APPENDIX C

Creditable Reductions for Beaumont/Port Arthur and Houston/Galveston

NATIONAL RULES

1. ARCHITECTURAL COATINGS

The reductions associated with the architectural coatings category were based upon an EPA memo which projected a 25% reduction for the future federal rule. When quantified for the 15% SIP, these reductions were applied to the area source categories of "Architectural Coating" and "Traffic Markings".

For the 9% SIP, further research has determined that two additional area source categories will be covered by the Architectural rule. These categories are "High performance Coatings" and "Other Special Purpose Coatings" and the full 25% reduction will be applied to these two additional source categories.

2. HAZARDOUS ORGANIC NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS (HON)

The majority of the reductions associated with the HON were quantified as a part of the state's Fugitive Monitoring and Industrial Wastewater rules. There was a portion of the fugitive provisions in the HON which go beyond the state's fugitive monitoring rule for Synthetic Organic Chemical Manufacturing Industries (SOCMI). The additional sources include Styrene Butadiene Rubber production, Polybutadiene

production, Chlorine production, Pesticide production, Chlorinated Hydrocarbon use, Pharmaceutical production and Miscellaneous butadiene use. A search of the emissions category #5, Chemical Manufacturing - Fugitive Leaks revealed the SIC codes 2812 and 2822 were the only SIC codes not credited for under the Fugitive provisions for SOCMI which would be subjected to the HON.

3. AIRCRAFT ENGINE EMISSIONS REDUCTIONS

Fleet conversion for commercial aircraft engines due to the Airport Noise and Capacity Act of 1990 (ANCA) reduces VOC emissions in addition to noise. The rule is a Federal Aviation Administration (FAA) requirement. The source of emissions is commercial aircraft engines which are reported in the Non-Road Mobile Source inventory. The estimated reduction is 40%.

On January 1, 2000, all aircraft with Stage II engines, approximately 2,000 aircraft from the 1990 U.S. fleet, will be prevented from operating at most airports worldwide. This prohibition is a result of the ANCA which was passed to reduce noise disturbance from jet aircraft. Stage III engines are quieter and generally, although not exclusively, are newer and emit smaller amounts of pollutants. This regulation will result in the early retirement of older, generally high emission aircraft, which will be replaced by newer aircraft that have improved environmental performance. These regulations have

already had an effect, and as more planes are forced from the fleet, the effect will grow, peaking in the year 2000 when presumably all Stage II aircraft will be removed. The Air Transport Association has estimated that the effect of these changes will exceed a 40% reduction in hydrocarbon (VOC) emissions that year.

The TNRCC estimated commercial aircraft emissions for 1990 by using the FAA landing and take-off (LTO) records for each commercial airport. These records also specify aircraft configuration. The LTO data was input into the FAA Aircraft Engine Emissions Database (FAEED) to give total aircraft emissions for each airport. The FAEED also includes the aircraft time-in-modes, fuel flow rates, number of engines, and emissions indices for each of the five modes of operation for each aircraft configuration. The five modes include taxi/idle-out, takeoff, climbout, approach, and taxi/idle-in. The FAEED also gives default times for each of the five modes.

Houston/Galveston Area Council (HGAC) is collecting information from each commercial carrier in the Houston/Galveston (H/GA) nonattainment area to determine the aircraft fleet mix by the end of 1999. Then, by adding the air carrier flight schedule information, and inputting the data into the FAEED model, HGAC will produce a 1999 aircraft emissions inventory. HGAC will also adjust the time-in-mode values to reflect the actual data for each of the H/GA airports to produce a more accurate

aircraft emissions inventory. The difference between the 1990 inventory and the 1999 inventory is the emissions reduction due to the ANCA rule.

4. **Pulp and Paper MACT**

There are a number of federal efforts which will result in VOC emission reductions by 1999. One group of these are the federal Maximum Achievable Control Technology (MACT) standards. While many of these have yet to be proposed, and those that have been proposed are not finalized, the federally mandated schedule indicates that they will be proposed by 1999. Therefore, the TNRCC has evaluated a number of these MACT standards and determined a conservative estimate of the reductions the rule will achieve once promulgated. From a planning perspective this is more sensible than developing and imposing additional state rules which may duplicate the federal efforts.

One of the first MACT standards will apply to the Pulp and Paper industry. The following description was taken from the proposed Pulp & Paper MACT. Based upon this the TNRCC has assumed that the Pulp and Paper category will be required to reduce emissions by at least 90%. The emissions for this category were taken from Emissions Inventory Categories 64 and 65. A query was performed for SIC codes in these categories. In Houston there were four SIC codes reported (2436, 2621, 2952, and 3275). It was determined that SIC codes 2436 and 2621 would

be controlled by this rule. In Beaumont only SIC code 2621 was reported. At an August 23, 1994 meeting with representatives from the plants which would be affected in the Houston and Beaumont areas, it was determined that 60% of the 1990 base year inventory would be affected by the first phase of the MACT standard. The following description was taken from the preamble of the proposed MACT standard.

6. Standards for Pulping

An emission standard to reduce HAP emissions by at least 98 percent by weight based upon the use of combustion is proposed for the pulping component of this source category. Three equivalent ways to meet this standard are proposed. Sources subject to the proposed standard would comply with the regulation by enclosing open process equipment and routing all emissions through a closed vent system and either demonstrating 98 percent reduction of HAP emissions through a control device, or demonstrating compliance in one of the three following ways:

(1) Concentration limitation - Meet an incinerator outlet concentration of 20 ppmv of total HAP;

(2) Equipment and design standard - Route emissions to an incinerator designed and operated at a minimum temperature of 1600°F and a minimum residence time of 0.75 seconds;

(3) Equipment and design standard - Route emissions to a boiler, lime kiln, or recovery furnace which introduces all emission point gas streams with the primary fuel or into the flame zone.

All emission points within the pulping component, except those from equipment that follow primary washing, such as deckers and screens, are required to be controlled by the proposed standards, unless the mill can show one of the following conditions exists:

(1) The emission point from an enclosed process has a flow rate less than 0.0050 scmm;

(2) The emission point from an enclosed process has an emission rate less than 0.230 kg total HAP/hr;

(3) The emission point from an enclosed process has emissions less than 0.0010 kg total HAP/Mg air dry pulp (ADP) produced; or

(4) Process equipment has a total liquid phase concentration from all entering streams combined of less than 0.050 kg of total HAP/Mg of ADP produced.

7. Standards for Bleaching

Sources subject to the proposed standards would comply with the regulations by enclosing open process equipment and routing all emissions through a closed vent system and reducing total HAP mass in the vent stream entering the treatment device by 99 percent, based upon use of a scrubber.

All emission points within the bleaching component are required to be controlled by the proposed standards, unless the mill can show one of the following conditions exists:

(1) The emission point from an enclosed process has a flow rate less than 0.0050 scmm;

(2) The emission point from an enclosed process has an emission rate less than 0.230 kg total HAP/hr; or

(3) The emission point from an enclosed process has emissions less than 0.0010 kg total HAP/Mg ADP produced.

8. Standards for Process Wastewater

Under the proposed standards, bleaching process wastewater streams are not required to be controlled. Pulping process wastewater streams with total HAP concentrations greater than or equal to 500 ppmw and flow rates greater than or equal to 1.0 ℓpm are required to be controlled. The proposed wastewater treatment standard is 90 percent reduction of total HAP, based upon steam stripping. Other techniques such as biological treatment that achieve a 90 percent reduction may also be used.

5. TAFF Estimated Emission Reductions in the Houston/Galveston and Beaumont/Port Arthur Areas

The Texas Alternative Fuel Fleet (TAFF) program is to take affect beginning September 1, 1998 in the Houston/Galveston, Beaumont/Port Arthur, and El Paso areas. The estimated emission

reductions in 1999 from light-duty vehicles in the Houston/Galveston area is 0.508 VOC tons per ozone day (TPOD). The estimated emission reductions in 1999 from light-duty vehicles in the Beaumont/Port Arthur area is 0.025 VOC TPOD.

Emission factors were taken from the EPA document entitled "Lifetime Emissions for Clean-Fuel Fleet Vehicles". Mileage estimates were taken from the Radian Study entitled "Emission Reductions from Using Alternative Transportation Fuels", and estimated to be 25,000 miles per year. Fleet numbers for each area were estimated from TNRCC's data base for fleets with 15 or more vehicles. This data base is found in the Texas Alternative Fuel Fleet State Implementation Plan.

Calculations:

The emission reduction factor in non-methane hydrocarbons (NMHC) is multiplied by a correction factor to convert it to VOC. This is to take into consideration the ozone reactivity of aldehydes and remove the effect of ethane which is not considered in VOC estimations. The summer correction factor for NMHC to VOC is 1.0131 (source EPA).

Conversion from NMHC to VOC: 0.102g/mile x 1.0131= 0.103g/mile

Examples:

Houston/Galveston in 1999:

0.103g/mile **x** 25,000miles/year **x** 0.002205lbs/g **x** 1ton/2000lbs **x** 32128 vehicles **x** 1 ozone year/250 days = 0.366 TPOD.

Beaumont/Port Arthur in 1999:

0.103g/mile **x** 25,000miles/year **x** 0.002205lbs/g **x** 1ton/2000lbs **x** 1592 vehicles **x** 1 ozone year/250 days = 0.018 TPOD.

The emission reduction estimates are based on available fleet data used for the Texas Alternative Fuel Fleet State Implementation Plan equivalency determination and the latest EPA emission factors for the clean fuel fleet vehicles. The fleet data is being revised based on information in the newly developed TNRCC reporting data system. The new estimates are not anticipated to vary significantly from the original estimates.

6. **RECREATIONAL MARINE VESSELS**

The national recreational marine rule will be effective in 1998. Based upon information the California Federal Implementation Plan (FIP) (see below) and refined by EPA's draft guidance, EPA

has indicated that for the implementation of the national rule it will allow credit for a 0.2% reduction in the inventory. To achieve this the TNRCC will assume a reduction of 20% and a turnover (reflected in the RP factor) of 10%. The emissions estimates were taken from the "Recreational Marine" subcategory of the Non-Road Mobile Source Emissions Inventory category "Other Non-Road Engines."

The following information was taken from the California FIP.

> Finally, EPA is proposing to apply national emission standards, scheduled to be proposed in 1994 and finalized by November 1995, to spark-ignited marine propulsion engines such as outboard engines, personal watercraft (jet-skis, etc.), and sterndrive and inboard engines. These national rules will apply to new spark ignition marine propulsion engines produced after August 1, 1998 and are proposed to be combined with a registration/permitting and fee system for marine engine use in FIP area waters. Marine engines meeting the new national standards would be exempt from the fees which are proposed to begin in 2004 (III.D.4.b.(3) and III.D.4.c.(2)). For the 1999 attainment option in Sacramento, EPA is proposing a fee system or boating restriction to reduce emissions from recreational boating by one-third.

(d) Spark-Ignition Marine Propulsion Engines

Reductions from this subcategory of nonroad equipment will come from a national program of emission standards and from a registering/permitting fee system for operation in FIP-area waters. The national regulation, scheduled to be final by November 1995, will reduce emissions from outboard engines, personal watercraft (jet-skis, etc.), sterndrive engines, and inboard engines through application of new engine emission standards. The standards themselves are not being proposed in the FIP, but will be proposed in September 1994. Reductions in per-engine emissions are expected to be on the order of 70-80 percent from current two-stroke outboard and personal watercraft engines, and up to 30-50 percent from current 4-stroke carbureted sterndrive and inboard engines.

The standards will apply to new spark ignition marine propulsion engines produced after August 1, 1998. Certification procedures will be similar to on-highway procedures, with some modifications appropriate for the ways these engines are used. The program may also include features such as assembly-line testing and recall.

Although these national standards will result in substantial emission reductions per new engine, overall reductions in emissions from this category will depend on how much boating activity uses the newer, cleaner engines, and how much activity uses older engines. EPA expects that approximately one half of the total fleet of marine pleasure craft owned by FIP-area residents will meet the standard by the year 2005. However, equal use of old and new engines, in combination with other available measures to reduce VOCs, does not appear to be enough to meet the goals of the FIP. Therefore, EPA is also proposing a permit based fee system for marine engines produced before the new standards take effect, to strongly discourage use of these very high emitting engines in the FIP areas. The fees for emission permits would be based on the average excess emissions of pre-control engines compared to engines meeting the new emission standards. This fee system would take effect in 2004, and would apply to only operators of marine pleasure craft who wished to operate a boat in the FIP areas. Owners who live in the FIP areas but only use their boats elsewhere would not be affected. Owners of boats meeting the new emission standards would be eligible for emission permits free of charge.

7. **ENHANCED MONITORING**

EPA's draft RULE EFFECTIVENESS IMPROVEMENTS PROTOCOL discusses the rule effectiveness improvement credit expected from the federally mandated enhanced monitoring rule. The document states that EPA is considering a 10% improvement in RE for all categories impacted by the enhanced monitoring rule. The TNRCC has evaluated the impact of this and has included these reductions as credit towards the SIP.

EXISTING RULES

8. **UTILITY ENGINE**

The Outdoor Power Equipment Institute (OPEI) and the Engine Manufacturers Association (EMA) have submitted data summarizing test results which demonstrate a reduction in emissions. These tests were restricted to specific four stroke equipment types. Based on this data, adjusting for growth, and using a 10% per year turnover rate, a 29% reduction for the affected inventory for 1994, 1995, and 1996 has been calculated.

EPA's Draft Guidance on Future Nonroad Emission Reduction Credits for Court-Ordered Nonroad Standards has been reviewed and following this draft guidance a reduction credit of 27.1% on the affected parts of the inventory has ben calculated. This

reduction credit has been adjusted to account for the reductions taken for the 15% SIP.

9. **UNDERGROUND STORAGE TANKS**

In response to federal requirements the state of Texas has a replacement program for leaking underground storage tanks. It has been difficult to quantify the reductions in a specific nonattainment area to date due to the flexibility of schedules. However, it is known that the program will be complete by 1998. The category for Leaking Underground Tanks in the Area Source Emissions Inventory is based upon the remediation of the leaking tanks. Therefore, 100% reduction credit is used for this category for the post-96 SIP.

10. **STAGE II**

Based upon Figure 4-15 of EPA's Stage II guidance document (Technical Guidance - Stage II Vapor Recovery Systems for Control of Vehicle Refueling at Gasoline Dispensing Facilities), the "program in-use efficiency" (i.e., control efficiency x rule penetration x rule effectiveness) corresponding to a 10,000 gallon per month exemption level and annual inspections is 84%.

The TNRCC's rule allows independent small business marketers of gasoline (ISBMGs) to apply for an extended compliance schedule

to 12/22/98. Since this would make some of the Stage II emission reductions occur after 11/15/96, EPA interpolated the data on Figure 4-15 to come up with the 81% reduction we expect by 11/15/96.

By 1999, all ISBMGs which applied for and received an extended compliance schedule should have installed Stage II controls. Provided that the inspection frequency doesn't change, the total reductions should be 84%. The difference between the 81% and 84% overall reduction levels is available as credit towards the post-1996 9% VOC reductions.

To achieve this reduction the rule penetration has been increased from 95% to 98%.

11. **STAGE I**

For post-1999 we have established that Stage II's "program in-use efficiency" (i.e., control efficiency x rule penetration x rule effectiveness) corresponding to a 10,000 gallon per month exemption level and annual inspections is 84%. CARB-certified Stage II systems achieve a control efficiency of 95%, so the post-1999 (rule penetration x rule effectiveness) portion of the "program in-use efficiency" is (84 / 0.95) = 88.4%.

Revisions to the Stage I requirements were adopted on 11/10/93 in order to insure consistency between Stage I and Stage II.

These Stage I enhancements include a prohibition on coaxial Stage I connections and a prohibition on storage tank vents which are not equipped with pressure/vacuum relief valves that meet specified criteria. These enhancements increase the Stage I control efficiency from 95% to 98%.

For Stage I, the post-1999 rule penetration (RP) should be identical to that of Stage II since the exemption levels are identical. Likewise, the rule effectiveness (RE) should be identical. Consequently, the post-1999 RE x RP for Stage I is 88.4%, and the overall level of control is 0.98 x 0.884 = 86.7%. This is an improvement over the old "unenhanced" Stage I overall level of control of 76.7%, and the difference is available as credit towards the post-1996 9% VOC reductions.

The recent CA FIP preamble states an additional 1%-3% can be obtained for Stage I as a result of requiring Pressure-vacuum relief valves. This was one of the recent additions to TNRCC rules during the phase I rule revisions adopted in November, 1993. At that time, it was not realized that credit coulld be obtained for this addition. The following information is from the CA FIP:

(k) Service Stations (Sacramento, Ventura, South Coast)

Proposed rule 40 CFR 52.2961(j) reduces VOC emissions from gasoline dispensing facilities. Gasoline service stations are a source of VOC emissions created during vehicle refueling and storage tank working/breathing losses. Service station VOC emissions are estimated at approximately 3.2 tpd in the Sacramento area, 25.3 tpd in the South Coast, and 1.2 tpd in Ventura. Although service stations in the FIP areas currently have vapor recovery systems, the proposed FIP rule builds upon current Phase I and Phase II regulations and strengthens and improves existing rules by requiring pressure/vacuum relief valves on open vent pipes and the phasing out of inefficient vapor recovery system components.

Pressure-vacuum relief valves are expected to virtually eliminate breathing and working losses from the storage tank vent pipe. Pressure-vacuum relief valves cost less than fifty dollars, are easily installed without underground construction, and improve efficiency of existing vapor recovery systems by one to 3%. The pressure/vacuum relief valves typically pay for themselves within less than one year and result in a

in a cost savings. Additional emission reductions will be achieved through elimination of exemptions and the replacement of remote check valves in Phase II control systems. The Phase I efficiency is expected to be increased through the combined impact of the requirements for poppetted drybreaks in the Phase I vapor control systems, the installation of the pressure-vacuum valve on the vent pipes, and the installation of CARB certified spill boxes. Phase II efficiency is expected to be increased through the combined impact of using proper tubing between the riser and dispenser cabinet, requiring a certified insertion interlock mechanism on all bellows-equipped nozzles, and replacing non-coaxial hose with coaxial hose. Many of the proposed revisions are based on recent amendments to BAAQMD Regulation 8, Rule 7 - Gasoline Dispensing Facilities.

Emission reductions expected from this proposed rule are estimated at 1.3 tpd in the Sacramento area, 8.9 tpd in the South Coast, and 0.3 tpd in Ventura. Because fuel savings result from installation of the pressure/vacuum relief valves and because inefficient vapor recovery components wear out and can be replaced by more efficient components during regularly scheduled maintenance, the cost impacts of the proposed measure

will be minimized. The overall cost effectiveness is estimated at $1,600 per ton of VOC reduced.

To achieve this the control efficiency is increased from 95% to 98%, the rule effectiveness has been increased from 80% to 90% and the rule penetration has been increased from 95% to 98%.

12. **MOBILE SOURCE PROGRAMS**

The Mobile5A model projects the on-road emissions after accounting for the various programs the state has in place. Because it combines all of the mobile source control programs in a hierarchical scheme, it is not possible to determine individual reductions for each program.

HOUSTON

The 1999 on-road mobile emissions inventory with only pre-1990 controls is 171.08 tpd. The 1999 projected on-road mobile emissions inventory adjusted for Reform Gas, Tier I, ETR and I/M programs implemented and extended to 1999 is 99.76 tpd. The total reduction between 1990 and 1999 from these programs is 71.31 tpd.

The reduction from 1990 to 1996 for these four programs is 57.12 tpd. Thus, between 1997 and 1999 these programs will yield an additional reduction of 14.19 tpd.

The 1999 on-road mobile emissions inventory with only pre-1990 controls is 21.49 tpd. The 1999 projected on-road mobile emissions inventory adjusted for Tier I and I/M programs implemented and extended to 1999 is 17.02 tpd. The total reduction between 1990 and 1999 from these programs is 4.47 tpd.

The reduction from 1990 to 1996 for these two programs is 3.38 tpd. Thus, between 1997 and 1999 these programs will yield an additional reduction of 1.09 tpd.

13. **RFG credits from storage tanks**

Reformulated Gasoline (RFG) is required for the H/GA nonattainment area. Since 1990, gasoline sold in the H/GA area has had to have a RVP of less than or equal to 7.8 pounds per square inch (psi). An average RVP of 7.2 psi is assumed for RFG. The reduction due to the lower RVP at gasoline storage tanks has been quantified. A study was conducted for eight scenarios and the emissions associated with gasoline with RVP of 7.8 psi and 7.2 psi under standard conditions. The emission reductions are calcullated by multiplying the number of tanks for each category by the typical emissions for gasoline with RVP's of 7.8 and 7.2, respectively. The difference between the two is the emission reduction. For example, there are 36

external floating roof tanks over 100' diameter with pontoon roofs. The typical emissions from gasoline with an RVP of 7.8 psi is 16.24 pounds per day, and the typical emissions from gasoline with an RVP of 7.2 psi is 14.09 pounds per day. Therefore, the total reductions for this type of tank is 77.40 pounds per day.

Tank Type	# of Tanks	RVP of 7.8 psi	RVP of 7.2 psi	Reduc-tion
External Floater (P) <100'	36	16.24	14.09	77.40
External Floater (P) >100'	103	27.43	23.72	382.13
External Floater (D) <100'	36	22.29	15.65	239.04
External Floater (D) >100'	78	25.35	22.28	239.46
Internal Floater <100'	80	19.12	16.66	196.80
Internal Floater >100'	58	79.37	68.86	609.58
Fixed <100'	58	170.49	152.14	1064.30
Fixed >100'	7	2935.57	2637.24	2088.31
Total	456			4897.02

("P" denotes pontoon roof, "D" denotes double-deck roof)

14. **RFG credits from loading racks**

Reformulated Gasoline (RFG) is required for the H/GA nonattainment area. Since 1990, gasoline sold in the H/GA area has had to have a RVP of less than or equal to 7.8 pounds per square inch (psi). An average RVP of 7.2 psi is assumed for RFG. The reduction due to the lower RVP at gasoline loading racks has been quantified. The same method described in Section 13 above was used to calculate the estimated reductions for loading racks.

Rack Type	**# of Racks**	**RVP of 7.8 psi**	**RVP of 7.2 psi**	**Reduc-tion**
Loading Racks	27	1.42	1.28	3.76

15. **RE improvements for storage tanks**

A review of storage tank inspections has indicated that the RE adjustment for Floating Roof tanks results in an over-inflation of the actual emissions. The TNRCC has developed an approach which will more accurately reflect the actual emissions from floating roof storage tanks. Changes have been made to Storage Tank monitoring and recordkeeping requirements to require actual seal gap measurements and to use these measurements to determine actual excess emissions. A change has been made to

the Emissions Inventory rule to require these reports to be submitted with the annual emissions inventory. Language has also been added to the Inspection Preparation Guidelines for industries to have these records on hand for their annual inspections. The TNRCC believes that this approach will eventually phase out the rule effectiveness adjustment for floating roof tanks. In the interim, the revisions to the recordkeeping requirements and to the Inspection Preparation Guidelines will result in an improved rule effectiveness of up to 95% for non-permitted sources and 98% for permitted sources.

The calculation of credit for this SIP has been adjusted for the reductions associated with the 15% SIP. A discrepancy was noted in the review of the algorithm used in adjusting for rule effectiveness and the credit calculation for the 15% SIP. The algorithm assumed a control efficiency of 95%, while the 15% SIP calculation assumed 61.9% control. It has been determined that the 95% control is accurate and has been used in the calculations for improved rule effectiveness. Since these calculations hold the control efficiency constant, additional credit for the error in assumptions has not been claimed. The rule effectiveness improvements will be applied to the following SCC codes:

40301101 < SCC < 40301155

or

40400110 < SCC < 40400210

or

40400113 < SCC < 40400117

or

40400130 < SCC < 40400132

or

40400230 < SCC < 40400241