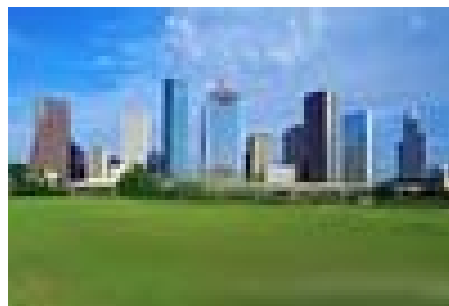
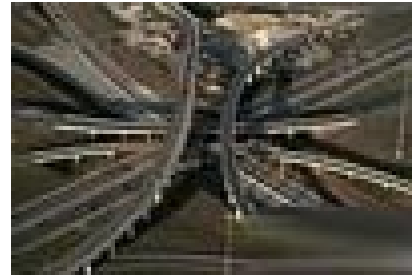


EMISSIONS REDUCTIONS PLAN



CITY OF HOUSTON

INTEROFFICE CORRESPONDENCE

To: City Council Members

From: Lee P. Brown
Mayor



Date: July 28, 2000

Subject: **Emission Reductions Plan**

I am pleased to provide the City of Houston Emissions Reduction Plan for your information and review. Reducing air pollution in order to assure cleaner air for our citizens to breathe is the number one public policy challenge faced by the Houston-Galveston Region. The effects of our air quality problems on our constituents' health and well being, on our governments and infrastructure, on our businesses, and on our region cannot be underestimated.

I am committed to providing leadership on this issue and to show that the Clean Air challenge can be met. In January, 2000, I created the Mayor's Clean Air Team through Executive Order 1-45. The Mayor's Clean Air team was charged with establishing a comprehensive emissions inventory of the City's internal activities and associated contractors. It was also charged with developing emission reductions targets for City operations and contracts consistent with the State Implementation Plan requirements for the Houston-Galveston Ozone Non-attainment Region. The Clean Air Team had further responsibilities of identifying City emissions reductions controls, establishing timelines and sequences of these controls to achieve the specified emission reduction targets, and determining cost estimates of the controls. All of these elements are included in the City of Houston Emissions Reductions Plan. While the cumulative costs to the City of Houston to meet the emission reductions targets are significant and the required actions are not all easy to accomplish, the costs of not meeting the emission reductions goals are much more significant and costly to ourselves, our neighborhoods, our communities, and our region.

The Plan is structured as a "how to" case study to allow other regional stakeholders to follow the steps used by the City Clean Air Team. Using the Plan as a guideline, they can identify and address their own emissions sources to achieve comparable emissions reductions from their own activities.

I want to applaud the collaborative efforts of the Clean Air Team, the department directors and their clean air liaisons in developing the City of Houston Emissions Reductions Plan. They have met and exceeded their charge, in a most timely manner. Now we must proceed to implement the plan elements and controls to achieve the required emission reductions and clean our air.

LPB:lmb



EMISSIONS REDUCTIONS PLAN TABLE OF CONTENTS

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The City of Houston, as part of the Houston-Galveston Ozone Non-attainment Region, must comply with the current federal standards for ground-level ozone by 2007.

The city and the region are faced with potential loss of federal transportation funds, increased health costs, and other consequences if the compliance mandates are not met. The impact of non-compliance for the city and the region is estimated to be as high as 4 billion dollars per year.

That is why the City of Houston, under the direction of Mayor Lee P. Brown, is committed to providing leadership on this issue and to ensure that the Clean Air Challenge can be met.

JANUARY 2000

Mayor Lee P. Brown enacted Executive Order 1-45. This Executive Order called for the establishment of a comprehensive air pollution emissions reductions plan for each department of the City. It also established procedures for City departments; ensures timelines for compliance with these procedures; educates City of Houston employees on the sources of air pollution emissions; authorizes an audit of air pollution emissions from City activities; and develops an Air Plan to reduce the air pollution emissions associated with City activities.

APRIL 2000

The Mayor's Clean Air Team completes the air pollution emissions audit.

JUNE 2000

The Mayor's Clean Air Team developed an Air Quality Plan to reduce the air pollution emissions resulting from, and associated with, City activities.

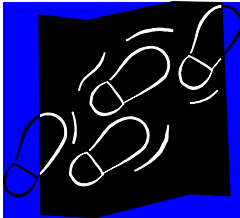
July 2000

Implementation of the City of Houston's Emissions Reductions Plan begins.

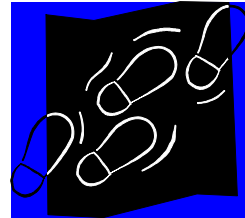
The success of this plan is based on a continuing team effort that created this plan in a very short time frame. It also meets the intent and spirit of Executive Order 1-45.

8 STEP EMISSIONS REDUCTIONS PROCESS

Executive Order 1-45 led to the creation of the Mayor's Clean Air Team. The team consisted of Air Quality Liaisons from each city department as well as other department and private sector stakeholders. The team collectively used an 8-step process, which resulted in the creation of the City of Houston's Emissions Reductions Plan and subsequent supporting guidelines.



THE STEPS



- | | |
|---------------|--|
| STEP 1 | Identify sources and quantify amounts of emissions |
| STEP 2 | Define the emissions reductions target goal |
| STEP 3 | Document and quantify previous emissions reductions |
| STEP 4 | Identify citywide emissions reductions controls and establish timelines for their implementation |
| STEP 5 | Identify needed departmental emissions reductions controls and establish a timeline for implementation |
| STEP 6 | Adopt citywide and departmental emissions reductions controls sufficient to meet the target goal |
| STEP 7 | Implement the adopted emissions reductions controls |
| STEP 8 | Monitor the actual emissions reductions versus the estimated emissions reductions and make adjustments to ensure achievement of target goal |

(Steps in blue are part of the actual plan)

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The City of Houston's Emissions Reductions Plan started with an emissions inventory of city sources. The scope of the inventory provided an initial summary inventory of multiple pollutants, while focusing on nitrogen oxides (NOx) emissions. The basis of the inventory was two-tiered. The first tier was based on known information from standard city databases for vehicles and equipment. The second tier of the inventory process identified stationary sources of emissions such as boilers and generators. The usage information and accuracy of the data was validated by the department clean air liaisons.

Once the inventories were completed, the information was combined and aggregated through consultant expertise. This process created a comprehensive citywide emissions inventory using EPA approved emission factors consistent with the required State Implementation Plan (SIP) modeling data.

Based on the SIP requirements and the final emissions inventory, a reductions target goal of 75% of current emissions was set. By identifying the sources and magnitude of NOx emissions, the type of emissions reductions controls needed to achieve the targets were determined, analyzed and evaluated.

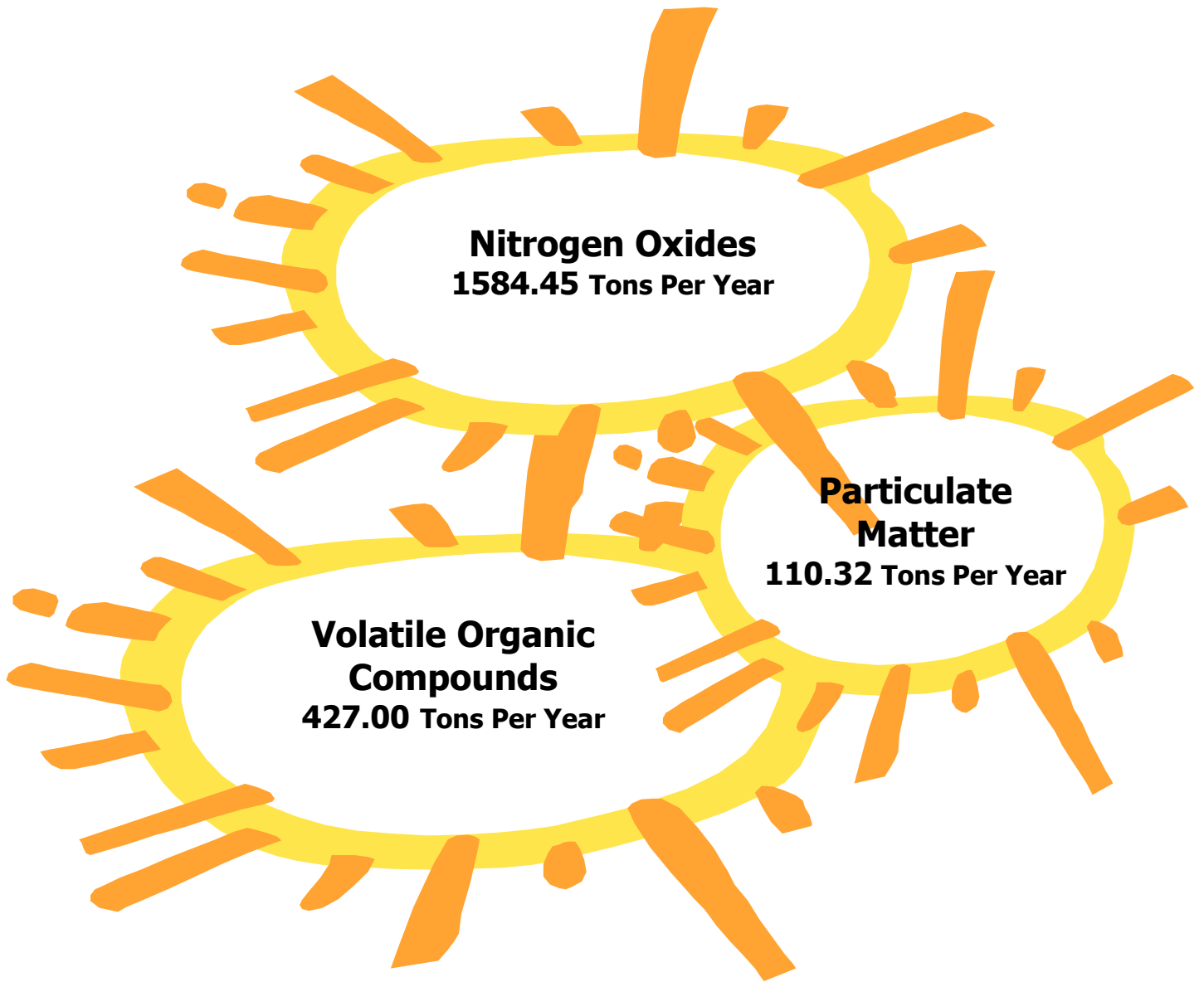
Identifying previous emissions reductions was the first step towards achieving the goal. This was accomplished by accounting for proactive actions which the City of Houston as taken since 1993. The reduction of NOx emissions for this period was 102.3 tons per year.

After determining what emissions reductions had already been achieved, the next steps involved identifying both citywide and generic departmental emissions control options and determining the costs and impacts.

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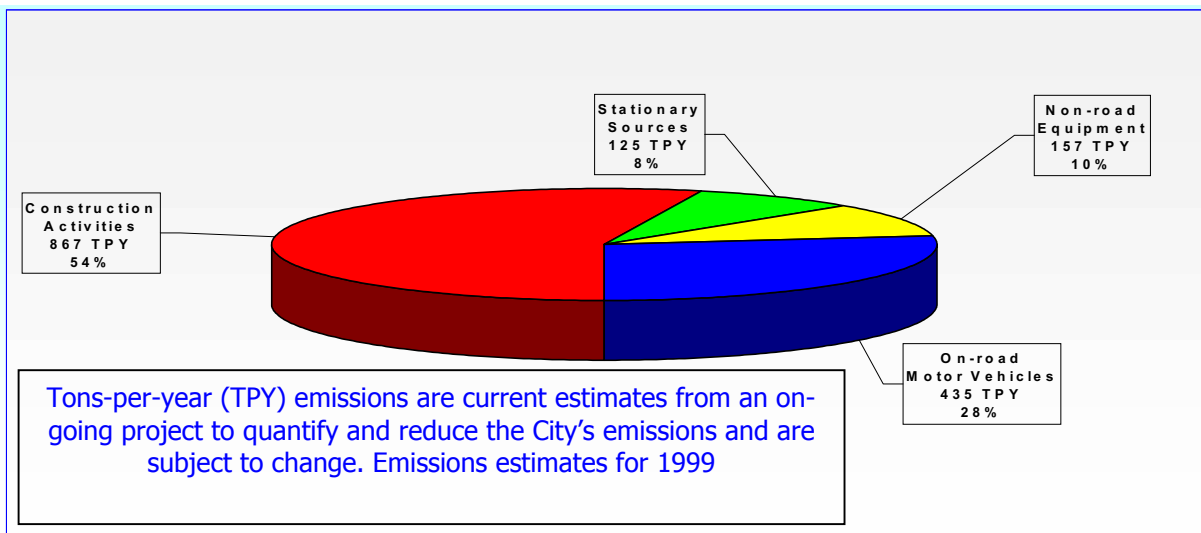
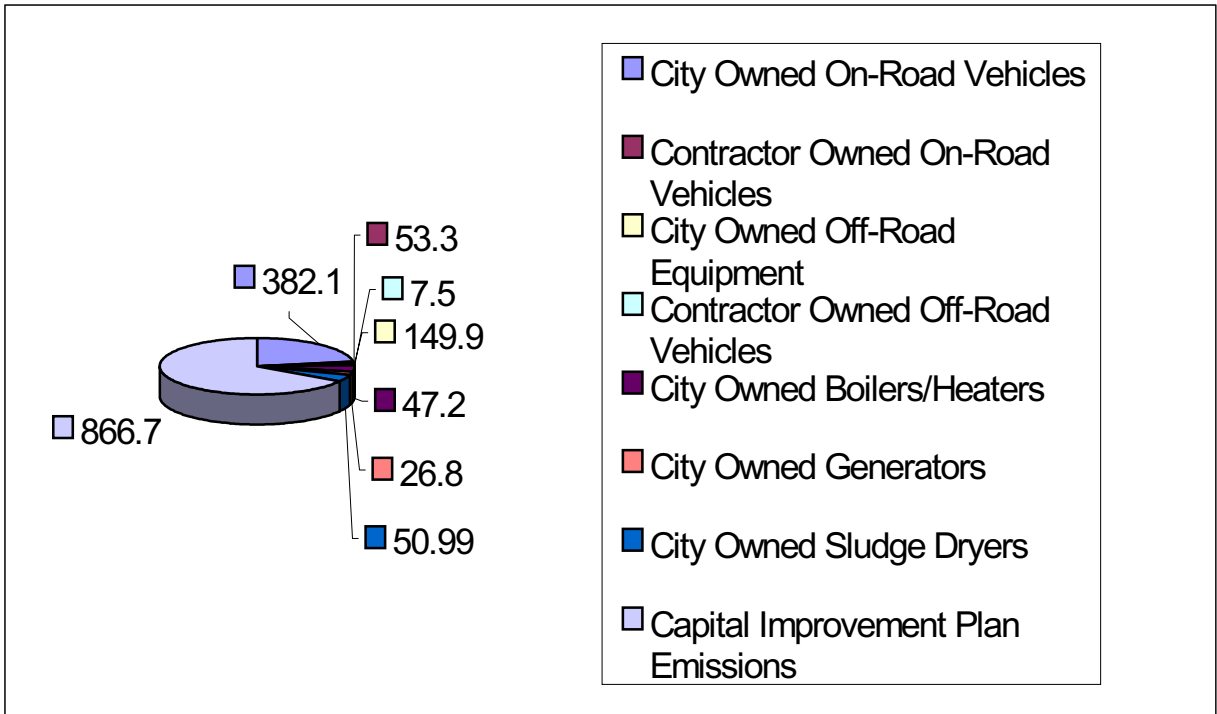
CITY OF HOUSTON AIR EMISSIONS INVENTORY SUMMARY



CITY OF HOUSTON

NO_x EMISSIONS BY TYPE OF SOURCE

(in tons per year)

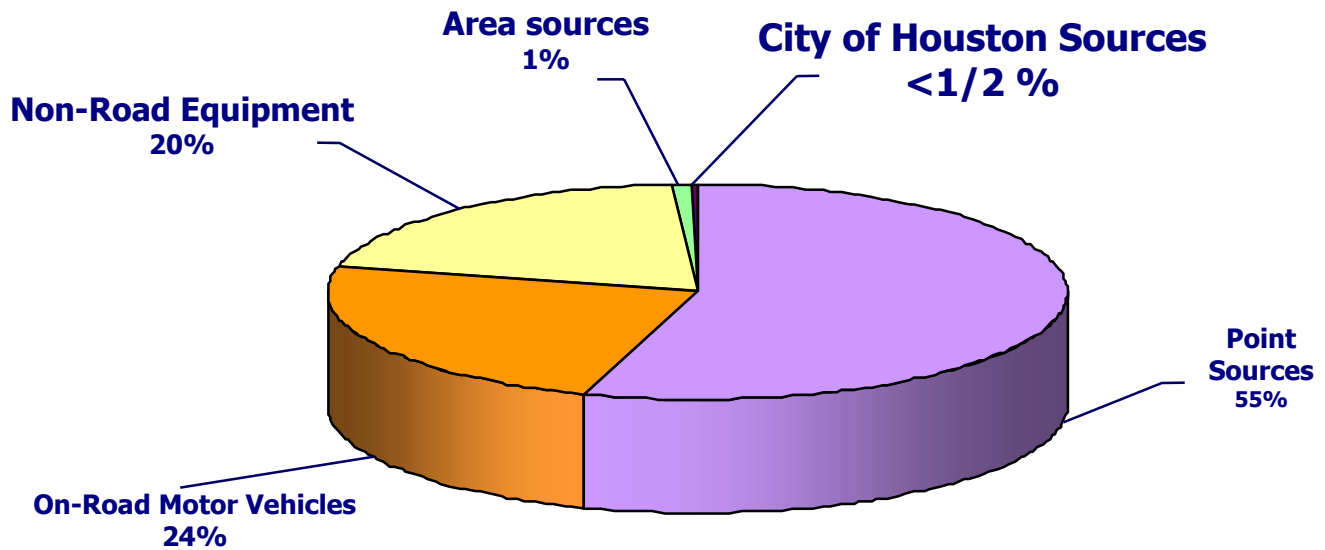


CITY OF HOUSTON NOX EMISSIONS INVENTORY

Summary of Estimated Emissions by Category and Department
Tons Per Year (TPY)

Department	On-Road Vehicles				NonRoad Equipment				Stationary Sources			Operational Total	Capital Improvement Plans				Total Operational plus Average CIP	
	City-Owned		Contractors		City-Owned		Contractors		Boilers / Heaters*	Generators	Sludge Dryers		FY 2001	FY 2002	FY 2003	FY 2004		4-year Avg.
	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline										
AA		0.05															0.05	
Aviation	1.2	8.19	0.56	1.4	15.4	3.06	0.0026	0.0007	14.42			378.75	236.45	132.65	73.15	205.25	249.5	
Building Svcs	0.06	1.39	1.4	2.7	0.22		0.158	0.012	9.58	1.23		2.12	1.34			0.87	17.6	
City Controller		0.001															0.001	
CE&F	0.25	0.055	0.05			0.39			1.67	3.2		10.93	91.41	84.70	74.68	65.43	71.0	
F & A	0.02	0.81							0.03								0.86	
Fire	11.4	35.0	0.03		0.18	0.52	0.00003	0.00003	3.10	0.64		3.31	3.12	3.43	4.51	3.59	54.5	
H & H S	0.05	7.5	0.02			0.01			0.66			10.86	13.21	8.96	3.21	9.06	17.3	
Housing		0.44										2.14	1.76	0.77	0.77	1.36	1.8	
HR		0.26															0.26	
Legal		0.09															0.09	
Library		0.77	0.01						0.76			6.13	2.46	0.37	7.01	3.99	5.5	
MCAD		0.37							0.08								0.45	
MCJD		0.05															0.05	
Parks & Rec	2.41	11.78	0.03		29.84	3.75		0.0007	1.44	0.04		2.58	1.99	2.26	1.47	2.08	51.4	
Planning		7.5							0.07	0.27							7.8	
Police	0.88	150.0	0.1			1.02		0.0005	5.50	5.85		12.10	12.64	1.93	2.97	7.41	170.7	
P/W & E	39.5	66.3	16.4	9.3	92.9	2.37	3.85	0.0192	9.71	15.4	51.0	507.91	582.07	601.48	563.22	563.67	870.5	
SWM	30.6	5.2	21.3		0.13	0.14	3.48		0.18	0.13		1.74	3.07	1.97	9.46	4.06	65.1	
Totals	86.4	295.7	39.9	13.4	138.6	11.3	7.5	0.0	47.2	26.8	51.0	938.6	949.5	838.5	740.5	866.8	1584.6	

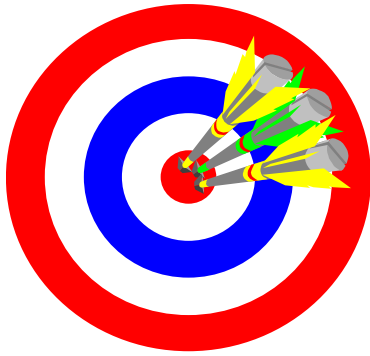
NO_x EMISSIONS IN THE HOUSTON-GALVESTON 8 COUNTY OZONE NON-ATTAINMENT AREA



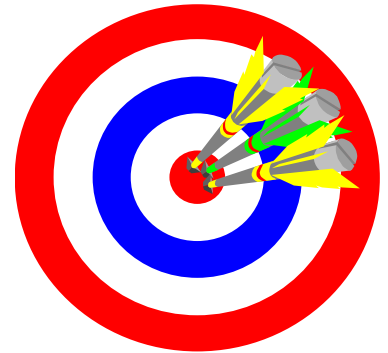
Source: 1996 Periodic Emissions Inventory, TNRCC
Subject to change

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EMISSIONS REDUCTIONS TARGETS



CITY OF HOUSTON NITROGEN OXIDES (NO_x) EMISSIONS

BASED ON EMISSIONS INVENTORY

NO _x	TONS PER YEAR (TPY)
CATEGORY ONE – City Owned On-Road Vehicles	382.1
CATEGORY TWO – Contractor Owned On-Road Vehicles	53.3
CATEGORY THREE – City Owned Off-Road Equipment	149.9
CATEGORY FOUR – Contractor Owned Off-Road Equipment	7.5
CATEGORY FIVE – City Owned Boilers/Heaters	47.2
CATEGORY SIX – City Owned Generators	26.8
CATEGORY SEVEN – City Owned Sludge Dryers	51.0
SUB-TOTAL - OPERATIONS NO_x EMISSIONS	718.62
CATEGORY EIGHT Capital Improvement Plans	866.8
SUB-TOTAL - CAPITAL IMPROVEMENT PLANS NO_x EMISSIONS	866.77
TOTAL NO_x EMISSIONS	1584.6
>REDUCTIONS TARGET	75% of current emissions
OPERATIONS REDUCTIONS TARGET	539
CAPITAL IMPROVEMENT REDUCTIONS TARGET	650.1
TOTAL NO_x EMISSIONS REDUCTIONS TARGET	1189.1

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In order to achieve optimal success and reach the target of 75% NOx emissions reductions, a set of eight citywide (seven operational and one construction) and five departmental controls were designed and evaluated.

Cost/benefit analyses of the respective controls were completed and the controls were then ranked in order from most cost effective to least cost effective. Based on this ranking, it was required to use all eight citywide controls and three of the five departmental controls to reach the target.

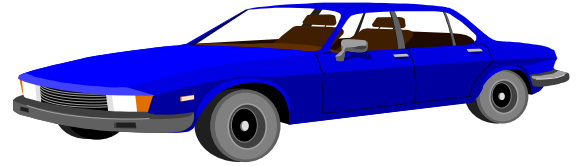
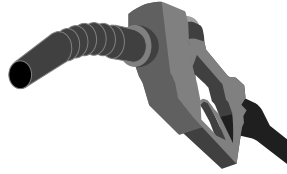
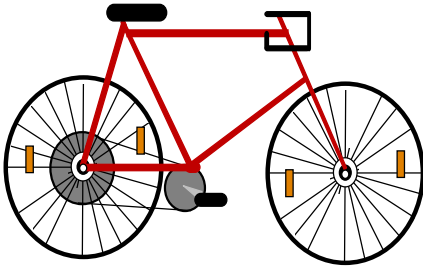
The plan consists primarily of the following controls:

1. Continue existing policy of requiring new purchases of clean vehicles and equipment
2. Purchase very low sulfur gasoline and diesel fuel starting in Fiscal Year 2002
3. Conduct field demonstrations of diesel catalysts in Fiscal Year 2001 and retrofit the city's diesel fleet with the successful catalysts, starting in Fiscal Year 2002
4. Retrofit the city's stationary emission sources (i.e. boilers, generators) starting in Fiscal Year 2002
5. Expand Employee Commute Options (bus passes and van/car pools) citywide starting in Fiscal Year 2002
6. Require city contractors to meet the same emission reductions requirements as city operations with the major costs starting in Fiscal Year 2003

At the heart of the plan's controls is the Diesel Field Demonstration Project. The city was awarded grants in the amount of \$671,057.00 in April 2000 for this project. It is important to note that if the field demonstration does not validate a retrofit emission control system capable of achieving 75% NOx reductions, the entire city plan will need to be reassessed and revised. The project will consist of field demonstrations using diesel catalysts on various vehicles and equipment from the summer of 2000 through the spring of 2001. The successful outcome of these demonstrations will allow the city to retrofit that part of its 2700 item inventory of on-road and off-road diesel equipment for which new clean replacements are not purchased. The results of the project will also assist city contractors in meeting the city's contractual requirements for clean vehicles and equipment on all city contracts starting in July 2002.

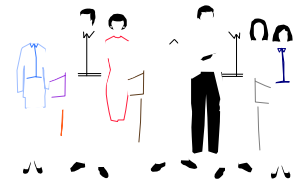
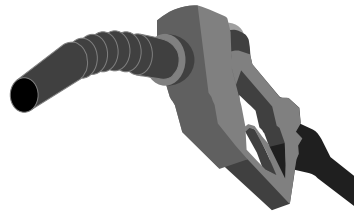
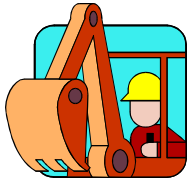
PREVIOUS ACTIONS FOR NO_x EMISSIONS REDUCTIONS

(Starting 1993)



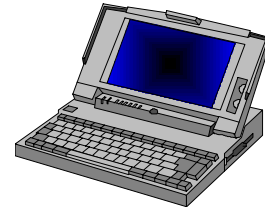
ACTION	DESCRIPTION	NO _x EMISSIONS REDUCTIONS (Tons Per Year)
①	EXPANDED CITY EMPLOYEE METRO BUS PASS PROGRAM = INCREASED RIDERSHIP BY 1019 EMPLOYEES	25.5
②	PURCHASE OF LOW EMISSION VEHICLES = 452 GASOLINE LEVS AND 124 CNG	18.4
③	PURCHASE OF ON-ROAD DIESEL FUEL FOR USE IN OFF-ROAD EQUIPMENT	4.2
④	IMPLEMENTATION OF GREEN LIGHTS & ENERGY STAR ENERGY CONSERVATION PROGRAMS	12.7
⑤	REDUCTIONS IN CITY FLEET SIZE (304 net reduction from 1994)	12.2
⑥	REDUCTIONS IN VEHICLES MILES TRAVELED	11.4
⑦	USE OF COMPRESSED WORK WEEK & CONSOLIDATION OF WORK LOCATIONS @ 611 WALKER AND 1200 TRAVIS	0.45 0.93
⑧	POLICE DOWNTOWN BIKE PATROLS	16.5
TOTAL PREVIOUS ACTIONS NO_x EMISSION REDUCTIONS		102.3 TPY

CITYWIDE EMISSIONS REDUCTIONS CONTROLS



CITYWIDE CONTROLS	NOX EMISSION REDUCTIONS	COST ESTIMATES	PROJECTED START
Control 1 - Clean Vehicles & Equipment			FY00 →
	93% gas vehicles	\$200-800/unit	
	60% diesel vehicles	\$500-1500/unit	
	93% gas equipment	\$200-800/unit	
	48% diesel equipment	\$1500-2500/unit	
Control 2 - Restrict Diesel Idling			FY00 →
	10-50% diesel vehicles	\$0	
	10-50% diesel equipment	\$0	
Control 3 - Expand Free Employee Bus Pass Program	40 passes = 1 ton NOx	\$312-\$634/pass	FY01 →
Control 4 – Very low sulfur sulfur/reformulated gasoline	15% gasoline vehicles & equipment	\$0.03-0.10/gallon	FY02 →
Control 5 - Diesel catalyst retrofits	75% diesel vehicles	\$5000/unit	FY02 →
	75% diesel equipment	\$7000/unit	
Control 6 - Generator & boiler & sludge dryer controls	90% diesel equipment	\$7000/generator	FY02 →
	90% natural gas equipment	\$7000/boiler \$1,100,000/sldg. dry.	
Control 7 – Subsidized car/van pools	40 riders = 1 ton NOx	\$600-750/employee	FY02 →
Control 8 - Operations & maintenance construction contractors diesel retrofits & clean equip	93% gas vehicle & equipment	\$200-800/unit	FY01 →
	60% new diesel vehicle	\$500-1500/unit	↓ FY03 →
	48% new diesel equip.	\$1500-2500/unit	
	75% diesel retro.equip.	\$7000/unit	

PROPOSED DEPARTMENT EMISSIONS REDUCTIONS CONTROLS



CONTROLS	NOx Emissions Reductions	Projected Costs	Projected Start Date
① Reduce Vehicle Miles	Varies based on miles traveled or equipment hours	\$0	FY01 →
② Expand Compressed Work Week or Telecommute Option	200 Employee Days = 1 Ton NOx	\$0-1200/Employee	FY02 →
③ Install global positioning system on fleet	Varies based on reduction in VMT (Vehicle Miles Traveled)	\$700/unit	FY02 →
④ Reduce Fleet & Equipment Inventory	Various based on reductions	\$0	FY 01 →
⑤ Purchase Emission Reductions Credits	Varies based on quantities bought	\$3500/Ton NOx	FY 03 →

COMMITTED* DEPARTMENT EMISSIONS REDUCTIONS CONTROLS



DEPARTMENT	SPECIFIC CONTROL	NOx REDUCTIONS (Tons Per Year)
Affirmative Action	Operations VMT reduction	0.07
Aviation	Reduce fleet size	.036
	➤ Idling restrictions	1.66
	➤ Teleconferencing	.010
Convention & Entertainment	Shuttle bus program	0.047
Fire	Reduce take home vehicle use	4.20
	➤ Reduce fleet size	1.96
Health & Human Services	Reduce fleet size	0.05
Parks	Idling reductions	13.805
	➤ Deploy employees work-home	3.09
	➤ Expand compressed work week	1.306
	➤ Revise and reduce equip. inventory	8.06
	➤ Reduce take home vehicle use	0.18
Planning & Development	Operations VMT reductions	0.33
	➤ Reduce take home vehicle use	0.33
	➤ Telecommuting	1.91
	➤ Electronic & video services	0.43
Police	Energy performance contract	5.79
	➤ Reduce fleet size	13.14
	➤ Expand compressed work week	6.25
	➤ Telecommuting	2.00
	➤ Accelerated LEV program	30.23
Public Works & Engineering	Car/van pools	42.45
	➤ Reduce fleet size	9.18
Solid Waste Management	Idling reductions	2.93
TOTAL		149.8 tons per year

*Based on department Clean Air Plans submitted 6/14/00

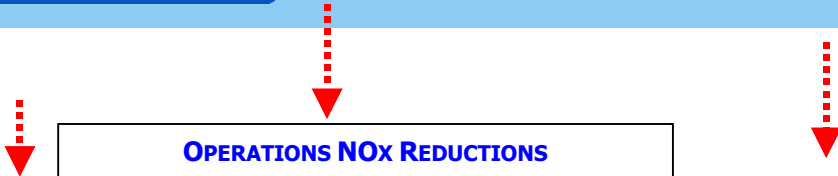
SUMMARY OF CITY OF HOUSTON EMISSIONS REDUCTIONS PLANS (TONS PER YEAR)



▼
OPERATIONS NOx REDUCTIONS
▼

Dept.	NOx Emissions	75% Target	Prior	Citywide	Dept.	Operation Totals	Difference (Shortage/Excess)	NOx CIP Reduction	Combined Totals (Ops & CIP)	Adjusted Difference (Target – Reductions)
Affirm Act	0.05	0.04	0.10	0.00	0.07	0.17	0.13	0.00	0.17	0.13
Aviation	249.45	187.09	1.25	31.07	2.12	34.44	-129.16	149.18	191.05	20.02
Building	17.61	13.21	12.70	13.54	0.00	26.23	13.03	0.64	26.87	13.66
Control	0.001	0.00	0.25	0.00	0.00	0.25	0.25	0.00	0.25	0.25
C&E	71.05	53.29	0.20	4.23	0.05	4.48	-48.81	48.53	53.01	-0.28
F&A	0.86	0.65	2.86	0.31	0.00	3.17	2.52	0.00	3.17	2.52
Fire	54.5	40.88	5.29	20.58	6.16	32.03	-8.84	2.55	34.58	-6.29
H&HS	17.33	13.00	3.02	9.92	0.05	12.99	-0.01	5.93	18.91	5.91
Housing	1.8	1.35	0.23	0.12	0.00	0.35	-1.00	0.92	1.27	-0.08
HR	0.26	0.20	0.63	0.10	0.00	0.73	0.54	0.00	0.73	0.54
Legal	0.09	0.07	0.55	0.13	0.00	0.68	0.61	0.00	0.68	0.61
Library	5.53	4.15	2.23	0.12	0.00	2.34	-1.81	2.78	5.12	0.97
MCAD	0.45	0.34	2.70	0.43	0.00	3.13	2.79	0.00	3.13	2.79
MCJD	0.05	0.04	0.05	0.00	0.00	0.05	0.01	0.00	0.05	0.01
Parks	51.37	38.53	1.55	29.91	26.26	57.71	19.19	1.50	59.21	20.69
Planning	7.83	5.87	1.39	3.67	3.02	8.08	2.21	0.00	8.08	2.21
Police	170.72	128.04	36.38	59.97	57.41	153.76	25.72	5.26	159.02	30.98
PWE	870.47	652.85	28.65	229.09	51.63	309.37	-343.48	410.03	719.39	66.54
SWM	65.15	48.86	0.13	47.88	2.93	50.94	2.07	2.63	53.57	4.71
Totals	1584.571	1189.1	102.3	451.02	149.8	703.38	-464.03	629.93	1340.74	165.89

% SUMMARY OF CITY OF HOUSTON EMISSIONS REDUCTIONS PLANS

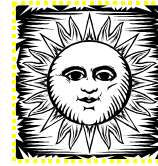


Dept.	Total NOx Emissions	Total Ops Emissions	75% OPS Target	Operations Total NOx Reductions	% Reductions to OPS Targets	75% Total Target	Total NOx Reductions	Total % Reductions to Target
Affirm Act	0.05	0.05	0.04	0.17	453%	0.04	0.17	453%
Aviation	249.45	44.2	33.15	34.44	104%	187.09	191.05	102%
BSD	17.61	16.7	12.53	26.23	209%	13.21	26.87	203%
Control	0.001	0.001	0.00	0.25	33333%	0.00	0.25	33333%
C&EF	71.05	5.6	4.20	4.48	107%	53.29	53.01	99%
F&A	0.86	0.9	0.68	3.17	470%	0.65	3.17	491%
Fire	54.5	50.9	38.18	32.03	84%	40.88	34.58	85%
H&HS	17.33	8.3	6.23	12.99	209%	13.00	18.91	145%
Housing	1.8	0.44	0.33	0.35	106%	1.35	1.27	94%
HR	0.26	0.26	0.20	0.73	374%	0.20	0.73	374%
Legal	0.09	0.09	0.07	0.68	1007%	0.07	0.68	1007%
Library	5.53	1.5	1.13	2.34	208%	4.15	5.12	123%
MCAD	0.45	0.5	0.38	3.13	835%	0.34	3.13	927%
MCJD	0.05	0.05	0.04	0.05	133%	0.04	0.05	133%
Parks	51.37	49.3	36.98	57.71	156%	38.53	59.21	154%
Planning	7.83	7.8	5.85	8.08	138%	5.87	8.08	138%
Police	170.72	163.3	122.48	153.76	126%	128.04	159.02	124%
PWE	870.47	306.8	230.10	309.37	134%	652.85	719.39	110%
SWM	65.15	61.1	45.83	50.94	111%	48.86	53.57	110%
Totals	1584.571	717.791	539	703.38	131%	1189.1	1340.74	113%

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THE IMPLEMENTATION PHASES

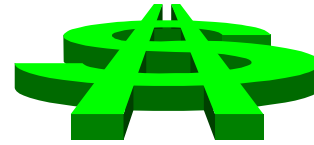
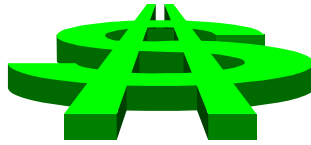
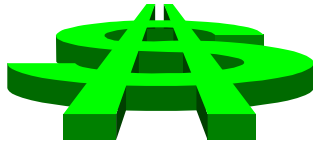


PHASES	CITYWIDE ACTIONS	DEPARTMENT ACTIONS	SCHEDULE (M/YY)
PRE-IMPLEMENTATION			
	✓ PLAN DEVELOPMENT		1/00 – 6/00
	✓ PLAN ADOPTION		7/00 –8/00
IMPLEMENTATION			
One – Existing actions, field demonstrations, and new clean vehicles & equipment	Control 1 – Clean Vehicles & Equipment	Control 1 – Reduce VMT and hours used	5/00–6/03
	Control 2 – Restrict Idling	Control 2 – Compressed Work Week	
	Conduct diesel field demonstrations	Control 3 – Global Positioning System	
		Control 4 – Reduce fleet and equipment inventory	↓
Two – Reformulated fuels and diesel retrofits; expand employee commute options	Control 3- Expand free bus passes		7/01-6/03
	Control 4 – Use very low sulfur gas & diesel		
	Control 5 – Install diesel retrofits		
	Control 6 – Implement generator/boiler combustion controls		
	Control 7 – Subsidize car/van pools		↓
Three – Expand contractor requirements	Control 8 – Construction and O&M Contracts		7/02–6/03
		Control 5 - Purchase Emission Reductions Credits	7/03 – 12/03
POST-IMPLEMENTATION	MONITOR, REVIEW & ASSESS		7/03-10/03

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EMISSIONS REDUCTIONS CONTROLS COSTS



CITYWIDE CONTROLS	COST ESTIMATES (MIN.)	COST ESTIMATES (MAX.)	PROJECTED START
Control 1 - Clean Vehicles & Equipment	\$1,014,000	\$3,303,000	FY01 → FY 03
Control 2 - Restrict Diesel Idling	\$0	\$0	FY01
Control 3 - Expand Free Employee Bus Pass Program	\$1,315,000	\$2,645,000	FY02
Control 4 – Very low sulfur sulfur/reformulated gasoline	\$350,000	\$1,150,000	FY02
Control 5 - Diesel catalyst retrofits	\$12,910,000	\$12,910,000	FY02 → FY03
Control 6 - Generator & boiler & sludge dryer controls	\$12,035,000	\$12,035,000	FY02
Control 7 – Subsidized car/van pools	\$1,019,000	\$1,274,000	FY02
Control 8 - Operations & maintenance & construction contractors (diesel retrofits & clean equip)	\$13,924,000	\$16,213,000	FY03
TOTAL CITYWIDE COSTS	\$42,567,000	\$49,530,000	

COST BENEFITS OF NOx EMISSIONS REDUCTIONS CONTROLS



RANK	CONTROL	NOx REDUCTIONS (TONS PER YEAR)	TOTAL COST RANGE	TOTAL COST PER TON
1	D #4 (Fleet Reduction)	37.83+	\$0	\$0
1	C #2 (Diesel Idling)	16.73+	\$0	\$0
1	D #2 (Compressed Work Week)	6.25+	\$0	\$0
1	D #1 (Vehicle Miles)	5.11+	\$0	\$0
5	D #5 (Purchase Emissions Reductions Credits)	1	\$3,500	\$3500
6	C #4 (Very Low Sulfur Gas)	54.65	\$355,000 –1,150,000	\$6500-\$21,000
7	C #1 (Clean Equipment & Vehicles)	119.28	\$1,014,000 – 3,303,000	\$8500-\$27,700
8	C #3 (Bus Passes)	104.33	\$1,315,000-2,645,000	\$12,600-\$25,350
9	C #7 (Cars/Van Pools)	42.45	\$0-1,300,000	\$0-30,600
10	C #8 (Contractor Requirements)	654.53	\$13,924,00016,213,000	\$21,300-\$24,800
11	C #6 (Generator/Boiler Controls)	69.55	\$2,135,000	\$30,700
12	D #3 (GPS)	1	\$65,000	\$65,000
13	C #5 (Diesel Retrofits)	168.75	\$12,910,000	\$76,500
14	C #6 (Sludge Dryer Retrofit)	50.99	\$9,900,000	\$194,000
	<p>Note: Departmental NOx reductions based on 6/14/00 department commitments and subject to increases if departments provide additional commitments</p>			

**COMBINED OPERATIONS & MAINTENANCE NOX EMISSIONS REDUCTIONS CONTROLS
(LISTED BY CUMULATIVE COST EFFECTIVENESS)**

CONTROL	CUMULATIVE NOX REDUCTIONS (TONS PER YEAR)	CUMULATIVE COST (MIN)	CUMULATIVE COST (MAX)
D#4 (Fleet Reduction)	37.83+	\$0	\$0
C#2 (Diesel Idling)	52.56+	\$0	\$0
D#2 (Compressed Work Week)	58.81+	\$0	\$0
D#1 (Vehicle Miles)	63.92+	\$0	\$0
D#5 (Purchase Emissions Reductions Credits) ¹	↓	↓	↓
C#4 (Very Low Sulfur Gas)	118.57	\$355,000	\$1,150,000
C#1 (Clean Equipment & Vehicles) ²	237.85	\$1,369,000	\$4,453,000
C#3 (Bus Passes)	342.18	\$2,684,000	\$7,098,000
C#7 (Cars/Van Pools)	384.63	\$2,684,000	\$8,398,000
C#8 (Contractor requirements) ³	↓	↓	↓
C#6 (Generator/Boiler Controls)	454.18	\$4,819,000	\$10,533,000
D#3 (GPS) ⁴	↓	↓	↓
OPERATIONS TARGET REDUCTIONS	539	↓	↓
C#5 (Diesel Retrofits) ²	622.93	\$17,729,000	\$23,443,000
C#6 (Sludge Dryer Retrofit)	673.92	\$27,629,000	\$33,443,000
CUMULATIVE TOTALS		\$27,629,000	\$33,443,000



EMISSIONS REDUCTIONS TARGET EXCEEDED

Notes:

All controls subject to substitution with less-costly controls if funds for additional emissions reductions are committed

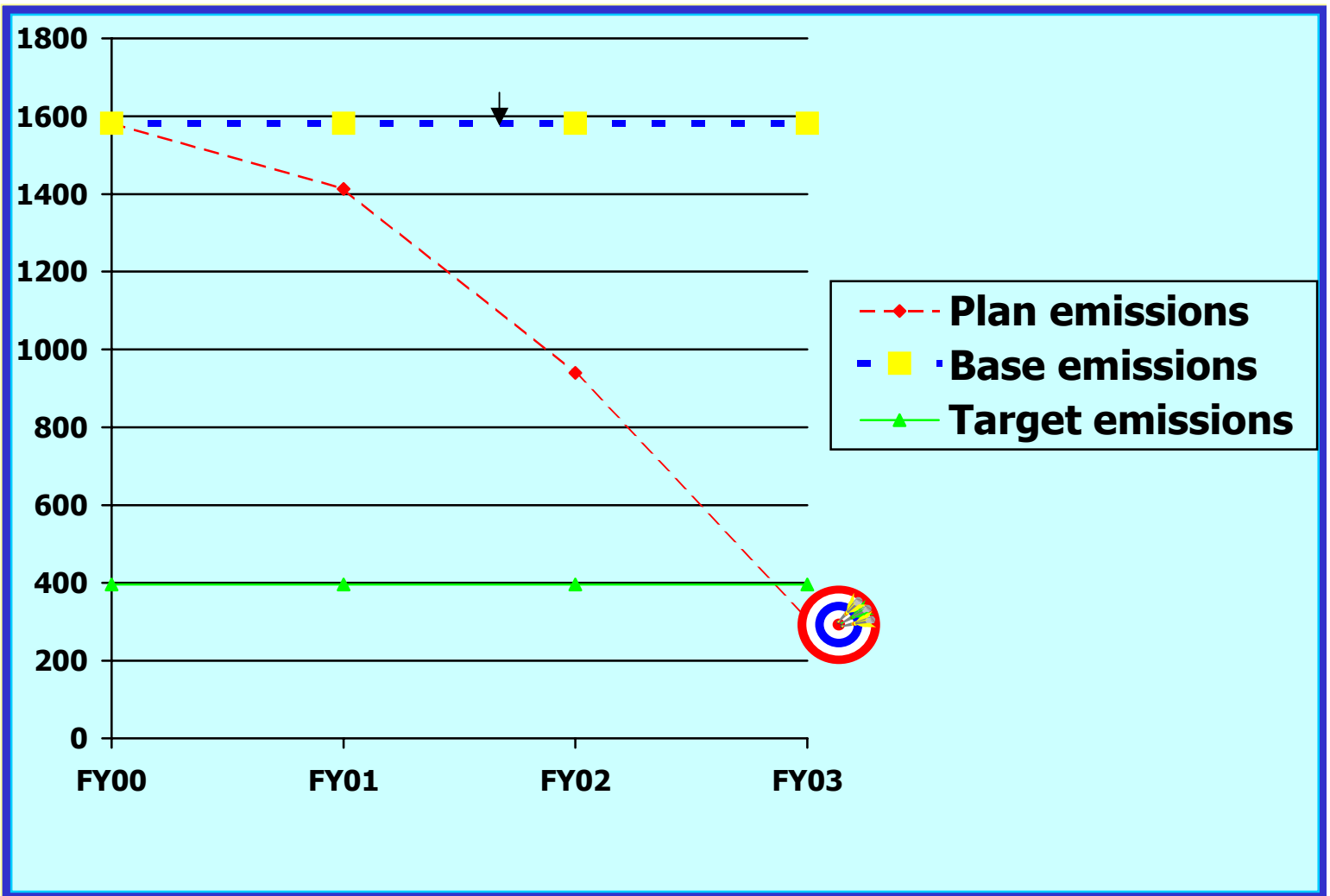
¹\$3500 per ton recommended only if other controls are unsuccessful

²Citywide Clean Equipment and Vehicles costs based on trend from FY01 budget; additional new vehicle purchases less costly than diesel retrofit controls

³ Capital (construction) controls, listed in cost benefit rank order

⁴\$65,000 per ton; not recommended except for selected instances

THE CHALLENGE IS MET



A P P E N D I C E S



CAPITAL IMPROVEMENT PLAN PROJECT DATA

Summary by Fuel and Type

Department	Off-Road Equipment			On-Road Vehicles*			Total
	Diesel	Gasoline	Subtotal	Diesel	Gasoline	Subtotal	
Affirmative Action							
Aviation	167.53	20.24	187.77	16.73	0.76	17.49	205.26
Building Services	0.74	0.02	0.76	0.11	0.00	0.11	0.87
City Controller							
CE&F	50.92	0.73	51.65	13.77	0.00	13.77	65.42
Finance & Administration							
Fire	3.34	0.08	3.42	0.09	0.07	0.16	3.58
Health & Human Services	7.36	0.98	8.34	0.49	0.22	0.71	9.05
Housing	0.93	0.11	1.04	0.30	0.03	0.33	1.37
Human Resources							
Legal							
Library	3.41	0.08	3.49	0.29	0.21	0.50	3.99
Muni Courts - Admin							
Muni Courts - Judicial							
Parks & Recreation	1.76	0.01	1.77	0.23	0.07	0.30	2.07
Planning							
Police	6.51	0.17	6.68	0.51	0.21	0.72	7.40
Public Works & Engineering	492.73	8.70	501.43	54.00	8.25	62.25	563.68
Solid Waste Management	3.53	0.36	3.89	0.01	0.16	0.17	4.06
Totals - All Departments	738.8	31.5	770.2	86.5	10.0	96.5	866.8

Emissions in tons per year, 4-year average, FY01 through FY04.

* "On-Road Vehicles" refers to cement trucks and other heavy trucks traveling to and from the job site and operating on the job site.

CAPITAL IMPROVEMENT PLAN PROJECT DATA

FY 2001

Department		Project Category	Total NOx		# Projects	Total \$	Avg. \$/Project	Tons NOx
			tpy	tpd				
Aviation		Airport Expansions	378.8	1.04	3			
PW&E - wastewater	R	WW System Improvements	212.5	0.58	23	130.900	5.691	1.6
PW&E - streets	N	Streets/Roads/Neighborhoods	148.8	0.41	27	87.198	3.230	1.7
PW&E - water	S	Water System Improvements	124.6	0.34	15	79.350	5.290	1.6
PW&E - drainage	M	Local Drainage Improvements	22.0	0.06	5	12.926	2.585	1.7
Police		Police Buildings	12.1	0.033	6	10.676	1.779	1.1
H&HS		Miscellaneous Projects	10.9	0.03	6	13.158	2.193	0.8
Conv. & Ent.		Renovations and new facilities	10.9	0.030	2	4.500	2.250	2.4
Library		Miscellaneous Projects	6.1	0.017	5	3.210	0.642	1.9
Fire		Miscellaneous Projects	3.3	0.009	4	6.072	1.518	0.5
Parks & Rec		Parks Projects	2.6	0.007	2	10.335	5.168	0.3
Housing		Housing Projects	2.1	0.006	3	0.850	0.283	2.5
Bldg Services (MCA)		Miscellaneous Projects	2.1	0.006	2	4.000	2.000	0.5
Solid Waste		Replace/Upgrade facilities	1.7	0.005	1	0.425	0.425	4.0
			938.5	2.57	104	363.600	33.054	1.5

FY 2002

Department		Project Category	Total NOx		# Projects	Total \$	Avg. \$/Project	Tons NOx
			tpy	tpd				
Aviation		Airport Expansions	236.5	0.65				
PW&E	R	WW Syatem Improvements	201.4	0.55	17	136.100	8.006	1.5
PW&E	N	Streets/Roads/Neighborhoods	184.5	0.51	18	75.220	4.179	2.5
PW&E	S	Water System Improvements	166.7	0.46	16	77.980	4.874	2.1
Conv. & Ent.		Renovations and new facilities	91.4	0.250	5	102.639	20.528	0.9
PW&E	M	Local Drainage Improvements	29.5	0.08	4	13.860	3.465	2.1
H&HS		Miscellaneous Projects	13.2	0.04	5	8.216	1.643	1.6
Police		Police Buildings	12.6	0.035	5	16.075	3.215	0.8
Library		Miscellaneous Projects	2.5	0.007	3	9.910	3.303	0.3
Fire		Miscellaneous Projects	3.1	0.01	4	2.799	0.700	1.1
Solid Waste		Replace/Upgrade facilities	3.07	0.008	2	1.166	0.583	2.6
Parks & Rec		Parks Projects	2.0	0.005	2	6.49	3.245	0.3
Housing		Housing Projects	1.8	0.005	3	0.569	0.190	3.2
Bldg Services (MCA)		Miscellaneous Projects	1.3	0.004	1	1.000	1.000	1.3
			949.5	2.60	85	452.024	54.931	1.6

CAPITAL IMPROVEMENT PLAN PROJECT DATA

FY 2003

Department	Project Category	Total NOx		# Projects	Total \$	Avg. \$/Project	Tons NOx
		tpy	tpd				
PW&E	N Streets/Roads/Neighborhoods	306.2	0.84	25	82.690	3.308	3.7
PW&E	R WW System Improvements	156.7	0.43	14	123.000	8.786	1.3
PW&E	S Water System Improvements	130.3	0.36	14	92.560	6.611	1.4
Aviation	Airport Expansions	132.7	0.36				
Conv. & Ent.	Renovations and new facilities	84.7	0.232	4	104.639	26.16	0.8
H&HS	Miscellaneous Projects	9.0	0.02	5	9.130	1.826	1.0
PW&E	M Local Drainage Improvements	8.3	0.02	1	6.000	6.000	1.4
Fire	Miscellaneous Projects	3.4	0.01	3	5.184	1.728	0.7
Parks & Rec	Parks Projects	2.3	0.006	2	8.350	4.175	0.3
Solid Waste	Replace/Upgrade facilities	2.0	0.005	1	0.441	0.441	4.5
Police	Police Buildings	1.9	0.005	2	0.615	0.308	3.1
Housing	Housing Projects	0.8	0.002	1	0.340	0.340	2.4
Library	Miscellaneous Projects	0.37	0.001	2	0.010	0.005	37.0
Bldg Services (MCA)	Miscellaneous Projects	0	0	0	0	0	
		838.6	2.30	74	432.959	59.688	1.2

FY 2004

Department	Project Category	Total NOx		# Projects	Total \$	Avg. \$/Project	Tons NOx
		tpy	tpd				
PW&E	S Water System Improvements	217.0	0.59	12	89.505	7.459	2.4
PW&E	R WW System Improvements	173.5	0.48	14	137.000	9.786	1.3
PW&E	N Streets/Roads/Neighborhoods	159.8	0.44	21	60.410	2.877	2.6
Conv. & Ent.	Renovations and new facilities	74.7	0.20	4	104.639	26.16	0.7
Aviation	Airport Expansions	73.15	0.20				
PW&E	M Local Drainage Improvements	13.0	0.04	2	6.524	3.262	2.0
Solid Waste	Replace/Upgrade facilities	9.5	0.03	3	3.485	1.162	2.7
Fire	Miscellaneous Projects	4.5	0.01	5	3.690	0.738	1.2
H&HS	Miscellaneous Projects	3.2	0.01	2	3.900	1.950	0.8
Library	Miscellaneous Projects	7.0	0.02	5	2.755	0.551	2.5
Police	Police Buildings	3.0	0.01	1	2.600	2.600	1.2
Parks & Rec	Parks Projects	1.5	0.00	1	7.335	7.335	0.2
Housing	Housing Projects	0.8	0.002	1	0.340	0.340	2.4
Bldg Services (MCA)	Miscellaneous Projects	0	0.00	0	0	0	
		740.7	2.03	71	422.183	64.220	1.2

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SUBJECT: PROCEDURE REGARDING AIR EMISSIONS IN CITY DEPARTMENTS	E. O. No. 1-45
	Effective Date Upon Approval

1.0 AUTHORITY

The Mayor has the authority to execute this Executive Order under City of Houston Charter Article VI § 7a which gives the Mayor control over "all the administrative work of the city government". This Executive Order is also a response to the Texas Health and Safety Code § 381.002 which states that the purpose of the Texas Clean Air Act is "to safeguard the state's air resources from pollution by controlling or abating air pollution and emissions of air contaminants, consistent with the protection of public health, general welfare, and physical property, including the aesthetic enjoyment of air resources by the public and the maintenance of adequate visibility."

2.0 PURPOSE

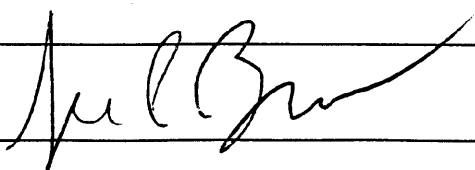
To establish a comprehensive air pollution emissions reduction plan for each department of the City. An audit will be performed by each department and the results will be used to develop a plan to reduce air pollution emissions from the department's activities. Each department will designate at least one Air Quality Liaison who is responsible for performing an air emission audit of their department and implementing the Air Plan.

3.0 OBJECTIVES

To establish procedures for City departments, ensure compliance with these procedures, educate City of Houston employees on the sources of air pollution emissions, perform an audit of air pollution emissions resulting from City activities by April of 2000, develop an Air Plan to reduce the air pollution emissions resulting from and associated with City activities by May 2000 and begin implementation of the Air Plan by July 2000.

4.0 SCOPE

The Executive Order applies to all City departments and the Mayor's office and is promulgated for the purposes of investigation, planning and reporting. The activities required under this Executive Order will not require additional funding.

Approved 	Date Approved 1-25-00	Page 1 of 4
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5.0 DEFINITIONS

- 5.1 "Air Emissions Audit" is an investigation of the source, quantity and duration of the emission of air pollutants. The audit shall primarily focus on NO_x and include VOC and fine particulate matter. The result of the Air Emissions Audit will be an air pollution emissions inventory.
- 5.2 "Air Plan" is the plan generated by each department to implement procedures and/or actions to reduce air pollution emissions for the purposes of complying with state and federal requirements. The Air Plan shall provide the source and amount of air pollution emissions and action plan for each emission source. The Air Plan shall include, but is not limited to, the reduction of air pollution emissions from the operation of motor-driven vehicles, the operation of motor-driven equipment, the use of electricity, the release of particulate matter to the ambient air, and vehicle miles travelled by employees. The Air Plan shall include a consideration and discussion of the purchasing of replacement energy efficient equipment and materials, the purchasing of replacement energy efficient lighting, the purchasing of replacement non-aerosol items as opposed to aerosol items, and increasing employee telecommunication in lieu of travel.
- 5.3 "Air Pollution Emissions" for the purposes of this Executive Order shall refer to emissions of VOC, NO_x and fine particulate matter.
- 5.4 "Air Pollution Emissions Inventory" shall include all the items required by the Director of Environmental Policy and in particular shall include air pollution emission sources found in the operation of City of Houston buildings, air pollution emission sources from motorized equipment and/or vehicles owned or operated by the City of Houston, air emission sources from motorized equipment and/or vehicles owned or operated by City of Houston employees in the performance of their job duties, and any other air pollution emissions sources from City of Houston activities.
- 5.5 "Air Quality Liaison" is an employee of the City of Houston who has been designated by his/her department head as the (one of the) representative(s) of the department who will attend HAXL training on air pollution emission inventory generation, oversee the collection of data and prepare an inventory of air pollution emissions for the department. The Air Quality Liaison will also oversee implementation of the Air Plan.
- 5.6 "Director of Environmental Policy" is a city employee previously appointed by the Mayor entrusted with the responsibility of developing city policy on environmental issues. The Director of Environmental Policy reports to the Mayor through the Chief Administrative Officer.
- 5.7 "Fine Particulate Matter" is the airborne particulate matter with diameter less than 2.5µm.

Subject	PROCEDURE REGARDING AIR EMISSIONS IN CITY DEPARTMENTS	E.O. No. 1-45	Page 2 of 4
		Effective Date: 1-25-00	

- 5.8 "HAXL" is a committee on Air Policy previously appointed by the Mayor and entrusted with the responsibility to develop policy for responding to federal and state requirements under the federal Clean Air Act of 1990. The HAXL committee reports to the Mayor through the Chief Administrative Officer. HAXL is an acronym for **H**ouston **A**ir **e**Xcellence and **L**eadership.
- 5.9 "No_x" is the abbreviation for nitrous oxides, a precursor pollutant for ozone.
- 5.10 "VOC" is the abbreviation for volatile organic compounds, a precursor pollutant for ozone.

6.0 RESPONSIBILITIES

- 6.1 All City Department Heads are charged with the responsibility of performing an Air Emission Audit and preparing and implementing a plan to reduce air pollution emissions ("Air Plan"). Each Department Head shall designate at least one Air Quality Liaison who has the authority to perform the duties outlined below. Each Department Head shall ensure that the Air Quality Liaison(s) attend all training sessions provided by HAXL. Each Department Head shall deliver no later than March 29, 2000 to the Director of Environmental Policy a final inventory of air emissions in the format required by HAXL. Each Department Head shall deliver no later than May 31, 2000 the departmental Air Plan to the Director of Environmental Policy. Each Department Head shall implement the Air Plan as finally approved by the Mayor and in the manner required by the Mayor-approved Air Plan. Each Department Head shall report the progress of implementing the Air Plan to the Director of Environmental Policy every three (3) months after the initial implementation of the Air Plan.
- 6.2 All Air Quality Liaisons shall participate in all training to be coordinated by the Director of Environmental Policy. Each Air Quality Liaison shall perform an air pollution emissions audit of his/her department as directed in the training provided by the Director of Environmental Policy. Each Air Quality Liaison shall prepare an inventory of the air pollution emissions in his/her department to be delivered by the Department Head to the Director of Environmental Policy no later than March 29, 2000. Each Air Quality Liaison shall prepare an Air Plan for his/her department to be delivered by the Department Head to the Director of Environmental Policy no later than May 31, 2000. For each department that has more than one Air Quality Liaison, the liaisons shall work together and produce only one inventory and one Air Plan for the department. The Air Quality Liaison is a position that will not require additional funding to accomplish the responsibilities set out above.
- 6.3 The Director of Environmental Policy has been designated by the Mayor, prior to this Executive Order. He/she shall be responsible for overseeing the training of the Air Quality Liaisons for the performance of their audits. The Director of Environmental Policy will be available for assistance to the Department Heads and Air Quality Liaisons. The Director of Environmental Policy will also review each department's Air Plan, recommend modifications as needed, and recommend approval of the acceptable Air Plans to the Mayor as appropriate, and support implementation of the Air Plans. The Director of Environmental Policy shall submit the results of implementation of all of the Air Plans every three months to the Mayor. No additional funding is necessary to complete the responsibilities delineated in this Executive Order.

7.0 INCONSISTENT POLICIES

This Executive Order supersedes any and all prior policies and/or executive orders to the extent such policies or executive orders are inconsistent with this Executive Order.

8.0 EFFECTIVE DATE

The effective date of this Executive Order is the date that it is signed by the Mayor of the City of Houston.

Subject	PROCEDURE REGARDING AIR EMISSIONS IN CITY DEPARTMENTS	E.O. No. 1-45	Page 4 of 4
		Effective Date: 1-25-00	

Mayor's Clean Air Team
Lee P. Brown, Mayor



DEPARTMENT

Affirmative Action
Aviation
Building Services
Controller's Office
Convention & Entertainment Facilities
Finance & Administration
Fire
Health & Human Services
Housing & Community Development
Human Resources
Legal
Library
Municipal Court – Administration
Municipal Court – Judicial
Parks & Recreation
Planning & Development
Police
Public Works & Engineering
Solid Waste Management

DIRECTOR

John de Leon
Richard E. Vacar
Monique McGilbra
Sylvia R. Garcia
Gerald J. Tollett
Sara C. Culbreth, Acting
Chief Lester Tyra
Dr. Mary desVignes-Kendrick
Margie L. Bingham
Lonnie Vara
Anthony W. Hall, Jr.
Barbara A. B. Gubbin
Ron Mangus
Judge Berta Mejia
Oliver B. Spellman, Jr.
Robert Litke
Chief C.O. Bradford
Tom Rolen, Acting
Everett A. Bass

LIAISON

J. Goodwille Pierre
Penny Webster
Tanwir Badar
Peter McStravick
Dave Osterhout
Dewayne Huckabay
Steve Dornak
Jacquie Lentz
Sheila Gilmore
Alfred Reeves
Dennis Yaksich
Donna Joy Burke
Joe Albrecht
Toby Black
Tom Grieve
Patsy Kallman
Assistant Chief Dennis Richards
Carl Bowker
Thomas Buchanan

**MAYOR'S CLEAN AIR TEAM
WORK GROUP LEADERS**

Airport Ground Service Equipment
Penny Webster
Contractor Controls
Ray DuRousseau, Louis Reznicek,
Richard Sanderson
Diesel Demonstration Projects
Steve Dornak
Emissions Reductions Plan & SIP
Dewayne Huckabay
Employee Commute Options
Alfred Reeves
Energy & Heat Island Bldg Codes
Marjorie Blythe, Victoria Herrin
Public Awareness
Jacquie Lentz
Scrappage Program
Vic Ayres

MAYOR'S CLEAN AIR TEAM STAFF

Dewayne Huckabay, Team Leader
Nader Afshari
Sonya Aston
Steve Dornak
Mary Eversole

CITY AIR TEAM

Sonya Aston
Dr. Pamela Berger
Mary Eversole
John Hall, Consultant
Rob Henry
Dewayne Huckabay
Jacquie Lentz
Penny Webster

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DEWAYNE HUCKABAY**

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INVENTORIES
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STARCREST CONSULTING**