

**The Importance Of Maintaining A Proper State Implementation Plan (SIP)
To Address Air Quality Issues In Texas:
An Economic And Fiscal Impact Assessment**

Prepared for

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November 21, 2002

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A Synopsis of Current Conditions

Over the past several years, Texas has experienced significant economic and population expansion, much of which was fueled by favorable cost advantages, natural resources, attractive climate, high-quality educational facilities, effective transportation infrastructure, and a generally favorable tax environment.

While there have been many positive elements associated with the state's expanding economy, there have also been several notable challenges in striving to balance the benefits of growth with the pressures that increasing activity creates. One of the most significant of these challenges is protecting the environment, particularly with regard to air quality.

Air pollution in many parts of the Lone Star State, as well as across much of the nation, is a very serious problem. Most of this pollution results from daily business routines and activities, such as higher factory output, increased construction, and greater traffic congestion.

During the 1990s, a period of substantial economic growth in Texas, environmental standards became more stringent as part of the 1990 Clean Air Act Amendments. Specific attention was given to the operation of vehicles and industrial equipment, considered to be major sources of two types of pollutants—nitrogen oxides and volatile organic compounds. These pollutants combine in hot, stagnant air to form ground-level ozone. High levels of this ozone can cause coughing, wheezing, headaches, shortness of breath, and throat and lung irritation. These health conditions result in increased medical expenses and losses in productivity and efficiency throughout the economy.

The Federal Clean Air Act as amended in 1990 is the legal foundation for the national air pollution control program. Authority to enforce the provisions of the Act is granted to the Environmental Protection Agency (EPA). This Act requires that each state develop and regularly update a State Implementation Plan (SIP) that denotes measures being taken to maintain proper air quality standards. The EPA has the authority to approve or reject SIPs, replace SIPs with Federal Implementation Plans (FIPs) when deemed necessary, and to monitor the achievement of goals

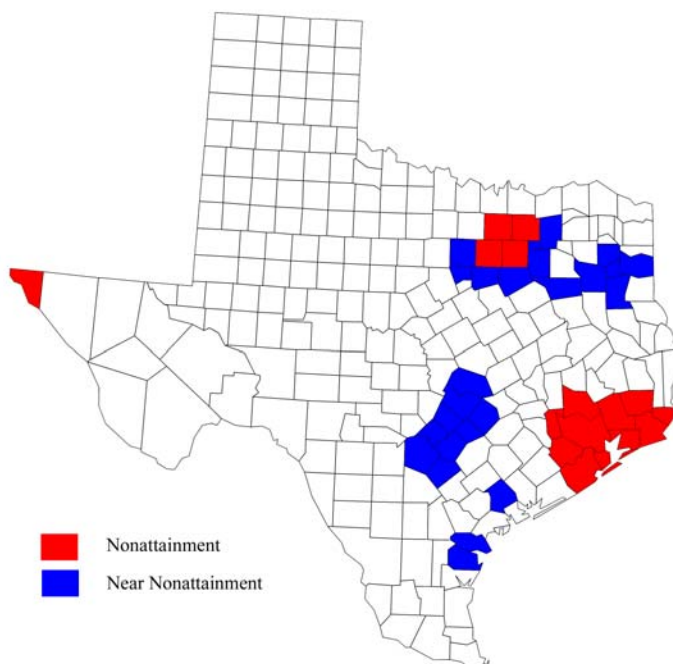


outlined in SIPs and FIPs. The EPA also imposes mandated penalties for areas that are not in compliance following a transition period. These sanctions include (1) limiting new facility development by requiring corresponding reductions in emissions from other sources at greater than a one-to-one ratio (which has the practical effect of virtually eliminating such growth) and (2) withholding federal highway funds from the affected areas.

Texas has been found by the EPA to be in violation of air quality standards in the metropolitan areas of El Paso (levels of ozone, carbon monoxide, and particular matter too high), and Houston/Galveston/Brazoria, Dallas/Fort Worth, and Beaumont/Port Arthur (ozone levels too high). These areas have been above mandated ozone levels for years, and face mandatory sanctions by the EPA unless clean air standards are met in the next four years.

In addition to these nonattainment areas, six additional urban regions—Corpus Christi, Victoria, Austin-San Marcos, San Antonio, Tyler, and Longview-Marshall—are characterized as “near nonattainment” areas. Because these regions could also be in jeopardy if their ozone levels are not reduced appropriately, they are incorporated within the present analysis.

The counties included in these areas are: Bastrop, Bexar, Brazoria, Caldwell, Chambers, Collin, Comal, Dallas, Denton, El Paso, Ellis, Fort Bend, Galveston, Gregg, Guadalupe, Hardin, Harris, Harrison, Hays, Henderson, Hood, Hunt, Jefferson, Johnson, Kaufman, Liberty, Montgomery, Nueces, Orange, Parker, Rockwall, Rusk, San Patricio, Smith, Tarrant, Travis, Upshur, Victoria, Waller, Williamson, and Wilson.



Nonattainment and Near Nonattainment Areas in Texas

Although they represent only a small portion of the vast landmass of Texas, they represent more than 70.0% of the state's population, 76.4% of aggregate employment, 83.4% of personal income, and 83.0% of gross state product. Nearly 85.0% of manufacturing activity in Texas is located in these counties. In addition, because of the integrated nature of the Texas economy and the dependence of rural and suburban areas on spin-off activity from the larger metropolitan areas, all parts of the state are affected by what occurs in these regions.

A major component of the Texas SIP is the Texas Emissions Reduction Plan (TERP). The plan was established by the 77th Texas Legislature through enactment of Senate Bill (SB) 5 and incorporates a variety of voluntary financial incentive programs, as well as other programs designed to assist in the improvement of air quality across the state. The overarching goal of the TERP as established in SB5 is to assure that the air in the state is safe to breathe and meets minimum standards under the Federal Clean Air Act. The TERP is also charged with funding research and developing multifaceted approaches to solving the state's environmental problems, while making Texas a leader in emerging technologies by creating new business and industry opportunities.

The TERP contains several financial incentive and assistance programs, administered by various state agencies, to address these goals. Included are the emissions reduction incentive grants

program, the heavy-duty motor vehicle purchase or lease incentive program, and the light-duty motor vehicle purchase or lease incentive program. The TERP also has a technology research and development program and several energy efficiency programs.

A major component of the TERP is the grant program to replace and retrofit diesel engines with unacceptable levels of emissions. Funding for this program was authorized by the Legislature at the end of the last session through a significant increase in fees on cars imported into the state (from \$1.00 to \$225 per vehicle). This fee increase was subsequently struck down by a court challenge, thus leaving a key element of the state compliance plan without a source of financing. The EPA has indicated that the Texas SIP will be deemed non-compliant unless TERP funding is restored. Estimates indicate \$188 million will be required each year of the biennium for the program to be fully funded. If the funds are not made available and the SIP is declared non-compliant, then the state is potentially subject to severe sanctions.

Empirical Analysis: Scope and Methodology

Because of the obvious significance of this situation and its potential consequences for all Texans, The Perryman Group (TPG), an economic analysis and research firm based in Texas, has been asked by the Texas Clean Air Working Group to evaluate the economic and fiscal consequences of non-compliance with the Clean Air Act Amendments. This analysis utilizes both the Texas Econometric Model and the Texas Multi-Regional Impact Assessment System, both of which were developed and are maintained by TPG. These models have been used in hundreds of applications over the past two decades, including numerous environmental and public policy initiatives, and have an excellent reputation for reliability.

The Texas Econometric Model is used to generate baseline forecasts of key economic variables impacted by the potential sanctions. These projections provide a benchmark to assess the consequences of non-compliance. The model is a large-scale forecasting system which revolves around the simultaneous determination of detailed, multi-regional projections for output, income, and employment. It also contains numerous additional expressions reflecting a broad spectrum of business activity and is fully integrated with several other large-scale models, including those used within the current study.

The Texas Multi-Regional Impact Assessment System evaluates the direct, indirect, and induced effects of changes in more than 500 industrial sectors on overall business activity. It has the capacity to provide detailed sectoral assessments of expenditures, output, income, employment, and numerous other economic aggregates. It is also linked interactively to several other systems,

including the Texas Econometric Model, a transportation mobility model, and a comprehensive fiscal impact system, all of which are incorporated into the current analysis.

The empirical elements of this study focus on multiple issues. Initially, the interrelationship between the affected areas and the remainder of the state is explored. This process involves examining the economic impact of current activity in the sectors and regions affected by the Clean Air Act Amendments to examine the “spillover” effects to other parts of the state. Two scenarios are used in this analysis. The first examines only the sectors for which air quality is a direct factor. These industries include oil and gas extraction, electric power generation, and several categories of manufacturing (petroleum refining; chemicals; rubber and plastics; stone, clay, and glass; and primary metals). The second incorporates the entire manufacturing sector. The rationale for this latter approach is simply that all types of goods production can be hindered by inadequate air quality. This fact is widely chronicled, particularly with regard to high-tech, high-growth industries (electronics, communications equipment, computers, etc.). In fact, adequate environmental standards are frequently a prerequisite for site selections in these industries.

The next phase of the investigation focuses specifically on the consequences to Texas of non-compliance. The adverse impacts stem from three sources. First, the economic aspects of ongoing health consequences are evaluated. This process makes use of recent EPA estimates of annual health-related costs, with allocations to Texas based on relative concentration of affected areas. The proper industry allocations for the impact assessment are derived based on a standard distribution of productivity effects across industries. Two scenarios were simulated based on the upper and lower bounds of the EPA analysis. This cost is a recurring annual loss to the state.

The second factor is the impact of sanctions limiting future expansion in the relevant set of industries. Two scenarios were considered, one reflecting only those manufacturing categories with direct consequences (as outlined above), and one including the entire manufacturing sector (both scenarios encompass oil and gas extraction and electric power generation). It is assumed in both instances that significant non-compliance would impact growth potential over a ten-year period, with baseline projections for the relevant geographic areas used as a benchmark for establishing the magnitude of the impacts.

The third factor relates to the effects of a sanction on the availability of federal highway funds in the affected areas. Historical levels of funding and allocations to the relevant regions were used to estimate the level of infrastructure funding at stake. The computations reveal that over \$1.1



billion per year could potentially be lost. For purposes of the current assessment, it was assumed that 80.0% of the amount would be foregone for a five-year period. The modeling process evaluates both (1) the temporary losses from engineering and construction activity associated with highway development and (2) the unrealized benefits of enhanced mobility once projects were completed (assuming a three-year construction cycle).

As a part of this evaluation, the fiscal effects of the various losses on State revenues are estimated and reported. Additionally, a ten-year synopsis is prepared to permit an overall benefit-cost assessment of the restoration of State funding for the TERP. It is assumed that the sanctions would only be imposed beyond this period for mandated compliance. All monetary values throughout the analysis are given in 2002 dollars to eliminate any effects of inflation, and the final cost-benefit analysis discounts future lost revenues to present value based on the approximate long-term borrowing rate of the State. The results of this analysis are presently offered.

The Importance of Compliance to the Entire State: Synopsis of Key Results

As noted earlier, the nonattainment and near nonattainment areas clearly dominate the business complex of the state. With regard to the industries most directly impacted by clean air standards, these regions currently produce 84.3% of the state's output and have experienced about 95.1% of the aggregate gains since 1990. These numbers change only modestly (to 83.8% and 89.6%, respectively) if the entire manufacturing complex is considered.

Because of the integrated nature of the state economy, the other segments of Texas are highly dependent on these dynamic regions. As an illustration, the total current economic impact of the **directly affected industries** in the nonattainment areas on the Texas economy is estimated to be

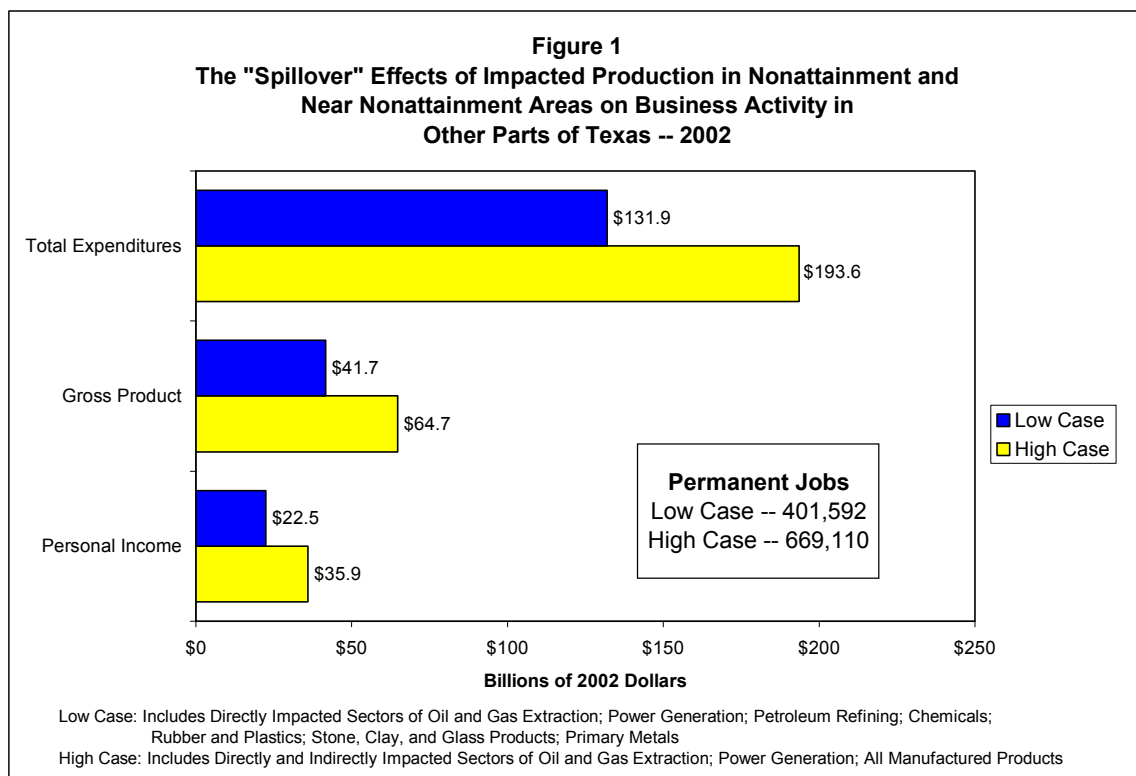
- ✓ \$826.6 billion in Total Expenditures;
- ✓ \$286.2 billion in Gross Product;
- ✓ \$160.5 billion in Personal Income; and
- ✓ 3,406,676 Permanent Jobs.

While the direct effects occur within the production areas, approximately 27.8% of the indirect and induced benefits accrue to other parts of the state. These benefits to external areas of Texas include



- ✓ \$131.9 billion in Total Expenditures;
- ✓ \$41.7 billion in Gross Product;
- ✓ \$22.5 billion in Personal Income; and
- ✓ 401,592 Permanent Jobs.

These amounts represent 30.7% of output in these areas, 26.1% of personal income, and 17.0% of employment. If the individuals who live outside the nonattainment areas but work in related activity within the nonattainment areas are included, the employment total rises to 20.7%. Note also that the compensation associated with these jobs is more than 50.0% higher than the average for these outlying areas, and that the degree of dependence has been increasing markedly over time.



When the analysis is extended to incorporate the **entire manufacturing** arena, the results are even more significant. Under this scenario, the overall benefits to Texas from production in nonattainment and near nonattainment areas are

- ✓ \$1,241.7 billion in Total Expenditures;
- ✓ \$472.2 billion in Gross Product;
- ✓ \$276.1 billion in Personal Income; and

- ✓ 6,175,726 Permanent Jobs.

The corresponding spillover effects are

- ✓ \$193.6 billion in Total Expenditures;
- ✓ \$64.7 billion in Gross Product;
- ✓ \$35.9 billion in Personal Income; and
- ✓ 669,110 Permanent Jobs.

In this instance, the benefits outside the nonattainment areas include 47.5% of output, 41.6% of income, and 28.3% of employment (38.0% if commuting residents are added). Thus, it is obvious that any sanctions which adversely impact the regions with compliance issues will have notable consequences for the remainder of the state.

As a final note, the view has been expressed at times that limitations on the largest urban areas in Texas might well provide opportunities for other areas to capture the resulting activity. This contention is not consistent with the realities of economic development and progress. First, as noted above, the major metropolitan areas are critical drivers of performance in other parts of the state. Moreover, these diverse regions possess a number of competitive resources which are simply not available in sufficient quantities in smaller population centers.

Among them are workforce availability, multi-modal transportation access, supplier and customer networks, amenities, international carriers, and other factors that enable them to compete effectively for new and expanded facilities on a national and global scale. If locations of industrial plants were restricted in these areas because of failure to meet clean air standards, it is likely there would be little expansion of plants in other parts of the state. Instead, site selections would probably occur in urban centers of other states that offer the requisite set of resources.

Infrastructure findings are comparable. Construction on large-scale mobility projects is concentrated in these urban areas. Should major infrastructure initiatives in these areas suffer because of failure to comply with environmental standards, funds for these entities would probably not be distributed to other segments in the Lone Star State. Instead, because federal dollars are usually allocated based on traffic counts, corridor locations, linkages, and similar criteria, the money would likely go to high-traffic regions elsewhere in the US. In summary, all of Texas has a significant interest in achieving compliance with Clean Air Act standards.

The Economic and Fiscal Impact of Potential Non-Compliance:



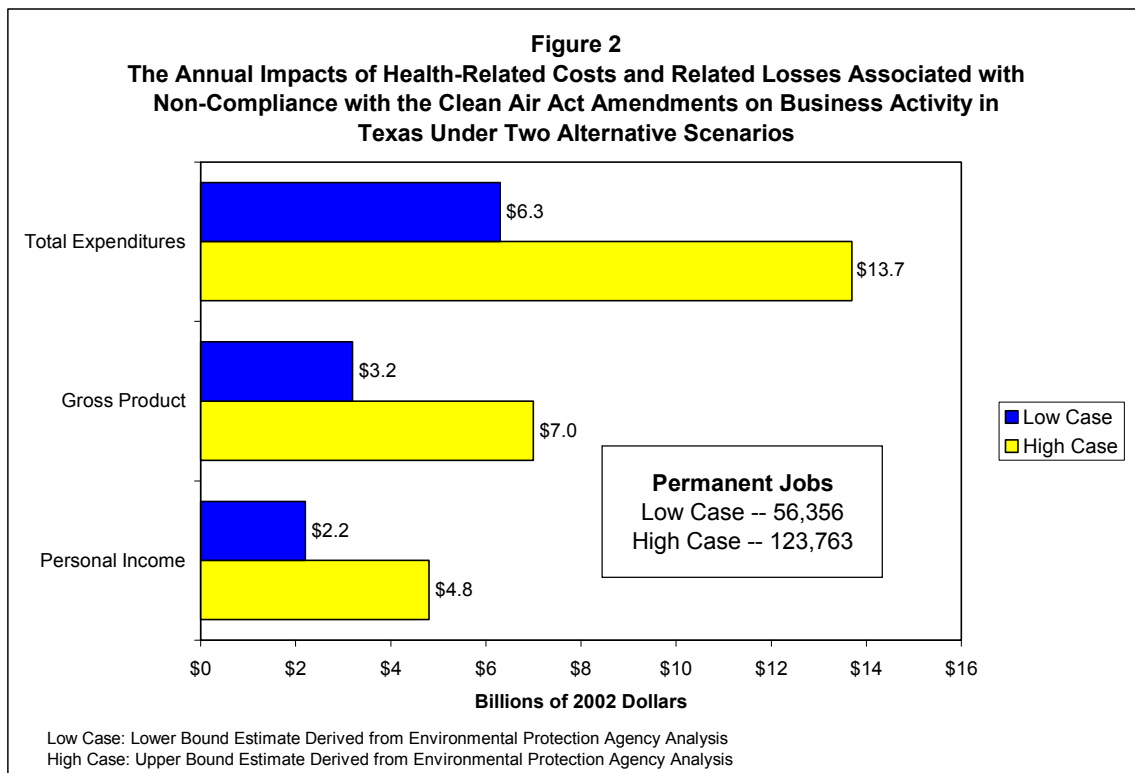
Synopsis of Key Results

As noted earlier, the results of non-compliance occur in numerous settings, several of which are examined at this point.

Health Effects

The aggregate losses to Texas in terms of medical expenses, lost time and productivity, and other health-related factors are estimated in the “low case” scenario to be

- ✓ \$6.3 billion in Total Expenditures;
- ✓ \$3.2 billion in Gross Product;
- ✓ \$2.2 billion in Personal Income;
- ✓ 56,356 Permanent Jobs; and
- ✓ \$157.4 million in State Fiscal Revenue.



Under the “high case” scenario, these effects increase to

- ✓ \$13.7 billion in Total Expenditures;

- ✓ \$7.0 billion in Gross Product;
- ✓ \$4.8 billion in Personal Income;
- ✓ 123,763 Permanent Jobs; and
- ✓ \$345.7 million in State Fiscal Revenue.

Note that these are annual estimates and, thus, persist over an extended period of time.

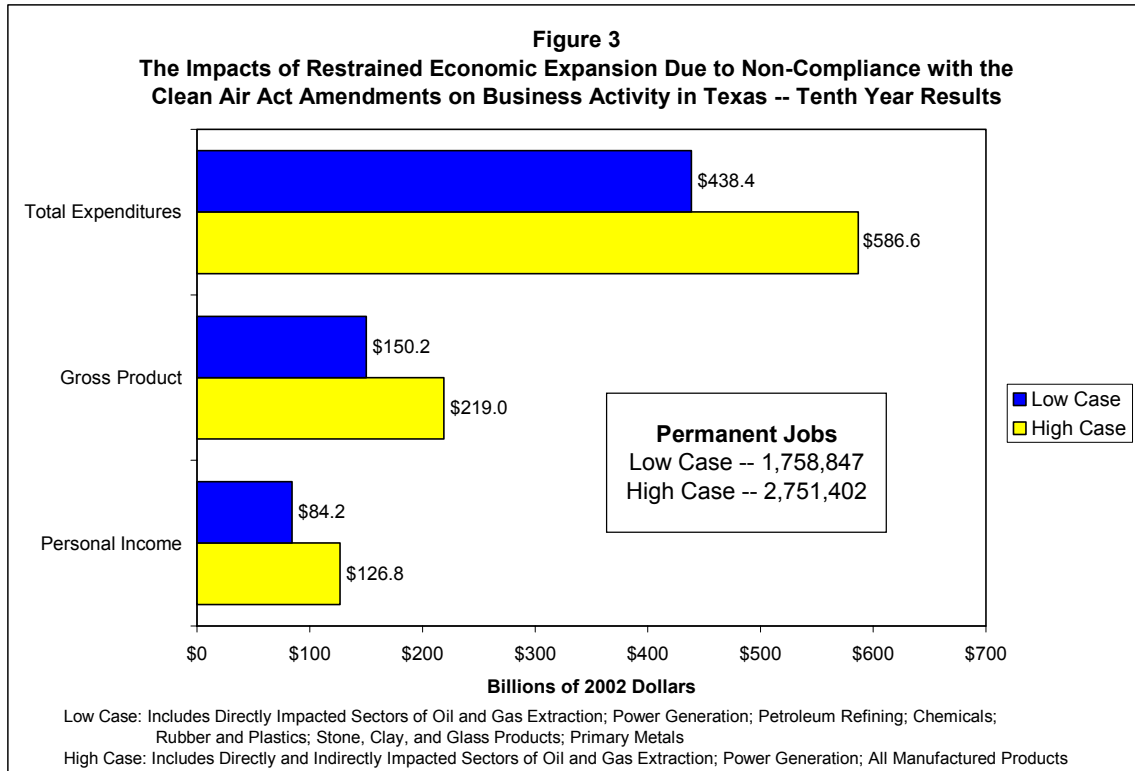
Expansion Restrictions

Assuming that the restrictions on expansion occur over a ten-year period and are confined to the directly affected sectors, the losses to the state economy in the final year of the analysis will be

- ✓ \$438.4 billion in Total Expenditures;
- ✓ \$150.2 billion in Gross Product;
- ✓ \$84.2 billion in Personal Income;
- ✓ 1,758,847 Permanent Jobs; and
- ✓ \$7.2 billion in State Fiscal Revenue.

If this sanction has a corresponding effect on the ability to attract other types of manufacturing (which seems likely), these adverse impacts will, by the tenth year, increase to

- ✓ \$586.6 billion in Total Expenditures;
- ✓ \$219.0 billion in Gross Product;
- ✓ \$126.8 billion in Personal Income;
- ✓ 2,751,402 Permanent Jobs; and
- ✓ \$10.6 billion in State Fiscal Revenue.



Obviously, the consequences of severe limitations on new expansion in key export sectors have a devastating effect on the aggregate economy.

Lost Highway Funds

The loss of a substantial portion of federal highway funds for a single year in the relevant areas brings losses during the construction period of

- ✓ \$3.6 billion in Total Expenditures;
- ✓ \$1.7 billion in Gross Product;
- ✓ \$1.1 billion in Personal Income;
- ✓ 27,122 Person-Years of Employment; and
- ✓ \$88.6 million in State Fiscal Revenue.

Once the construction process is completed, the improved mobility brings benefits across a wide variety of sectors on an ongoing basis. This yearly gain which would be foregone is estimated to be

- ✓ \$464.3 million in Total Expenditures;

- ✓ \$238.3 million in Gross Product;
- ✓ \$145.0 million in Personal Income;
- ✓ 4,830 Permanent Jobs; and
- ✓ \$13.1 million in State Fiscal Revenue.

Texas is currently able to meet only about 36.0% of its mobility needs each year, and congestion is on a significantly increasing trend in major metropolitan regions. This deficiency causes extensive losses in overall productivity, and the higher traffic concentrations hinder efforts to achieve acceptable air quality standards. The loss of substantial highway funds would only serve to make matters worse.

Benefit-Cost Analysis

In order to gain an overall perspective on the importance of achieving the requisite emission standards, TPG created two ten-year simulations of the consequences and costs associated with non-compliance. In the “low case” estimates, it is assumed that the lower bound in annual health losses is achieved and that there are no adverse economic development effects beyond the most directly affected sectors. The results of this analysis are presented in Table 1.

Table 1
Ten-Year Simulation of the Aggregate Losses Associated with Non-Compliance with the Clean Air Act Amendments on Business Activity and State Fiscal Revenues in Texas Under a "Low Case" Scenario

Year	Total Expenditures	Gross State Product	Personal Income	Employment	State Revenues	NPV State Revenues
1	\$53.742	\$19.892	\$11.744	259,606	\$0.967	\$0.706
2	\$97.951	\$35.040	\$20.233	436,971	\$1.693	\$1.189
3	\$144.616	\$51.110	\$29.250	627,162	\$2.465	\$1.665
4	\$182.436	\$64.148	\$36.568	781,861	\$3.091	\$2.008
5	\$222.234	\$77.865	\$44.266	944,501	\$3.750	\$2.342
6	\$262.602	\$91.336	\$51.634	1,096,684	\$4.389	\$2.636
7	\$307.633	\$106.845	\$60.337	1,280,315	\$5.134	\$2.965
8	\$344.359	\$119.429	\$67.389	1,427,660	\$5.737	\$3.185
9	\$392.648	\$135.976	\$76.662	1,621,397	\$6.530	\$3.486
10	\$446.975	\$154.592	\$87.094	1,839,355	\$7.422	\$3.810
Cumulative Net Present Value (NPV) of State Revenue Losses						\$23.993

* Includes (1) Foregone Highway Construction and Associated Benefits, (2) Lower Bound Health Losses, and (3) Directly Affected Production Categories.

Monetary values are in Billions of 2002 dollars.

Source: Texas Multi-Regional Impact Assessment System, The Perryman Group

Note that, on a present discounted value basis, the cumulative losses in State revenue (which would also continue beyond that point) total approximately \$24.0 billion. When compared with the incremental outlays required for the TERP incentives, the benefit-cost ratio is 63.8-to-1.

In the "high case" scenario, the upper bound of health losses is assumed, as well as economic development consequences which span the entire manufacturing sector. The ten-year findings under these conditions are exhibited in Table 2.

Table 2
Ten-Year Simulation of the Aggregate Losses Associated with Non-Compliance with the Clean Air Act Amendments on Business Activity and State Fiscal Revenues in Texas Under a "High Case" Scenario

Year	Total Expenditures	Gross State Product	Personal Income	Employment	State Revenues	NPV State Revenues
1	\$76.173	\$30.582	\$18.630	426,405	\$1.492	\$1.090
2	\$135.433	\$52.665	\$31.418	703,862	\$2.557	\$1.797
3	\$197.828	\$75.983	\$44.928	998,656	\$3.683	\$2.488
4	\$248.365	\$94.881	\$55.878	1,237,929	\$4.597	\$2.986
5	\$301.554	\$114.768	\$67.402	1,489,624	\$5.557	\$3.471
6	\$356.728	\$135.061	\$78.999	1,740,266	\$6.530	\$3.922
7	\$416.932	\$157.561	\$92.036	2,024,799	\$7.617	\$4.398
8	\$466.161	\$175.907	\$102.660	2,255,293	\$8.501	\$4.721
9	\$530.890	\$200.029	\$116.628	2,558,360	\$9.665	\$5.160
10	\$603.712	\$227.167	\$132.343	2,899,318	\$10.974	\$5.634
Cumulative Net Present Value (NPV) of State Revenue Losses						\$35.667

* Includes (1) Foregone Highway Construction and Associated Benefits, (2) Upper Bound Health Losses, and (3) Directly and Indirectly Affected Production Categories.

Monetary values are in Billions of 2002 dollars.

Source: Texas Multi-Regional Impact Assessment System, The Perryman Group

In this instance, the net present value of fiscal losses to the State increases to \$35.7 billion and the benefit-cost ratio becomes 94.9-to-1. Furthermore, the economic dislocations seriously undermine the long-term stability and prosperity of Texas.

Synopsis

This study has examined in detail the potential setbacks to the Texas economy associated with failure to comply with the 1990 Clean Air Act Amendments. While the full brunt of the potential sanctions might be avoided, the risk is simply too great. The health of Texans, the quality of life, future business and export expansions, and improving mobility are all critically tied to meeting appropriate standards. Moreover, the potential losses permeate every sector and geographic area of Texas. The benefit-cost ratios effectively illustrate the need to achieve acceptable emission levels, and the negative economic development implications of poor air quality in an increasingly technological environment are indeed profound.

In summary, the findings from this study are a “no brainer.” Texas must comply with the Clean Air Act Amendments as a prerequisite to sustainable prosperity.

Respectfully submitted,

A handwritten signature in black ink that reads "M. Ray Perryman". The signature is written in a cursive, flowing style.

The Perryman Group

M. Ray Perryman, PhD, President