in turn allows for DSNY's expanding use of various advanced emission-control retrofit technologies, such as diesel particulate filters and diesel oxidation catalysts (high sulfur diesel fuel harms these devices). With the use of these new technologies, diesel emissions differ only slightly from those of compressed natural gas (CNG)-fueled heavy duty vehicles, with nitrogen oxides emissions from CNG-fueled vehicles still somewhat lower than from diesel vehicles.[2] DSNY has particulate filters on 80 diesel powered street sweepers and 911 collection vehicles. Meanwhile, with the new national standards for ULSD fuel, federal standards for new on-road heavy duty diesel engines which took effect with the 2007 model year will result in a reduction in particulate and nitrogen oxides pollution by over 98%, as compared with pre-1988 engines.[3]

DSNY currently has over 904 vehicles that operate on alternative fuels. DSNY is the first city agency to use E85 ethanol fuel – a mixture of 85% ethanol and 15 % gasoline – in its fleet. Currently, there are six E85 fueling facilities in operation citywide, and 422 DSNY vehicles run on E85. DSNY also has 372 hybrid electric vehicles and 110 CNG vehicles in its active fleet.

Local Law 38 of 2005 (LL 38/2005) provides that, beginning no later than March 1, 2006, DSNY shall implement a program for testing the mechanical reliability and operational feasibility of alternative fuel street sweeping vehicles. This law provides for a pilot project where alternative fuel street sweeping vehicles are used exclusively in at least four sanitation districts, with at least one district in an area where high rates of asthma are found among

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[1] The federal mandate for using on-road ULSD took effect in September 2006.

[2] *See* Ayala, *et al.*, *CNG and Diesel Transit Bus Emissions in Review* (August 2003); Ayala, *et al.*, *Diesel and CNG Heavy-Duty Transit Bus Emissions over Multiple Driving Schedules: Regulated Pollutants and Project Overview* (Society of Automotive Engineers, 2002).

[3] Nitrogen Oxides levels are capped at 0.2 grams per brake horsepower-hour (g/bhp-hr), and particulate matter is capped at 0.01 g/bhp-hr. 66 Fed. Reg 5001, 5005 (Jan 18, 2001).

residents. In addition, LL 38/2005 requires that DSNY assess the feasibility of incorporating new alternative fuel sanitation vehicles and technology into its fleet.[4]

Under LL 38/2005, alternative fuels include natural gas, liquefied petroleum gas, hydrogen, electricity, and any other fuel which is at least eighty-five percent, singly or in combination, methanol, ethanol, any other alcohol or ether.[5] DSNY is currently utilizing CNG as an alternative fuel for its street sweepers and sanitation vehicles. CNG-fueled heavy-duty vehicles emit significantly less particulate matter and nitrous oxides than pre-2007 model year diesel-fueled vehicles without retrofit technology, and it has been reported that they make less noise.[6] However, it has also been noted that CNG-fueled vehicles have lower fuel efficiency and emit more methane and carbon monoxide than conventional diesel vehicles,[7] and the costs of CNG-fueled vehicles and CNG fueling station infrastructure are relatively high.

LL 38/2005 requires the Commissioner of Sanitation to report to the Mayor, the Comptroller and the Speaker of the Council on DSNY's alternative fuel street sweeping vehicle pilot project, and all testing, analyses and assessments of the alternative fuel street sweepers and sanitation vehicles. To fulfill this mandate, this report includes:

- The number of alternative fuel street sweeping vehicles included in the pilot project;
- The districts in which alternative fuel street sweeping vehicles are located and the type of alternative fuel used by such vehicles;
- The total number of alternative fuel sanitation vehicles owned or operated by DSNY, separated according to vehicle model and type of alternative fuel used;
- A description of all testing, analyses and assessments done on DSNY's alternative fuel street sweepers and sanitation vehicles;
- Conclusions based upon such testing, analyses and assessments;
- Information regarding efforts made by DSNY to develop initiatives for further incorporating alternative fuel sanitation vehicles into its fleet; and
- Information regarding the feasibility of incorporating alternative fuel sanitation vehicles into the DSNY fleet.

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[4] NYC Administrative Code § 24-163.2(c)(1), (2).
[5] NYC Administrative Code § 24-163.1(a)(1). Other types of fuels, such as biodiesel, do not qualify as alternative fuels.
[6] INFORM, Inc., *Greening Garbage Trucks: New Technologies for Cleaner Air* (2003).
[7] DSNY Commercial Waste Management Study, Vol. VI, at ES-5, 23 (March 2004); Ayala, *et al.*, *Diesel and CNG Heavy-Duty Transit Bus Emissions over Multiple Driving Schedules* (indicating CNG buses emit more carbon monoxide than retrofitted diesel buses).

II. Street Sweepers

This section reports on the number of alternative fuel street sweeping vehicles included in the pilot project; the districts where alternative fuel street sweeping vehicles are located and the type of alternative fuel used by such vehicles; and a description of all testing, analyses and assessments done on DSNY's alternative fuel street sweepers.

DSNY currently owns twenty-five (25) alternative fuel street sweepers, all of which use CNG (see Table 1), and all of which operate in the following four sanitation districts: Brooklyn 4; Queens 2; Queens 4; and Queens 5. In particular, the ten CNG street sweepers used in the pilot study (see Table 2) have been allocated as follows: four street sweepers in Brooklyn 4; and two street sweepers each in Queens 2; Queens 4; and Queens 5 (see Table 3). Of the four sanitation districts selected for the pilot study, Brooklyn 4 was determined to have high asthma rates among residents. These ten pilot study CNG street sweepers were compared with ten diesel fuel powered street sweepers (see Table 4) used in certain other districts.

DSNY seeks to keep its fleet as up to date as possible. Accordingly, in Calendar Year 2008 DSNY put into service ten (10) new CNG street sweepers from Johnston to replace 10 of the oldest CNG street sweepers in the fleet. These newest sweepers were too recent to be included in the pilot study, but their performance is being carefully monitored separately.

Table 1: Total DSNY Alternative Fuel Street Sweepers

VehicleID	VIN #	Vehicle Type	Make / Model
20CNG-501	1J9VM4L903C172001	Street Sweeper	Johnston 4000
20CNG-502	1J9VM4L923C172002	Street Sweeper	Johnston 4000
20CNG-503	1J9VM4L943C172003	Street Sweeper	Johnston 4000
20CNG-504	1J9VM4L963C172004	Street Sweeper	Johnston 4000
20CNG-505	1J9VM4L983C172005	Street Sweeper	Johnston 4000
20CNG-601	1J9VM4L956C172001	Street Sweeper	Johnston 4000
20CNG-602	1J9VM4L976C172002	Street Sweeper	Johnston 4000
20CNG-603	1J9VM4L996C172003	Street Sweeper	Johnston 4000
20CNG-604	1J9VM4L906C172004	Street Sweeper	Johnston 4000
20CNG-605	1J9VM4L926C172005	Street Sweeper	Johnston 4000
20CNG-606	1J9VM4L946C172006	Street Sweeper	Johnston 4000
20CNG-607	1J9VM4L966C172007	Street Sweeper	Johnston 4000
20CNG-608	1J9VM4L986C172008	Street Sweeper	Johnston 4000
20CNG-609	1J9VM4L9X6C172009	Street Sweeper	Johnston 4000
20CNG-610	1J9VM4L966C172010	Street Sweeper	Johnston 4000
20CNG-701	1J9VM4L988C172111	Street Sweeper	Johnston 4000
20CNG-702	1J9VM4L9X8C172112	Street Sweeper	Johnston 4000
20CNG-703	1J9VM4L918C172113	Street Sweeper	Johnston 4000
20CNG-704	1J9VM4L938C172114	Street Sweeper	Johnston 4000
20CNG-705	1J9VM4L958C172115	Street Sweeper	Johnston 4000
20CNG-706	1J9VM4L978C172116	Street Sweeper	Johnston 4000

20CNG-707	1J9VM4L998C172117	Street Sweeper	Johnston 4000
20CNG-708	1J9VM4L908C172118	Street Sweeper	Johnston 4000
20CNG-709	1J9VM4L9X8C172109	Street Sweeper	Johnston 4000
20CNG-710	1J9VM4L968C172110	Street Sweeper	Johnston 4000

Table 2: DSNY Alternative Fuel Street Sweepers Used in Pilot Study

Vehicle	VIN #	Fuel	Make / Model	In-Service date
20CNG-601	1J9VM4L956C172001	CNG	Johnston 4000	08/28/06
20CNG-602	1J9VM4L976CI72002	CNG	Johnston 4000	10/02/06
20CNG-603	1J9VM4L996C172003	CNG	Johnston 4000	08/25/06
20CNG-604	1J9VM4L906CI72004	CNG	Johnston 4000	10/26/06
20CNG-605	1J9VN4L926C172005	CNG	Johnston 4000	09/07/06
20CNG-606	1J9VM4L946CI72006	CNG	Johnston 4000	08/31/06
20CNG-607	1J9VM4L966C172007	CNG	Johnston 4000	08/28/06
20CNG-608	1J9VM4L986CI72008	CNG	Johnston 4000	09/18/06
20CNG-609	1J9VM4L9X6CI72009	CNG	Johnston 4000	08/29/06
20CNG-610	1J9VM4L966C172010	CNG	Johnston 4000	08/28/06

Table 3: Pilot Study Sanitation Districts & Vehicles

District	Vehicles
Brooklyn 4	20CNG-601; 20CNG-602; 20CNG-605; 20CNG-609
Queens 2	20CNG-607; 20CNG-608
Queens 4	20CNG-604; 20CNG-606
Queens 5	20CNG-603; 20CNG-610

Table 4: Diesel Fuel Powered Street Sweepers Used For Comparison

Vehicle	VIN #	Fuel	Make / Model	In-Service date
20AY-039	1J9VM4LD26C172039	Diesel	Johnston 4000	06/02/06
20AY-040	1J9VM4LD96C172040	Diesel	Johnston 4000	05/25/06
20AY-041	1J9VM4LD06C172041	Diesel	Johnston 4000	05/25/06
20AY-042	1J9VM4LD26C172042	Diesel	Johnston 4000	06/08/06
20AY-043	1J9VM4LD46C172043	Diesel	Johnston 4000	07/18/06
20AY-044	1J9VM4LD66C172044	Diesel	Johnston 4000	06/12/06
20AY-045	1J9VM4LD86C172045	Diesel	Johnston 4000	06/16/06
20AY-046	1J9VM4LDX6C172046	Diesel	Johnston 4000	12/08/06
20AY-047	1J9VM4LD16C172047	Diesel	Johnston 4000	12/19/06
20AY-048	1J9VM4LD36C172048	Diesel	Johnston 4000	12/08/06

DSNY tested its 10 pilot study alternative fuel street sweepers for operability and reliability and compared their performance to the performance of ten conventional diesel sweepers (see Tables 5 and 6). Their days in service were tracked and compared to their "down" incidents (i.e., incidents of required repairs) over the period from their in-service date through October 31, 2008. Each CNG sweeper was in service for between 737 and 799 days; the overall average was about 783 days of service. Each diesel sweeper was in service for between 683 and

891 days; the overall average was about 819 days of service. The CNG sweepers each experienced at least 11 down incidents, with a high of 26 incidents and an average of 18 incidents; in comparison, diesel sweepers had at least six down incidents, with a high of 20 incidents and an average of 14 incidents. The CNG sweepers' down incidents amounted to between 40 and 184 days out of service per vehicles, with a combined total of 1,046 days out of service and an average of 105 days out of service per vehicle; diesel sweepers' down incidents per vehicle ranged from 20 to 168 days out of service, with a combined total of 769 days out of service and an average of 77 days out of service per vehicle. The percent of time CNG sweepers spent down ranged from 5 % to 24 %, with an average of about 13 %, whereas the percent of time diesel sweepers spent down ranged from 2.9 % to 19 %, with an average of about 9 %. CNG street sweepers down time improved in the second half of the study period.

Table 5: CNG Sweepers Reliability Statistics By District

Brooklyn 4		**# Days In-Service**	**# of Down Incidents**	**# of Down Days**	**% of Down time**
20CNG-601	1J9VM4L956C172001	796	12	51	6.4
20CNG-602	1J9VM4L976CI72002	761	15	184	24
20CNG-605	1J9VN4L926C172005	786	13	146	19
20CNG-609	1J9VM4L9X6CI72009	795	11	51	6.4

Queens 2		**# Days In-Service**	**# of Down Incidents**	**# of Down Days**	**% of Down time**
20CNG-607	1J9VM4L966C172007	796	25	131	16
20CNG-608	1J9VM4L986CI72008	775	26	102	13

Queens 4		**# Days In-Service**	**# of Down Incidents**	**# of Down Days**	**% of Down time**
20CNG-604	1J9VM4L906CI72004	737	23	124	17
20CNG-606	1J9VM4L946CI72006	793	20	40	5

Queens 5		**# Days In-Service**	**# of Down Incidents**	**# of Down Days**	**% of Down time**
20CNG-603	1J9VM4L996C172003	799	17	114	14
20CNG-610	1J9VM4L966C172010	796	17	103	13

Total # Days In-Service	**Total # of Down Incidents**	**Total # of Down Days**	**Total % of Down time**
7834	179	1046	13.38

Table 6: Diesel Sweepers Reliability Statistics

Vehicle	VIN #	# Days In-Service	# of Down Incidents	# of Down Days	% of Down time
20AY-039	1J9VM4LD26C172039	883	15	78	8.8
20AY-040	1J9VM4LD96C172040	891	17	66	7.4
20AY-041	1J9VM4LD06C172041	891	19	111	12
20AY-042	1J9VM4LD26C172042	877	12	58	6.6
20AY-043	1J9VM4LD46C172043	837	16	64	7.6
20AY-044	1J9VM4LD66C172044	873	8	119	14
20AY-045	1J9VM4LD86C172045	869	20	168	19
20AY-046	1J9VM4LDX6C172046	694	15	39	5.6
20AY-047	1J9VM4LD16C172047	683	9	46	6.7
20AY-048	1J9VM4LD36C172048	694	6	20	2.9

Total # Days In-Service	Total # of Down Incidents	Total # of Down Days	Total % of Down time
8192	137	769	9.06%

III. Collection Trucks

DSNY currently owns 26 dedicated CNG sanitation collection trucks (see Table 7). DSNY is phasing out its older fleet (2001-2003 vintage) that has been problematic. CNG-fueled trucks are longer than conventional sanitation vehicles, preventing them from accessing narrower streets because of their wider turning radius.[8] In Calendar Year 2008, DSNY put into service 10 new collection trucks from Crane Carrier Corporation equipped with the new generation of the Cummins ISL gas CNG engines to replace 10 of the oldest CNG trucks in the fleet. Also, in Fiscal Year 2009, DSNY ordered 10 additional CNG trucks from Crane Carrier Corporation; DSNY expects delivery in 2009. Additionally, DSNY purchased one front-loading Crane Carrier Corporation collection truck equipped with a Cummins ISL gas CNG engine; DSNY expects delivery in 2009. The total number of CNG sanitation collection vehicles in DSNY's fleet will be 27 by year-end.

Under a federal consent order, DSNY has built a fully-operational, heavy-duty vehicle CNG fueling station in Woodside, Queens, at a cost of approximately $2,950,000.[9] This station went into service in May 2007 and provides better fueling times and increased efficiency of the CNG vehicle fleet.

[8] Testimony of DSNY Deputy Commissioner Rocco DiRico to City Council Committee on Environmental Protection (September 23, 2004).

[9] This project was undertaken as part of a settlement of a lawsuit brought against the City and the New York City Department of Sanitation by the United States for violations of the Clean Air Act. *United States v. City of New York*, 99 Civ. 2207 (LAK) (S.D.N.Y.).

Table 7: DSNY's CNG Sanitation Trucks[10]

Vehicle	VIN #	Vehicle Type	Make / Model
25CNG-401	1M2AC12C03M008004	Collection Truck	Mack LE 613
25CNG-402	1M2AC12C23M008005	Collection Truck	Mack LE 613
25CNG-403	1M2AC12C43M008006	Collection Truck	Mack LE 613
25CNG-404	1M2AC12C63M008007	Collection Truck	Mack LE 613
25CNG-405	1M2AC12C83M008008	Collection Truck	Mack LE 613
25CNG-406	1M2AC12CX3M008009	Collection Truck	Mack LE 613
25CNG-407	1M2AC12C63M008010	Collection Truck	Mack LE 613
25CNG-408	1M2AC12C83M008011	Collection Truck	Mack LE 613
25CNG-409	1M2AC12CX3M008012	Collection Truck	Mack LE 613
25CNG-410	1M2AC12C13M008013	Collection Truck	Mack LE 613
25CNG-411	1M2AC12C33M008014	Collection Truck	Mack LE 613
25CNG-412	1M2AC12C53M008015	Collection Truck	Mack LE 613
25CNG-413	1M2AC12C73M008016	Collection Truck	Mack LE 613
25CNG-414	1M2AC12C93M008017	Collection Truck	Mack LE 613
25CNG-415	1M2AC12C03M008018	Collection Truck	Mack LE 613
25CNG-416	1M2AC12C23M008019	Collection Truck	Mack LE 613
25CNG-501	1CYCCZ4868T048393	Collection Truck	Crane Carrier LET2
25CNG-502	1CYCCZ4868T048569	Collection Truck	Crane Carrier LET2
25CNG-503	1CYCCZ4828T048570	Collection Truck	Crane Carrier LET2
25CNG-504	1CYCCZ4848T048571	Collection Truck	Crane Carrier LET2
25CNG-505	1CYCCZ4868T048572	Collection Truck	Crane Carrier LET2
25CNG-506	1CYCCZ4888T048573	Collection Truck	Crane Carrier LET2
25CNG-507	1CYCCZ48X8T048574	Collection Truck	Crane Carrier LET2
25CNG-508	1CYCCZ4818T048575	Collection Truck	Crane Carrier LET2
25CNG-509	1CYCCZ4838T048576	Collection Truck	Crane Carrier LET2
25CNG-510	1CYCCZ4858T048577	Collection Truck	Crane Carrier LET2

DSNY is further developing its clean air efforts by implementing advanced technologies to reduce emissions and utilizing clean renewable alternative biofuel. For example, in March 2007, DSNY launched a biodiesel (B5) initiative citywide on all diesel-powered equipment (on-highway and off-highway), utilizing 5% biodiesel and 95% ultra low sulfur diesel (ULSD). To date, the B5 initiative resulted in no change in vehicle performance, no operator or mechanic complaints, no increase in down rate, and good winter operability. In August 2007, DSNY implemented its B20 (20% biodiesel) pilot study in one district location (Queens 6) and testing is on-going. Furthermore, as a part of New York City's efforts to improve air quality, save energy, and reduce fossil fuel use, DSNY issued a purchase order in Calendar Year 2008 to Crane Carrier Corporation to build three hybrid-electric diesel trucks, two hybrid-hydraulic diesel trucks, and one hybrid-hydraulic CNG truck. DSNY expects delivery by the first quarter of

[10] Vehicles 25CNG-301, -302, -303, -304, -305, -306, -307, -308, and -309 were purchased as part of a settlement of a lawsuit brought against the City and the New York City Department of Sanitation by the United States for violations of the Clean Air Act. *United States v. City of New York*, 99 Civ. 2207 (LAK) (S.D.N.Y.).

2009. DSNY intends to conduct further studies on the economic and operational feasibility of incorporating more alternative fuel sanitation vehicles into its fleet.

IV. Conclusions

After two years of evaluation and assessment of CNG street sweepers as compared to diesel-powered street sweepers, diesel street sweepers appear to have a better record in terms of reliability and operability, with 9% of downtime compared to 13% for CNG street sweepers. The data gathered over the two-year period indicates that CNG street sweepers' performance is improving. Nevertheless, further evaluation is necessary regarding the mechanical reliability and operational feasibility of alternative fuel street sweepers and collection trucks. DSNY will continue to study its current fleet of alternative fuel street sweepers and collection trucks, while participating in research and development of new technologies.