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GAO

Briefing Report to the Honorable Charles E. Schumer, House of Representatives

August 1987

GASOLINE MARKETING

Octane Mislabeling in New York City

GAO

United States
General Accounting Office

New York Regional Office

Room 4112, 26 Federal Plaza
New York, NY 10278

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August 18, 1987

The Honorable Charles E. Schumer
House of Representatives

Dear Mr. Schumer:

On January 30, 1987, you and Representative Philip Sharp, Chairman, Subcommittee on Energy and Power, House Committee on Energy and Commerce, asked us to review the potential problem of "octane cheating," the sale of gasoline with an octane rating lower than the posted rating. More specifically, you asked us to review the alleged octane cheating in New York City, including the source and extent of the problem, the types of gasoline stations involved, the long-term effects on automobiles, and the financial incentives involved. The Petroleum Marketing Practices Act of 1978 requires that gasoline octane ratings be posted at the point of sale.

On March 26, 1987, we briefed Chairman Sharp's and your office on our preliminary work. It was agreed at that meeting that we would first report to you on the situation in New York City, and then expand our efforts nationwide.

Our findings on the situation in New York City are summarized below.

- The problem of octane mislabeling at gasoline stations in New York City appears to have grown in recent years. In 1981 New York City issued 46 or fewer octane mislabeling citations. It issued 178 and 171 citations in 1985 and 1986 respectively. The 1986 citations involved almost 8 percent of the city's gasoline stations. Almost 20 percent of the citations issued in 1985 and 1986 were for violations 4.0 octane points or more below the posted rating. This is the same as selling regular gasoline as premium.
- No single source of octane mislabeling exists. According to city officials, the gasoline station operators and the fuel distributors blame each other. The city has found both to be violators, but in its most recent tests at the gasoline distribution terminals in January 1986, it found only one minor violation.
- The problem does not seem to be unique to any one type of gasoline station. In 1986, 57 percent of the 171 citations issued to gasoline stations involved branded gasoline (that sold under the name of a major refiner); the rest involved unbranded gasoline. At that time about 43 percent of the stations sold branded gasoline. The most citations were

issued to stations in Brooklyn; the fewest citations were issued to stations in Staten Island.

- Using gasoline with an octane rating lower than needed can have a negative long-term effect on an automobile. Severe damage, however, should be infrequent because in most cases knocking can be easily corrected by using a higher grade gasoline.
- Octane cheating can be lucrative in New York City. A station intentionally mislabeling its gasoline could realize amounts many times the city's maximum $500 fine for octane cheating.

We reviewed violation and citation data and statistics developed by the New York City Department of Consumer Affairs (DCA), the local agency enforcing the city's consumer protection law. To learn the city's enforcement procedure, we interviewed DCA officials and reviewed pertinent records. We also interviewed marketing and distribution representatives from two major refiners, representatives from two automobile manufacturers, a service station owners' organization representative, a gasoline terminal operator, and Federal Trade Commission (FTC) and Environmental Protection Agency (EPA) officials involved with the oversight of the quality of gasoline. We reviewed related literature from the FTC, EPA, and the U.S. Departments of Transportation, Energy, and Commerce.

We discussed the contents of this report with DCA officials and considered their comments in completing it. Our work was performed in accordance with generally accepted government auditing standards.

As agreed with your office, except for a copy to the Chairman of the Subcommittee on Energy and Power, we will make no further distribution of this report for 7 days from the date of this letter, unless you publicly announce its contents earlier. At that time we will send copies to interested parties and make copies available upon request. If you have any questions about this report, please call me at (212) 264-0961.

Major contributors to this report are listed in appendix I.

Sincerely yours,

Mary R. Hamilton

Mary R. Hamilton
Regional Manager

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Abbreviations

DCA	New York City Department of Consumer Affairs
EPA	Environmental Protection Agency
FTC	Federal Trade Commission
GAO	General Accounting Office
PMPA	Petroleum Marketing Practices Act

Background

In 1978 the Congress enacted the Petroleum Marketing Practices Act (PMPA). One of the act's purposes was to require that information regarding the octane rating of automotive gasoline be disclosed to consumers. To accomplish this, title 2 of the act required the Federal Trade Commission (FTC) to promulgate a rule relating to octane rating disclosure. The resulting rule required that octane ratings be posted on gasoline pumps and that ratings be certified by refiners, terminals, and distributors all along the gasoline distribution line.

Octane is a rating applied to fuel used in spark ignition engines. The vast majority of motor vehicles in the United States are powered by spark ignition engines; the remainder are powered by diesel engines.

The octane rating of gasoline indicates its resistance to engine knock. Knock occurs when, instead of burning smoothly, a portion of the fuel explodes or detonates spontaneously and prematurely in the cylinder of the engine. The higher the octane rating, the greater the resistance to knock.

Table 1.1 shows the octane ratings of the different types of gasoline being marketed.

Table 1.1: Gasoline Octane Ratings

Type of Gasoline[a]	Octane Rating
Unleaded regular	87
Leaded regular	89
Unleaded midgrade	89
Unleaded premium	91–93

[a]Excludes leaded premium gasoline because very little is marketed anymore

When a gasoline station[1] sells gasoline to a motorist, or when a distributor sells gasoline to a station, and that gasoline has an octane rating lower than the rating posted on the pump or certified by the distributor, octane mislabeling occurs. Doing it knowingly is octane cheating.

[1]In this report the term "gasoline station" refers to any retail establishment selling automotive fuel.

The Problem of Octane Mislabeling in New York City

Octane mislabeling seems to have increased in New York City in recent years. In 1981 the city issued 46 or fewer octane mislabeling citations.[2] In 1985 it issued 178 citations; in 1986 it issued 171. The 1986 citations involved almost 8 percent of the city's gasoline stations.[3] We were unable, however, to exactly determine the year-to-year fluctuations through 1984 because DCA's available records for 1981 through 1983 did not specifically identify octane mislabeling citations. Table 2.1 shows the gasoline-related citations issued by DCA from 1981 through 1986.

Table 2.1: Lead and Octane Mislabeling Citations in New York City, 1981-86

Year	Total	Octane	Lead
1986	172	171	1
1985	215	178	37
1984	138	106	32
1983	112	[a]	[a]
1982	58	[a]	[a]
1981	46	[a]	[a]

[a]Available DCA records did not allow us to identify which citations for the years 1981 through 1983 were for octane mislabeling

Since at least 1975, DCA has been responsible for visiting each gasoline station in New York City at least once a year. Except when it visits a station to initially inspect the gasoline pumps for proper mechanical operation, DCA's inspections are unannounced.

Octane testing is just one of the tasks that DCA performs when it visits a gasoline station. Normally, the main reason it visits a station is to ensure that the gasoline pumps are functioning properly, namely, that each pump is dispensing a gallon of gasoline at the price displayed. During the visit it might test for octane.

In 1986 there were about 1,750 gasoline stations in New York City. DCA inspected them all at least once. Records from 1981 through 1985, however, were not available to show the number of stations visited, but according to the supervising inspector in DCA's enforcement division, DCA inspected all stations from 1981 through 1985 just as it did in 1986.

[2]For the purposes of this report, a violation is defined as any gasoline sample that tested below the posted octane rating. A citation is defined as the action taken to penalize the offender. DCA calls a citation a notice of violation.

[3]The total number of gasoline stations in the city was available only for 1986.

How Does DCA Test for Octane?

DCA's procedure to test the octane rating of gasoline is a two-step operation. The first step is visual and is done at the station. The second step is done under controlled conditions in a laboratory by a DCA contractor.

A New York City law requires each company selling gasoline in the city to supply DCA with 1 gallon of a color sample for each type of gasoline that it markets in the city. Gasolines with different octane ratings, according to DCA, normally have different colors. The inspector takes some of the color sample to the station to compare with the color of the gasoline found at the station. If there is a mismatch, the inspector will take a sample for laboratory testing. If the tested sample is found to be 0.5 octane points or more in violation, a citation is issued.

A consumer gasoline quality complaint automatically triggers a laboratory test. Most of the 1986 laboratory tests, however, were generated by color mismatches rather than by consumer complaints.

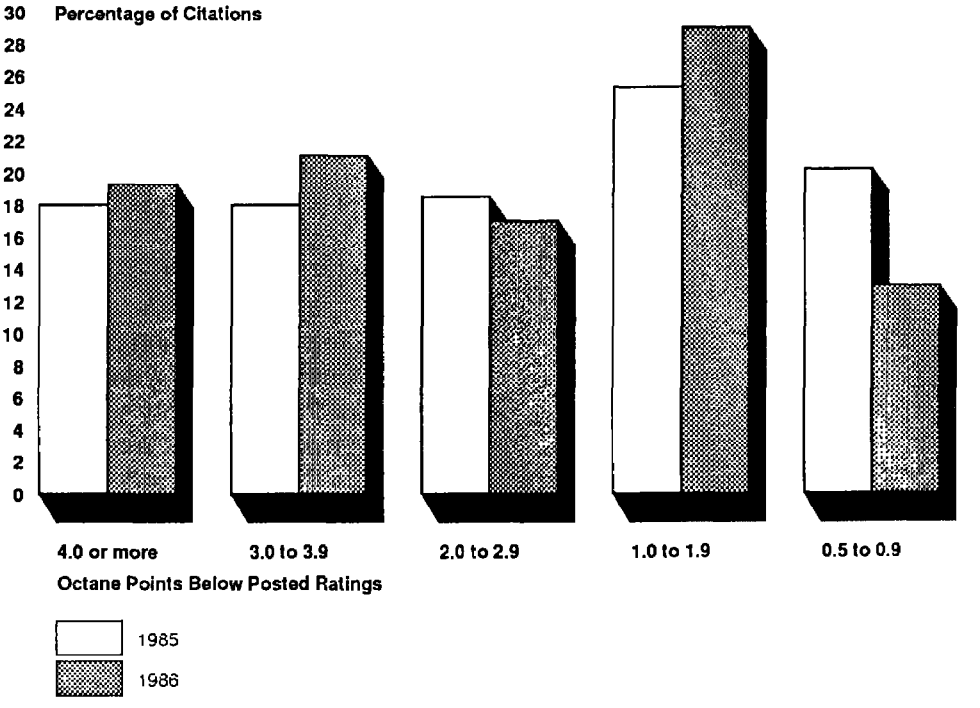
The Severity of Recent Octane Mislabeling in New York City

In 1985, 18 percent of the octane mislabeling citations issued by DCA were for selling gasoline 4.0 or more octane points below the posted rating. Four octane points is the difference between the lowest-graded unleaded premium and unleaded regular gasoline. Another 37 percent of the citations involved 2.0- to 3.9-octane point differences.

In 1986 the situation was roughly the same. Nineteen percent of the citations were for selling gasoline 4.0 or more octane points below the posted rating. Another 38 percent of the citations involved 2.0- to 3.9-octane point differences.

See figure 2.1 for a further analysis of the severity of the 1985 and 1986 octane mislabeling violations.

Figure 2.1: Octane Mislabeling Citations Issued in New York City in 1985 and 1986 - Severity of Violations



The Source of the Problem

We found no single source of octane mislabeling. According to DCA, the gasoline station operators blame the fuel distributors if the actual octane rating of the gasoline is less than the posted rating. Conversely, the distributors claim the station operators mislabel the gasoline. We could not determine whether either was responsible for the mislabeling. Available data indicated problems at both the stations and distributor terminals. In addition to the violations found at the gasoline stations, violations were also found at distributor terminals inspected by DCA.

In December 1984 DCA tested the octane rating of gasoline at the 12 gasoline distributor terminals located in New York City. All 12 samples tested below the certified octane rating—between 0.1 and 0.7 points below,—resulting in eight citations. In January 1985 DCA reinspected the terminals. This time only one sample tested lower than certified. In April 1985 DCA made another inspection and found no violations. In January 1986 DCA visited 11 terminals to test for octane. One sample tested 0.1 octane points below the certified rating. According to DCA's director of enforcement, all inspections were unannounced.

Types and Locations of Cited Gasoline Stations

DCA's 1986 octane mislabeling violations were found at both branded and unbranded stations. A total of 135 stations were cited for the 171 violations. Fifty-seven percent, or 98 of the 171 citations, dealt with branded gasoline. The other 43 percent involved unbranded gasoline. Of the approximately 1,750 gasoline stations in New York City in 1986, about 1,000 (57 percent) sold unbranded and about 750 (43 percent) sold branded gasoline. Some of the station operators who were cited more than once sold gasoline at both branded and unbranded stations.

Table 4.1 shows the number of citations issued in 1986 to gasoline stations in each of New York City's five boroughs.

Table 4.1: Location by Borough of New York City's Gasoline Stations Cited for Octane Mislabeling in 1986

	Stations			
Borough	**Number**	**Cited**	**Percent**	**Citations**
Brooklyn	537	68	12.7	84
Queens	633	34	5.4	47
Bronx	331	24	7.3	28
Manhattan	96	5	5.2	7
Richmond[a]	146	4	2.7	5
Total	**1743**	**135**	7.7	**171**

[a]Staten Island constitues the Borough of Richmond. DCA records refer to Staten Island.

Long-Term Effect of Engine Knock

According to the FTC rule on octane posting, if the octane rating of the gasoline in an automobile is less than what it needs, power is wasted and the effectiveness of the engine is lowered. Persistent or severe knocking can seriously damage the engine, possibly resulting in expensive repairs. Severe damage, however, should be infrequent because in most cases knocking can be easily corrected by using a higher octane gasoline. This is a view shared by the U.S. Departments of Transportation and Energy, and representatives from two automobile manufacturers whom we interviewed.

As mentioned earlier, engine knock is the detonation (explosion) of fuel in the engine cylinder. Fuel is to burn smoothly, not detonate. When detonation occurs, the last portion of the fuel burns instantaneously. The sudden increase in pressure spreads throughout the cylinder chamber, causing high-frequency pressure fluctuations and the knocking noise. In addition to the loss of power and objectionable noise, detonation leads to overheating of engine parts, such as valves, spark plugs, and pistons. Overheating promotes further detonation and also preignition,[5] which can cause cracked or burned piston heads in severe cases. Overheating also shortens the life expectancy of valves and sparkplugs.

[5]If all parts of the engine operate correctly, the fuel will be ignited by the spark plug. Preignition is the surface ignition that occurs before the sparkplug fires.

The Gain to Be Made by Octane Cheating

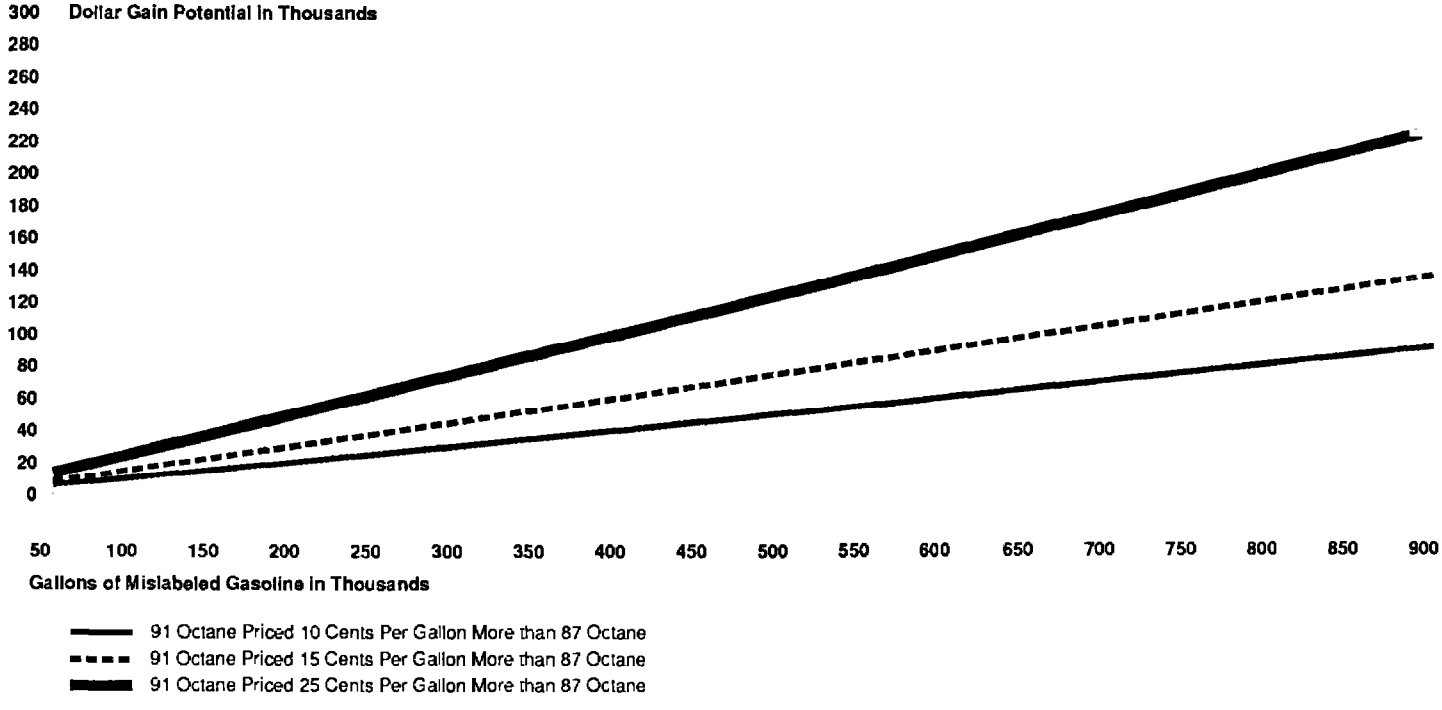
Octane cheating in New York City can be lucrative. How lucrative depends on the demand for the various types of gasoline at a specific station, the severity of the mislabeling, and the price difference between the various grades of gasoline. Compared with the maximum New York City fine of $500, however, octane cheating can be financially rewarding.

According to DCA's market surveys, the average price difference between unleaded regular and unleaded premium gasoline in New York City was about 15 cents a gallon during 1986. (The average differences for selected brands ranged between 12 and 25 cents a gallon.) We could not determine the amount of mislabeled gasoline sold by the cited stations because DCA records are not designed to record the volume or types of gasoline that stations sell. On the other hand we know that a station need only sell 3,333 gallons of regular gasoline as premium at a 15-cent differential to cover a fine of $500. A high-volume station intent on octane cheating could realize a substantial economic gain.

According to the National Petroleum News of February 1987, industry experts put the average volume of gasoline sales per station in the United States at 50,000 gallons a month. It also reported that the number of stations selling 100,000 to 500,000 gallons a month "are too many to count," and that some modern stations sell a million gallons or more a month. One industry source, the Lundberg Letter, reported that as at December 1986 about 25 percent of gasoline sales in the United States were for unleaded premium gasoline. A New York City gasoline terminal operator said that more than 50 percent of his sales were for unleaded premium gasoline.

Figure 6.1 depicts the levels of potential gain from octane cheating that might be associated with various volumes of mislabeled gasoline sold at three assumed price differentials between premium and regular gasoline.

Figure 6.1: The Potential Gain From Octane Cheating



Major Contributors to This Report

New York Regional Office

Mary R. Hamilton, Regional Manager
Nicholas M. Zacchea, Assistant Regional Manager
William F. Paller, Evaluator-in-Charge
Manfred Schweiger, Site Senior
Gokaran Singh, Evaluator

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