

A Vision of Clean Air

Strategies for Improving Air Quality in the Houston Region

By Jim Blackburn, GHASP Policy Committee

From the beaches of Galveston to the pine forests of Conroe, and from the skyscrapers of downtown Houston to the suburbs that surround it, air pollution threatens the health of our families and communities. Although many of the people who live here have come to think of it as inevitable, it is not. We believe we can, and should, do more to improve air quality in our region.

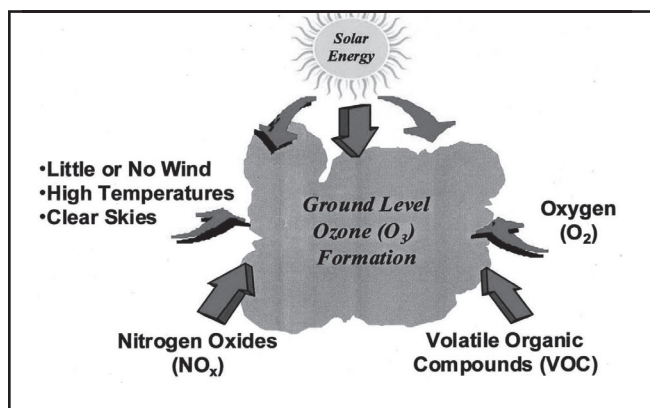
In this document, we will review some of the past and current efforts to reduce air pollution in the Houston area, and describe our vision for the future. Inherent in this vision is the belief that clean air is inextricably linked to our region's economic health and to our residents' quality of life.

I. Initial Efforts to Control Ozone in the Houston-Galveston Region Under the Clean Air Act

The first federal law regulating air pollution was passed in 1955, and all future air quality laws are amendments to that act. However, the Clean Air Act (CAA) of 1970 is considered the first national air quality law with some teeth, and our discussion begins with it.

The first step in implementation of the CAA focused on developing health standards for six common pollutants, or *criteria pollutants*, found in the outside air. These health-based standards are called National Ambient Air Quality Standards, or NAAQS. They are designed to reduce concentrations of these criteria pollutants below a level determined to be safe. The CAA set a deadline of 1975 for all states to attain the NAAQS. The penalty for not meeting that deadline was withholding of federal transportation funds and a prohibition on new industrial permits.

If the air quality in one or more areas of a state does not meet a NAAQS, the CAA requires the state to study the extent and sources of the problem, including the area's meteorology, emissions



Ozone is formed by the photochemical reaction of volatile organic compounds (VOCs) and nitrogen oxides (NO_x) in the presence of sunlight. So unlike most other air pollutants, ozone is not emitted directly. To reduce ozone, emissions of VOCs and NO_x must be controlled.

sources, atmospheric chemistry and opportunities for pollution control. Based on this information, the state must develop and implement a State Implementation Plan (SIP) to regulate the sources of the air pollution. As part of this process, the states often develop and use models to explore various control strategies and determine which would be most effective for reducing pollution and meeting federal health standards.

In the early 1970s, air quality in the Houston-Galveston area did not meet the standard for ozone, and the state was required to develop a SIP for the region. However, all of the actors – the U.S. Environmental Protection Agency (EPA), the Texas air pollution control agency (now called the Texas Commission on Environmental Quality, or TCEQ), Houston-Galveston area industries and certain other Texas institutions – disagreed on the models and the impact of certain control strategies.

The EPA disapproved the first SIP submitted by the state and implemented its own plan strongly controlling industrial and mobile sources of air pollution. In turn, Texas, Texas industry, several counties and even Rice University sued. Ultimately, the U.S. 5th Circuit Court of Appeals, in the case of

Texas v. EPA,¹ ruled against the EPA, finding that the EPA violated federal law in rejecting elements of the state plan and in requiring certain controls.

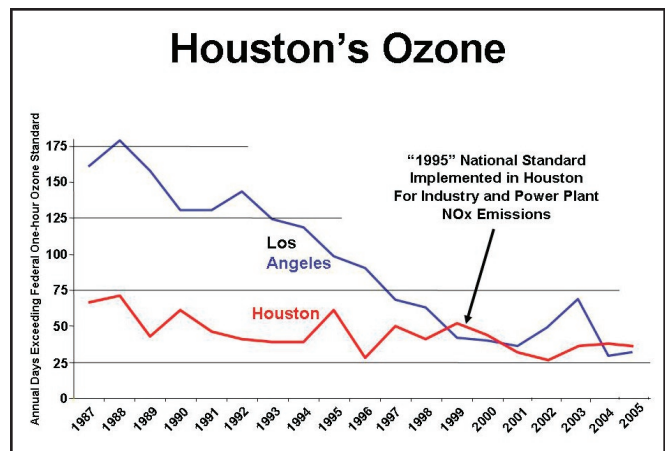
In 1977, the CAA was amended, giving areas still not in compliance with NAAQS until 1982 to reach attainment. Texas asked for, and was granted, another five years, giving the Houston-Galveston area until 1987 to meet the federal health standard.

Rather than invest the resources and expertise necessary to address the region's ozone problem, the Houston Chamber of Commerce (now known as the Greater Houston Partnership) sought to undermine the ozone standard by sponsoring the Houston Area Oxidant Study (HAOS), with primary funding from industry and support from the state. Their position was that there was no proven link between the federal ozone standard and health effects, and that the federal health standard was unattainable in Houston under any circumstances, short of actions which would completely disrupt economic activity. Though the effort failed, many in Texas air pollution circles continue to dismiss the substantial record of sound science indicating that ozone is a health hazard.

While progress was made in the Houston-Galveston area during the 1980s, the region was still significantly above the NAAQS in 1987, as were many other areas in the nation. In December of that year, Congress acted to extend the deadline and directed EPA to update state designations. But in 1990, before that process was complete, another major revision was made to the CAA.

II. Controlling Ozone Under the Clean Air Act Amendments of 1990

The 1990 amendments reset the deadlines for complying with NAAQS, and created classifications of severity for non-attainment areas. The eight-county Houston-Galveston-Brazoria (HGB) area – which includes Harris, Galveston, Brazoria, Chambers, Fort Bend, Liberty, Montgomery and Waller counties – was designated as a severe, and was given 17 years to address its ozone problem, thereby extending the deadline to 2007. Even so, the amendments initially appeared to be a major step forward in meeting air quality goals. For ozone, the EPA began to concentrate on the control of nitrogen oxides (NO_x) as well as volatile



Los Angeles has made great strides in reducing ozone, while Houston appears to be jogging in place.

organic compounds (VOCs). Also, the 1990 CAA tightened vehicle emission requirements, which would reduce NO_x emissions from mobile sources.

A. NO_x Control

To implement the 1990 CAA in Texas, the EPA gave the state until 1994 to submit a revised ozone SIP for the HGB area. This SIP revision was to include the actions (*control measures*) Texas was taking to attain the ozone NAAQS, and modeling to demonstrate that the proposed actions would result in attainment (*attainment demonstration*).

Because ozone is formed by a photochemical reaction of VOCs and NO_x, ozone control measures typically include controls on NO_x emissions. In 1994, however, the state asked the EPA to defer NO_x controls for the HGB and Dallas-Fort Worth non-attainment areas. The request was based on the belief that reducing NO_x created a “disbenefit” to ozone levels – in other words, that such reductions could increase ozone levels.

Surprisingly, EPA agreed and issued a waiver in 1995. By the time the waiver expired at the end of 1997, new data interpretation showed that significant NO_x reductions would indeed be required for Houston and Dallas to meet the ozone standard by 2007. Clearly, the NO_x waiver was ill-advised. In this circuitous manner Texas lost years of NO_x regulation – perhaps a short-lived economic benefit to industry, but not to the citizens of Texas breathing ozone.

Moreover, the state did not submit to the EPA the SIP revision that was due in 1994 until

November 1999. The EPA rejected the state's submission one month later and set December 2000 as a deadline for the state to adopt rules that would result in attainment of the ozone NAAQS in Houston. Missing this deadline would result in serious sanctions under the 1990 CAA, including the loss of road-building funds for Houston. This caught the attention of Texas politicians, and the state moved forward to address the deficiency.

In December 2000, the state filed the SIP that was due in 1994. This revised plan continued VOC controls and required a 90% reduction in NO_x emissions generally, as well as 90% for industrial sources. The substantial NO_x reduction requirement was adopted, at least in part, because the EPA had taken a strong position that a 90% reduction was necessary to attain the federal standard. The EPA approved the state's plan.

Industry did not like the 90% NO_x reduction requirement, however. So in 2001, the Greater Houston Partnership formed the Business Coalition for Clean Air (BCCA) Appeals Group to sue the state agency for adopting the 90% rule. Rather than defend the revised SIP, the state agency staff conceded that the EPA's requirement for a 90% reduction in emissions lacked scientific justification.² The state quickly settled the suit mid-trial.

As part of the settlement, the state lowered the industrial NO_x reduction requirement from 90% to 80%. This created a new legal dilemma, however. The CAA prohibits backsliding in controls established to attain the NAAQS. That is, previously passed regulations cannot be replaced by weaker regulations. For several years, the EPA-approved SIP for Texas included a requirement for a 90% NO_x reduction while the state's SIP, which had not been approved by the EPA, required an 80% NO_x reduction. In September, 2006, the EPA adopted the 80% NO_x reduction, thereby moving backwards in its efforts to clean up Houston's air.

B. Highly Reactive VOCs and the 2004 SIP Mid-course Correction

From the beginning in the 1970s, ozone control in the Houston region focused on control of VOCs. For almost 40 years, control of these reactive hydrocarbons has been the centerpiece of the state's efforts to protect the health of those of us living in this polluted area. However, in 2000,

samples taken as part of the first Texas Air Quality Study (TexAQS I) found significantly more VOCs in the region's air than was previously reported, particularly from sources along the Houston Ship Channel. Thus, the emissions inventory and models relied upon to design controls to clean up our air, and to demonstrate attainment of the federal ozone standard, were dramatically wrong.

This new information was incorporated into the modeling. To ensure that a new SIP was submitted, GHASP filed a notice of intent to sue in October 2004. After the filing, the state finally did submit another revised SIP, known as the mid-course review, which reduced the industrial NO_x control to 80% and instead emphasized control of highly reactive VOCs (HRVOCs). The state argued that prioritizing control of the chemicals which most rapidly reacted with NO_x to form ozone was the most efficient way to reduce ozone concentrations. Once these controls were in place, additional controls on other VOCs and NO_x should follow. By the end of 2006, however, the TCEQ had yet to even propose regulations tightening controls on a second tier of VOCs.

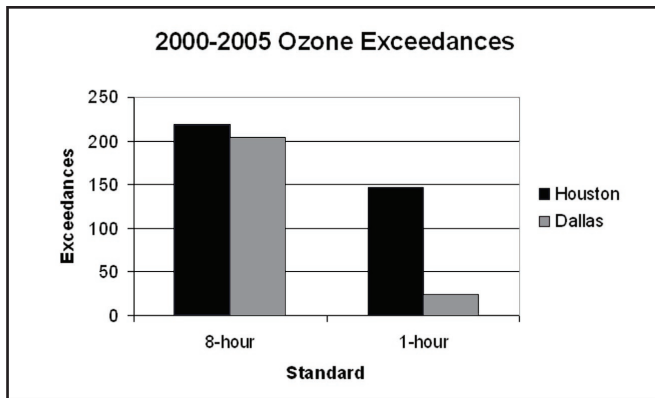
TexAQS I demonstrates that, for 30 years, significant sources of industrial emissions were never identified and included in the emissions inventories used to model proposed controls. Clearly, then, the state is not serving its citizens by weakening existing controls and dragging its feet on proposing new ones.

C. The Eight-hour Ozone Standard and Yet Another Deadline Extension

In the midst of the discovery of significantly more HRVOCs in the air above the Houston Ship Channel, and during the dispute over the necessity for a 90%, versus 80%, NO_x reduction, the EPA abandoned the ozone health standard it had been pursuing for more than 30 years. Under that standard, an ozone exceedance occurred if the average one-hour concentration of ozone exceeded 125 parts per billion (ppb). In 1997, the EPA established an eight-hour ozone health standard: measured ozone concentrations could not exceed an average of 85 ppb in a given eight-hour period. However, rather than add the eight-hour standard to the regulatory regime, EPA substituted the new eight-hour standard for the old, one-hour standard.

In most U.S. cities, ozone develops slowly throughout the day as emissions, primarily from mobile sources, build up in the morning and cook in the afternoon. During periods of relatively still air, ozone levels can climb slowly over days. These cities benefit from the tighter eight-hour standard.

However, Houston often undergoes rapid ozone formation due to sudden industrial releases of VOCs, especially HRVOCs, which can cause ozone to spike to levels that exceed the one-hour standard. Many times, these situations lead to an exceedance of both the one-hour and the eight-hour standards. Yet on some occasions, ozone reaches high enough concentrations to violate the one-hour standard, but is not sustained for long enough to violate the eight-hour standard. This situation is unique to the Houston region, and makes using solely the eight-hour standard problematic for our area. Theoretically, Houston could reach attainment for the eight-hour standard and still violate the one-hour health standard on a regular basis.



Due to industrial activities, Houston exceeds the one-hour ozone standard much more frequently than Dallas does.

Another concern with the new eight-hour standard is that it once again extended Houston’s deadline for complying with federal health standards – this time, from 2007 to 2010.

The TCEQ staff recently proposed a plan for meeting the eight-hour standard. By law, it must include any controls that had been approved as part of the plan for meeting the one-hour standard. However, the new plan contains very few additional controls. TCEQ has stated that the plan will not lead to attainment of the eight-hour standard by 2010. In fact, they said it could be 2018 before local air quality meets that standard.

State regulators claim attainment of the eight-hour standard requires more emphasis on off-road and on-road sources such as automobiles, trucks, bulldozers and ships. They also claim that these sources are controlled at the national level, and that the state cannot take action to reduce pollution from these sources. This is false – there are actions the state can take to decrease mobile emissions. There are also other industrial controls that could be implemented.

Though the battle is just beginning for the eight-hour SIP, the fight over the one-hour ozone standard isn’t finished yet. It is important to note that EPA is required to continue to focus on the one-hour standard even though there is no longer a date for compliance. At the local level, GHASP has petitioned for review in the 5th Circuit the EPA’s approval of the one-hour SIP for Houston, which is insufficient to meet the one-hour standard and also violates the back-sliding provision.

On the national level, Earthjustice and several other groups – including the American Lung Association, Environmental Defense, Sierra Club, and Natural Resources Defense Council – challenged the EPA’s abandonment of the one-hour standard in the D.C. Circuit Court of Appeals. In December 2006, the court ruled against EPA in that suit and ordered the agency to come up with a new enforcement plan. This case could have serious implications for the Houston area.

III. Other Pollutants – Fine Particles and Air Toxics

From 1970 to 1990, the EPA focused on controlling ozone in the Houston-Galveston region. For the most part, the courts had to force the EPA to honor its statutory obligation to regulate other air toxics, beginning with benzene and mercury. Even today, there are no federal ambient air standards for most air toxics. As a result, the states must not only develop and implement plans for controlling these pollutants, as they do with ozone, but also must set the standards in the first place.

Because of EPA’s focus on ozone, this pollutant has received the most attention in Houston air pollution circles as well. But two other types of air pollution pose health issues just as serious, or more serious, as ozone – fine particles and air toxics.

A. Fine Particles

Large particles such as smoke and soot have been regulated health hazards under national ambient air quality standards since the inception of the NAAQS program. However, in the early 1990s, researchers began documenting an even more significant relationship between fine particles (PM_{2.5}) and severe pulmonary health problems. In 1997, the EPA adopted a new NAAQS for PM_{2.5}, which is particulate matter that is 2.5 microns (μ) in size or smaller. The previous standard had focused upon particles that were 10 μ or smaller.

EPA's initial PM_{2.5} limits were 15 μg/m³ annually, and 50 μg/m³ over 24 hours. In 2006, based on new health effects data, the EPA lowered the 24-hour standard to 35 μg/m³. Though the agency's science advisory committee recommended lowering the annual standard to 12 μg/m³, it remains at 15 μg/m³.

In the Houston region, several air quality monitors periodically violate the 24-hour standard, but as of yet, not frequently enough to cause Houston to be declared in non-attainment for that pollutant. However, fine particle pollution has been on the rise at the Clinton Drive air monitor (near the Port of Houston) for the past couple of years. Unless this issue is addressed, it seems inevitable that the region will exceed the 24-hour PM_{2.5} standard, triggering another SIP.

Ports and terminals with extensive truck and ship traffic generate large amounts of particles, often laced with toxic compounds. Indeed, computer modeling of particulate pollution at the Bayport container terminal, currently under construction, indicates that 24-hour levels could exceed 50 ug/m³, far in excess of the new PM_{2.5} standard.

B. Air Toxics

The 1990 CAA created a program for regulating air toxics using technology-based standards. It also established the first comprehensive national permitting program. There are currently 189 substances that EPA has classified as air toxics, which means they adversely affect human health or the environment. Air toxics can cause cancer or other chronic disease. They can affect virtually every system of the body, from the respiratory and cardiovascular systems to immunological and reproductive systems.

The new regulations set emissions limits on individual industrial facilities, processes or pieces of equipment, rather than ambient air quality standards. The absence of health-based ambient air quality standards is a major shortcoming, however, because technology-based standards do not necessarily correlate to levels of air toxics in the air we breathe. For example, in a heavily industrialized area such as east Harris County, numerous sources of air toxics exist close to one another, leading to a cumulative effect from multiple sources. Regulations that may be sufficient to protect the public from one source are not sufficient to protect us from multiple sources.

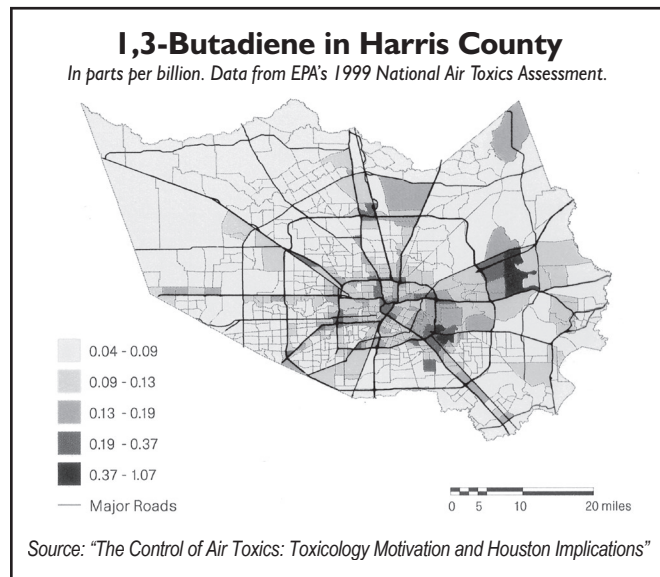
States can set ambient air standards for toxics. Texas has chosen not to do so, though it has established ambient air guidelines, known as Effects Screening Levels (ESLs), that are used in its permitting process. However, these guidelines are not regulatory controls, and are not enforceable. In fact, a facility that exceeds the ESLs can still be issued a permit. Moreover, many of our industrial facilities have been in existence for decades, and were never subjected to review relative to air toxics, or to compliance with the ESLs.

Several recent studies have focused attention on Houston's problems with air toxics. A recent report published by Rice University and funded by the Houston Endowment brought together many prominent local scientists to evaluate the human health risk posed by four common air toxics – benzene, butadiene, formaldehyde and diesel particulate matter – in Houston.

The Rice report recommends that the state adopt enforceable ambient air quality standards for these four air toxics. The authors suggest that interim standards be implemented first, to be followed by tighter standards that would meet the goal set forth in the CAA – which states that air pollution should not increase a person's risk of developing cancer by more than one in a million.

As proposed in the Rice study, ambient air quality standards would differ from ESLs in several respects. First, they would be enforceable regulations rather than guidance. Second, if the ambient standard in a particular area is frequently exceeded, the state would be required to develop a plan to attain and maintain that standard.

In this manner, existing sources contributing to the air toxics problem would be subject to regulation even if they had initially been permitted decades ago. Additionally, new sources of air toxics would be evaluated for compliance with these standards, and would be regulated to ensure that the standards are not violated, something that is not required under the ESL guidelines.



IV. Institutional Issues

From the inception of air pollution control in Texas, the state air quality agency and the EPA have been in charge, particularly with regard to policy issues. The City of Houston, and Harris and Galveston Counties, all have pollution control programs, but they have historically been limited to enforcement of state regulations and local nuisance ordinances.

Harris County historically has been a strong enforcement entity. Walter Quebedoux was a legend in the 1970s for his willingness to use nuisance laws to pursue industrial offenders, and today the County Attorney's office is quite adept at civil prosecution. However, the county has never attempted to regulate beyond the policy boundaries established by EPA and state regulators.

The City of Houston is a bit different. For years, the Bureau of Air Quality Control has undertaken an enforcement role under contract with the state. Under that agreement, the City received money from the state to undertake various tasks, such as inspecting plants and gas pumps. In exchange,

the City of Houston agreed not to undertake any enforcement actions without state approval. When Bill White was elected as Houston's mayor, he attempted to renegotiate this contract to have freedom of enforcement. Denied by the TCEQ, the City severed the contract. As a result of this severance, Mayor White has been able to negotiate an excellent enforcement agreement against Texas Petrochemicals – a major source of butadiene in east Houston.

Even earlier, though, the City was interested in policy issues. The Sonoma Study, published in 1999, considered the health benefits of air pollution control. It found that significant health benefits would result from controlling ozone and PM_{2.5} pollution, with quantified savings of more than \$6 billion per year. This study was a breakthrough effort by the City of Houston to attempt to have a voice in future of air pollution control.

In 2005, Mayor White assembled a task force to review and evaluate data on air toxics in Houston. In its 2006 report, the task force identified 12 air toxics as posing a "definite risk" to human health in the Houston area. Mayor White has expressed a commitment to protecting the population from air toxics and frustration at the lack of regulatory controls on air toxics at the state level. He has also joined a coalition of cities fighting the fast-track permitting of 13 new coal-fired power plants that will add to the air pollution problems of major cities in Texas.

The Houston-Galveston Area Council (HGAC) is the regional planning organization for the Houston-Galveston region. HGAC plays a major role in transportation planning and a facilitating role in air quality planning. HGAC prepares the Transportation Implementation Plan (TIP) required for federal funding of road projects, and the documentation leading to a determination of whether or not the TIP is in conformity with the region's ozone control plan (transportation conformity).

In developing the eight-hour ozone SIP, the TCEQ works with HGAC. Specifically, HGAC assembles the details on controls deemed suitable for the Houston-Galveston-Brazoria non-attainment area. These controls are then submitted to the state for modeling to determine whether implementation of these controls will be sufficient for the area to achieve attainment of the federal ozone standard.

There is no city or regional authority with power to comprehensively address the air quality issues in the Houston Galveston region. This situation can be contrasted with the situation in California, which has created the South Coast Air Quality District to comprehensively address and control the air quality problems in Los Angeles and southern California. The improvement in air quality in the South Coast Basin has been dramatic.

From an institutional standpoint, the Houston and Galveston medical complexes are worthy of special note. Although our region has world-class medical facilities, they have not been involved until recently in research or public discussion regarding air quality in the region. There is very little health-based research published on the health impacts of air pollution in the Houston area. Perhaps no region of the United States is more worthy of study, yet is less studied, than we are.

The air quality committee of the Greater Houston Partnership has historically been more concerned with short-term economic growth and federal funding for new roads than it has been about public health. The BCCA appeals group that litigated against the 90% NOX controls was formed by the executive committee of the Partnership. Today, however, the Partnership is facing a serious dilemma as quality of life becomes a more important variable for business and employee recruitment. For this region to compete in the global marketplace, issues such as air pollution and its health impacts are becoming more important.

Finally, consider the TCEQ. Although there are excellent, well-intentioned people in the agency, the Texas Legislature has ensured that regulators first protect industry and short-term economic goals, and then worry about public health. While that may have been a recipe for economic success in the past, it is not in the state's long-term economic interest. Many states are now adopting California automobile emission standards to expedite the next generation of emissions controls on cars and trucks. California has adopted its own ambient air quality standards that are more stringent than the national standards. It and many states are adopting enforceable standards on air toxics. Many states are now acting on the belief that quality of life and protection of the health of its residents will generate more jobs and ensure economic development.

V. The Vision for Houston

To date, residents of the Houston-Galveston region do not breathe the clean air promised by the federal and state governments. Recently, the City of Houston has made great strides in attempting to regulate individual sources and fighting for a more effective ozone SIP. However, more is needed. The following steps will lead to cleaner air and a higher quality of life for Houston area communities, which are key to economic development in the Houston Galveston region. Clean air is inextricably linked to health of our residents and the health of our economy. They work together, rather than against one another.

1. The Texas Legislature should require the TCEQ:
 - a. to immediately adopt ambient air quality standards for the four air toxics studied in the Rice University report; and
 - b. to develop and adopt within one year ambient air quality standards for the additional eight air toxics identified in the City of Houston's air toxic study.

These ambient standards should be set at a 1 in 100,000 risk level on an interim basis, and then should revert to a 1 in 1,000,000 risk level once compliance has been obtained with the interim standard.

2. PM_{2.5} control must become a priority. The state should conduct as soon as possible a rapid assessment of the current status of Houston's air with respect to the federal standards, one of which has recently been lowered. To the extent possible, controls should be put in place immediately to address the hot spots for non-attainment. Local, state and federal officials should reconsider authorization of projects such as the Bayport Container Port, which is to be conducted in phases. Determination of the optimum size of such facilities should take into account the likely level of PM_{2.5} that will be generated from the project. Areas that are to be constructed in phases that are likely to exceed this standard such as the Bayport Container Port should be reconsidered by local, state and federal officials to determine the optimum size taking PM_{2.5} generation into account.

3. The state should make it clear that it will not seek to extend the deadline for attainment of the eight-hour ozone standard beyond 2010. The state must reverse its 37-year-old approach of simply seeking extension of the deadline for attainment. Enough is enough. The role of on-road transportation must be realistically evaluated. We are being told that it is impossible to regulate much of the on-road component due to preemption at the federal level. Instead, our approach seems to be to wait for the federal government to control automobile and truck emissions. The State of Texas could adopt the California automobile standards, a move that would accelerate emission controls and gas efficiency, thereby reducing on-road mobile NO_x emissions more quickly.
4. All measures that have previously been approved to attain the one-hour ozone standard should be implemented without exception, including the requirement for a 90% reduction in NO_x. The state should continue to pursue compliance with the one-hour standard in the HGB non-attainment area.
5. Mass transportation within the developed metropolitan area is absolutely necessary for the long-term air quality future of the Houston area. We should pursue funding for commuter rail, light rail and other forms of mass transit throughout the metropolitan area.
6. Enforcement against violations of air quality regulations and permits is essential. Upset emissions contribute to ozone events and localized air toxics issues. With our large industrial base, we can't afford non-compliance. State and local governments should prosecute violations vigorously to discourage upsets and other unauthorized emissions.
7. Air pollution is a complex nut to crack, but regulators make it much more difficult by limiting, and in some cases denying, public access to critical information and the regulatory process. We have repeatedly found that simply bringing public attention to an issue prompts action by industry, even before new regulations are on the books. GHASP must:
 - a. demand timely public access to the information necessary for the public to hold regulators accountable for holding industry accountable;
 - b. train students, volunteer professionals, community activists and others to use the information in advocating for clean air; and
 - c. develop the information resource infrastructure necessary to track regulatory information, and hold regulators and industry accountable in a timely manner.
8. The stated purpose of some in the TCEQ's air permits division is issuing permits, not protecting public health. Over the years, the agency has simply created more permitting short cuts to avoid the difficult modeling analysis necessary to fully understand the health impacts of proposed facilities. The state's permitting requirements and procedures must be brought up to federal standards.

¹ 499 F. 2d 1897 (5th Cir. 1974).

² Plaintiffs exhibit 8, BCCA Appeal Group v. TNRCC, Cause No. GN100210, Travis County District Court, 2001).

³ http://www.utexas.edu/research/ceer/texaqsarchive/pdfs/EXEC_SUMMARY_Nov_02.pdf



The Galveston-Houston Association for Smog Prevention (GHASP) works to persuade government and corporate officials to prevent smog. GHASP seeks to accomplish its mission by being the most credible advocate for clean air in the Houston region; by supporting efforts to educate the public; and by directly engaging government officials, community leaders, the media and industry on regional air pollution issues.

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