APPENDIX B

Control Measure Catalog

"One Pagers"

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EMISSION CONTROL MEASURES
(DESCRIPTIVE INDUSTRY SOURCE CLASSIFICATION)

Control Measure Description:	This section shall describe the conceptualized control measure, and impact (if any) on existing rules.
Control Measure Source:	This section lists the reference(s) used to develop the conceptualized control measure.
Rule Effectiveness: Identifies the assumed rule effectiveness. **Control Efficiency** Identifies the assumed control efficiency. **Rule Penetration:** Identifies the assumed rule penetration (if applicable).	
Source of Projected Emissions: Description of typical emission point(s) to impacted by the control measure. **Identified SCCs:** A comprehensive list of the SCCs affected by the control measure (if applicable). **Total Affected Emissions (adjusted 1999 EI):** The actual 1990 Emissions Inventory Tons per Ozone Day affected by the control measure.	
Affected Parties: States the industries and nonattainment areas impacted by the conceptualized control measure.	
Estimated Costs: This section should synopsize assumptions made concerning cost. It should include up front capital costs, an amortized annual value, an assumption of annual maintenance costs, an attempt to quantify indirect and social costs. It could also include any other cost type information which may prove pertinent during the decision making process. A reference to where the cost analysis came from would also be helpful. **Cost Effectiveness:** This is a measure of the total capital cost divided by the total affected emissions.	
Comments:	This section should include discussions of the reactivity and toxicity of the VOCs to be reduced. Reactivity and toxicity should be tagged to those processes which contribute the most to emissions. A discussion of any NOx increases as a result of VOC reduction should be estimated here.
Staff Contact: Name and Phone number of person responsible for preparing this page.	

Mobile Sources

EMISSION CONTROL MEASURE (#1)
Non Metro Area Transit

Control Measure Description:	To provide transit service to the metropolitan area that is not currently serviced by the public transit system. This can by accomplished by bus service and/or paratransit service to the area not currently served.
Control Measure Source:	United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington, D.C., March 1992.
Rule Effectiveness: N/A **Control Efficiency** **Rule Penetration:** N/A	
Source of Projected Emissions:	Bus and paratransit emissions from an increase in transit service.
Identified SCCs: N/A	
Total Affected Emissions (adjusted 1999 EI): 99.76 Tons per Ozone Day	
Affected Parties:	Those outlying areas that are not currently served by the public mass transportation system. This would affect areas in the Houston/Galveston nonattainment area that are not currently served by a mass transit system.
Estimated Costs:	
Cost Effectiveness:	
Comments:	Legislative authority may be needed in order to carry out the non-metro area transit. Since transit is contingent upon sales tax levied, only those areas that are in the sales tax area receive transit service. Transit service to areas that are not currently serviced could be a valuable asset not only in the short term but also in the long term.
Staff Contact: Teresa Hardin Nguyen (512) 239-0599 work (512) 239-1514 fax	

EMISSION CONTROL MEASURE (#2)
Bicycle Improvements

Control Measure Description:	Measures to encourage pedestrian travel as a viable alternative transportation mode to the single occupant vehicle.
Control Measure Source:	United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington, D.C., March 1992.
Rule Effectiveness: N/A **Control Efficiency** **Rule Penetration:** N/A	
Source of Projected Emissions:	Bicycling has the potential of reducing emissions 100% for that particular trip. Bicycling could also be used in conjunction with transit or other forms of transportation.
Identified SCCs: N/A	
Total Affected Emissions (adjusted 1999 EI): 99.76 Tons per Ozone Day	
Affected Parties:	Students, commuters, and recreation make up the majority of bicycle users. This program could be combined with the ETR or ECO program in the Houston/Galveston nonattainment area.
Estimated Costs:	Annualized Costs=$5,021 Cost per ton reduction=$215,864. Most of this money comes from enhancement or CMAQ funds. Costs of this program include: * developing a system of bicycle routes, lanes, and paths; * providing plans and maps; * providing lockers, racks, and other storage facilities; and * ancillary facilities (showers and clothing lockers)
Cost Effectiveness:	
Comments:	A progressive bicycle program is needed in order to get a measurable air quality benefit. The reduction of trips or VMT is a direct emissions reduction benefit if the program is used properly. This reduces trips be 100%. A 50% increase in commute trips made by bicycle would result in the following: * 6.56% reduction in hydrocarbons * 7.00% reduction in carbon monoxide, and * 14.97 reduction in nitrogen oxides. These statistics are from the University of Wisconsin Walker, "Of Bikes and Cars: An Urban Transportation Emissions Model," University of Wisconsin, July 8, 1988.
Staff Contact:	Teresa Hardin Nguyen (512) 239-0599 work (512) 239-1514 fax

EMISSION CONTROL MEASURE (#3)
Parking Management

Control Measure Description:	A program to limit or restrict vehicle use in downtown areas or other areas of emission concentration particularly during periods of peak use; and programs and ordinances to facilitate non-automobile travel, etc. Parking management strategies can include preferential parking for HOV, public sector pricing, parking requirements in zoning codes, and control of parking supply.
Control Measure Source:	Loudon, William R., Deborah A. Dagang, and Robert Dulla, "The Effectiveness of Transportation Control Measures in Reducing Congestion and Improving Air Quality." Air and Waste Management Association. Denver, CO. June 1993.
Rule Effectiveness: N/A **Control Efficiency** **Rule Penetration:** N/A	
Source of Projected Emissions:	Vehicles driving to and from the work site in areas with high concentrations of emissions, especially during peak use.
Identified SCCs:	
Total Affected Emissions (adjusted 1999 EI): 99.76 Tons per Ozone Day	
Affected Parties:	This program primarily effects persons riding in single-occupant vehicles parking in dense or highly congested areas. This would include the Houston/Galveston non-attainment area.
Estimated Costs:	Cost would include setting up and implementing the program as well as provide enforcement action. The type of parking program could influence total cost.
Cost Effectiveness:	
Comments:	Parking management strategies are most effective when implemented in dense CBDs that have limited available parking. If there is an excess of parking, this will diminish the effectiveness of the parking management program. Parking Management can be an effective tool for local government to reduce traffic and associated emissions in congested areas by encouraging travelers to use modes other than driving alone. Four strategies can be applied with the public sector: preferential parking policies for high occupancy vehicles (HOV); public sector pricing policies; parking requirements in zoning codes; and control of parking supply. Parking management has the potential of reducing period trips by 6.25% and off-peak trips by 2.6%. This is due to the elimination of trips.
Staff Contact:	Teresa Hardin Nguyen (512) 239-0599 work (512) 239-1514 fax

EMISSION CONTROL MEASURE (#4)
Telecommuting

Control Measure Description:	Telecommuting is working at a location other than one's usual office, and therefore avoiding the trip to the office, while performing the same duties as would otherwise be performed in the central office.
Control Measure Source:	United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington, D.C., March 1992.
Rule Effectiveness: N/A **Control Efficiency** **Rule Penetration:** N/A	
Source of Projected Emissions:	Even though telecommuting is working at locations other than one's usual office, this could result in emissions to a satellite work site. This program could either be for the entire Houston/Galveston ozone nonattainment area or could be in areas of higher concentration of vehicular traffic.
Identified SCCs: N/A	
Total Affected Emissions (adjusted 1999 EI): 99.76 Tons per Ozone Day	
Affected Parties:	Telecommuting is widely used by many employers, both large and small, on a national scale. Telecommuting is favored because it allows the employee to work at home on a flexible schedule.
Estimated Costs:	Cost for this program has not yet been determined because of the lack of information about employee involvement. Equipment and computer hook-up, satellite work center and training is part of the cost, depending on the particular program developed.
Cost Effectiveness:	
Comments:	A reduction in vehicle trips due to this program could and would have positive air quality benefits to the area. Positive air quality benefits include reduced trips and VMT during peak and non-peak periods and reduced hot and cold starts. Unfortunately, a thorough survey of employees and employers would need to be conducted in order to assist in the evaluation of this program.
Staff Contact:	Teresa Hardin Nguyen (512) 239-0599 work (512) 239-1514 fax

EMISSION CONTROL MEASURE (#5)
Flexible Work Schedules

Control Measure Description:	Changes in work schedule to provide greater flexibility in work schedules and reduce the volume of commute and travel during peak periods.
Control Measure Source:	United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington, D.C., March 1992.
Rule Effectiveness: N/A **Control Efficiency** **Rule Penetration:** N/A	
Source of Projected Emissions:	Vehicular emissions. Overall emissions may rise or fall depending on success of program.
Identified SCCs: N/A	
Total Affected Emissions (adjusted 1999 EI): 99.76 Tons per Ozone Day	
Affected Parties:	Flexible work schedules are widely used by many employers, both large and small on a national scale. This TCM allows the employee to work a full time schedule with the flexibility to arrange the hours. This program could be used in the Houston/Galveston nonattainment area or could be modified to the highest congested areas.
Estimated Costs:	Cost for this program has not yet been determined because of the lack of information about employee involvement. Set schedules are not easily obtainable due to the flexibility of the program. Once the program is on-line, the administration costs should decrease as everyone becomes accustom to the new work schedule.
Cost Effectiveness:	
Comments:	This program can be combined with the ETR or ECO program. Flexible work schedules may provide greater flexibility in arrival and departure times to support ridesharing activities. Positive air quality impacts include reduced peak period congestion and a modal shift. Negative impacts may be that flexible work schedules cause some transit users to drive alone thus offsetting the initial benefit.
Staff Contact:	Teresa Hardin Nguyen (512) 239-0599 work (512) 239-1514 fax

EMISSION CONTROL MEASURE (#6)
Control of Truck Movements

Control Measure Description:	Controlling or restricting trucks from certain areas, restricting loading zones, and/or scheduling deliveries. This could include restricting certain areas of the central business district, certain hours of the day, and/or removal of trucks from the freeway/highway.
Control Measure Source:	United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington, D.C., March 1992.
Rule Effectiveness: N/A **Control Efficiency:** **Rule Penetration:** N/A	
Source of Projected Emissions:	Emissions generated from heavy duty trucks operating during peak periods.
Identified SCCs: N/A	
Total Affected Emissions (adjusted 1999 EI): 99.76 Tons per Ozone Day	
Affected Parties:	Truck drivers, freight and delivery companies operating in the Houston/Galveston nonattainment area.
Estimated Costs:	Higher costs may result due to banning heavy duty trucks from peak period use. This would force them to operate at inconvenient times and might increase shipping and receiving fees, which would have to be offset by the consumer. Incident management strategies for truck safety would add to the overall cost of the project as well as a cost to implement the program.
Cost Effectiveness:	
Comments:	Controlling movements in certain areas area can be very beneficial in reducing congestion and the associated pollution generated from this control. Shifting peak period truck movements could have a negative effect on air quality. If the trucks are being banned from freeway use or other areas, this could shift the traffic on to other facilities causing those facilities to be congested. This could result in slightly negative air quality impacts. Also, removing trucks from the freeway facilities could increase overall speeds which may lead to lower VOC levels but slightly higher NOx levels.
Staff Contact:	Teresa Hardin Nguyen (512) 239-0599 work (512) 239-1514 fax

EMISSION CONTROL MEASURE (#7)
Control of Extended Vehicle Idling

Control Measure Description:	Measures to reduce the amount of time which vehicles spend in idle mode as part of their overall operation.
Control Measure Source:	United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington, D.C., March 1992.
Rule Effectiveness: N/A **Control Efficiency:** N/A	
Source of Projected Emissions:	Tailpipe emissions generated as a result of vehicle idling. Includes passenger and heavy duty vehicles. Reductions in idle time emissions are the product of the idle emission rate, in grams per hour, and the number of hours per day in reduced idling time. Sources of projected emissions include drive-thru, curbside, and bus/truck.
Identified SCCs: N/A	
Total Affected Emissions (adjusted 1999 EI):	99.76 Tons per Ozone Day
Affected Parties:	Controls on construction and operation of drive-thru facilities such as banks and fast food restaurants; controls on extended vehicle idling during layover time, particularly of diesel engines used by transit vehicles and delivery trucks.
Estimated Costs:	
Cost Effectiveness:	
Comments:	Laws can be enacted to limited idle time of heavy-duty vehicles if the vehicle is not performing useful work. Time limits can be set by the legislature. Also, drive-up window design can be modified as to minimize idling time or queue time.
Staff Contact:	Teresa Hardin Nguyen (512) 239-0599 work (512) 239-1514 fax

EMISSION CONTROL MEASURE (#8)
TAFF Program Requirements Extended to Vehicles Over 26,000 LBS. GVWR

Control Measure Description: This control measure would extend the requirements of the Texas Alternative Fuel Fleet (TAFF) program to vehicles weighing more than 26,000 lbs. gross vehicle weight rating (GVWR). Beginning September 1, 1998, any vehicle purchased, leased, or otherwise acquired by affected fleets would be required to be certified to a minimum of the low emission vehicle (LEV) standards.

Control Measure Source: *Adopting the California Low Emission Vehicle Program in Texas*, E.H. Pechan and Associates, Inc., Report No. 92.09.012/259 (Revised), Prepared for the Texas Air Control Board, 1993; *Quantifying the Emission Reductions Due to the Texas Alternative Fuel Fleet Program*, Engine, Fuel, and Emissions Engineering, Inc., Prepared for the Texas Natural Resource Conservation Commission, 1995; *Regulatory Impact Analysis Clean Fuel Fleet Program*, U.S. Environmental Protection Agency, Office of Air and Radiation, Office of Mobile Sources, 1994; American Automobile Manufacturers Association estimates for light-duty LEV vehicles for the OTC-LEV program..

Rule Effectiveness: n/a
Control Efficiency: n/a
Rule Penetration: n/a

Source of Projected Emissions: Medium heavy-duty on-road vehicles over 26,000 lbs. GVWR and heavy heavy-duty on-road vehicles operated in fleets with 15 or more vehicles that operate in the nonattainment area. This would include trucks, transit buses, and large school buses.

Identified SCCs: n/a

Total Affected Emissions (adjusted 1999 EI): 99.76 Tons per Ozone Day

Affected Parties: Owners/operators of fleets with 15 or more vehicles that operate in the nonattainment area.

Estimated Costs: The estimates for the costs of the program were based upon assumptions made by EPA in its Regulatory Impact Analysis of the Clean Fuel Fleet Program. EPA made a number of assumptions for the incremental costs of acquiring heavy-duty LEV vehicles, both gasoline- and diesel-powered. The most expensive EPA estimate was an incremental cost of $477.00 for diesel-powered LEV heavy-duty vehicles. EPA did not assume any additional maintenance or fuel costs.

Cost Effectiveness: Based on staff assumptions (please see attachment), the costs are estimated to be $1249/ton NMOG, $668/ton NOx, $193/ton CO for a transit bus; $4736/ton NMOG, $2534/ton NOx, $766/ton CO for a school bus; and $1358/ton NMOG, $727/ton NOx, and $211/ton CO for a heavy-duty truck.

Comments: Because the LEV standards provide for NOx reductions, there is no NOx increase associated with this program.

This requirement would exceed the Federal Clean Fuel Fleet requirements, which do not include vehicles over 26,000 lbs. GVWR. In addition, proposed legislation currently before the Legislature would specifically exempt privately owned and local government vehicles over this weight from the requirements of the **Texas Alternative Fuels Program** if finally passed. This may have to be interpreted as the intent of the Texas Legislature that these vehicles **not** be covered under any such fleet programs. However, in its current form the bill does impose the LEV standards on vehicles over 26,000 lbs. GVWR for transit and state fleets. This bill has not been finally passed by the Legislature at this writing. (3/15/95)

Staff Contact: Bill Jordan, Mobile Source Division, (512) 239-2583; Brian Christian, Mobile Source Policy and Regulations Division, (512) 239-1760

EMISSION CONTROL MEASURE (#9)
Proposed Texas Diesel
Scenario 1

Control Measure Description:	Proposed Texas Diesel is a reformulation of low sulfur diesel. The proposed fuel would have a raised cetane number in order to decrease NOx and VOC emissions. This scenario assumes a 10 number raise in cetane (44 to 54), a $0.07 increase per gallon cost, and a 33% aromatic concentration.
Control Measure Source:	1990 TNRCC on-road and off-road diesel inventories and fuel estimates. Effects of Fuel Aromatics, Cetane Number, and Cetane improver on Emissions from a 1991 Prototype Heavy-Duty Engine., SAE Paper 902171, October 1990.* The National Petroleum Refiners Association Update on the Effect of Government Regulations on Diesel Fuels, Amoco Oil Company Naperville, Illinois, Christopher I. McCarthy. Diesel Fuel Property Effects on Exhaust Emissions from a Heavy Duty Diesel Engine That Meets 1994 Emissions Requirements, SAE Paper 922267, Christopher I. McCarthy, Amoco Oil Company, Warren J. Slodowske, Edward J. Sienicki, and Richard E. Jass, Navistar International Transportation Corp. *The most recent SAE papers regarding diesel fuel cetane number and its relation to emissions are contained in 1995 SAE publications 950249, 950250, and 950251. These papers will be reviewed for a more recent predictive equation to estimate emission responses to cetane changes. Cost and emission estimates may therefore be modified to reflect this most recent data.
Rule Effectiveness: **Control Efficiency:** **Rule Penetration:**	N/A HC:51%, NOx:3%, CO:26% 100%
Source of Projected Emissions:	All on- and off-road diesel powered vehicles in the eight county Houston/Galveston non-attainment area (excluding locomotives and marine vessels).
Identified SCCs:	NA
Total Affected Emissions (adjusted 1999 EI):	23.41 tons/day VOCs, 214.75 tons/day NOx, 102.25 tons/day CO
Affected Parties:	Owner/Operators of diesel powered vehicles and engines, Oil industry and distributors of diesel fuel.
Estimated Costs:	$0.07 per gallon
Cost Effectiveness:	HC:$4621/ton, NOx:$8161/ton, CO:$2053/ton

Comments:	EPA has stated that it may be possible to implement this measure only after: The state shows that the control is necessary to meet air quality standards, and that no other methods are available, or if other methods are available they are unreasonable or impracticable to implement. All price information is from a single source (additive maker Ethyl Corp.) and therefore may be not be representative of the actual costs of this control measure. This program may be difficult to implement in light of the significant problems California has had with their "clean diesel" program. The program may be difficult to enforce only on a regional level.
Staff Contact:	Bill Jordan, Mobile Source Division, Technology and Fuels Section (512) 239-2583, James Cheng, Mobile Source Division, Technology and Fuels Section (512) 239-5716

EMISSION CONTROL MEASURE (#10)
Proposed Texas Diesel
Scenario 2

Control Measure Description:	Proposed Texas Diesel is a reformulation of low sulfur diesel. The proposed fuel would have a raised cetane number in order to decrease NOx and VOC emissions. This scenario assumes a 10 number raise in cetane (40 to 50), a $0.03 increase per gallon cost, and a 35% aromatic concentration.
Control Measure Source:	1990 TNRCC on-road and off-road diesel inventories and fuel estimates. Effects of Fuel Aromatics, Cetane Number, and Cetane improver on Emissions from a 1991 Prototype Heavy-Duty Engine., SAE Paper 902171, October 1990.* The National Petroleum Refiners Association Update on the Effect of Government Regulations on Diesel Fuels, Amoco Oil Company Naperville, Illinois, Christopher I. McCarthy. Diesel Fuel Property Effects on Exhaust Emissions from a Heavy Duty Diesel Engine That Meets 1994 Emissions Requirements, SAE Paper 922267, Christopher I. McCarthy, Amoco Oil Company, Warren J. Slodowske, Edward J. Sienicki, and Richard E. Jass, Navistar International Transportation Corp. *The most recent SAE papers regarding diesel fuel cetane number and its relation to emissions are contained in 1995 SAE publications 950249, 950250, and 950251. These papers will be reviewed for a more recent predictive equation to estimate emission responses to cetane changes. Cost and emission estimates may therefore be modified to reflect this most recent data.
Rule Effectiveness: **Control Efficiency:** **Rule Penetration:**	N/A HC:65%, NOx:5%, CO:36% 100%
Source of Projected Emissions:	All on- and off-road diesel powered vehicles in the eight county Houston/Galveston non-attainment area (excluding locomotives and marine vessels).
Identified SCCs:	NA
Total Affected Emissions (adjusted 1999 EI):	23.41 tons/day VOCs, 214.75 tons/day NOx, 102.25 tons/day CO
Affected Parties:	Owner/Operators of diesel powered vehicles and engines, Oil industry and distributors of diesel fuel.
Estimated Costs:	$0.03 per gallon
Cost Effectiveness:	HC:$4148/ton, NOx:$6395/ton, CO:$1706/ton

Comments:	EPA has stated that it may be possible to implement this measure only after: The state shows that the control is necessary to meet air quality standards, and that no other methods are available, or if other methods are available they are unreasonable or impracticable to implement. All price information is from a single source (additive maker Ethyl Corp.) and therefore may be not be representative of the actual costs of this control measure. This program may be difficult to implement in light of the significant problems California has had with their "clean diesel" program. The program may be difficult to enforce only on a regional level.
Staff Contact:	Bill Jordan, Mobile Source Division, Technology and Fuels Section (512) 239-2583, James Cheng, Mobile Source Division, Technology and Fuels Section (512) 239-5716

EMISSION CONTROL MEASURE (#11)
Proposed Texas Diesel
Scenario 3

Control Measure Description:	Proposed Texas Diesel is a reformulation of low sulfur diesel. The proposed fuel would have a raised cetane number in order to decrease NOx and VOC emissions. This scenario assumes a 15 number raise in cetane (40 to 55), a $0.09 increase per gallon cost, and a 35% aromatics concentration.
Control Measure Source:	1990 TNRCC on-road and off-road diesel inventories and fuel estimates. Effects of Fuel Aromatics, Cetane Number, and Cetane improver on Emissions from a 1991 Prototype Heavy-Duty Engine., SAE Paper 902171, October 1990.* The National Petroleum Refiners Association Update on the Effect of Government Regulations on Diesel Fuels, Amoco Oil Company Naperville, Illinois, Christopher I. McCarthy. Diesel Fuel Property Effects on Exhaust Emissions from a Heavy Duty Diesel Engine That Meets 1994 Emissions Requirements, SAE Paper 922267, Christopher I. McCarthy, Amoco Oil Company, Warren J. Slodowske, Edward J. Sienicki, and Richard E. Jass, Navistar International Transportation Corp. *The most recent SAE papers regarding diesel fuel cetane number and its relation to emissions are contained in 1995 SAE publications 950249, 950250, and 950251. These papers will be reviewed for a more recent predictive equation to estimate emission responses to cetane changes. Cost and emission estimates may therefore be modified to reflect this most recent data.
Rule Effectiveness: **Control Efficiency:** **Rule Penetration:**	N/A HC:73%, NOx:6%, CO:43% 100%
Source of Projected Emissions:	All on- and off-road diesel powered vehicles in the eight county Houston/Galveston non-attainment area (excluding locomotives and marine vessels).
Identified SCCs:	NA
Total Affected Emissions (adjusted 1999 EI):	23.41 tons/day VOCs, 214.75 tons/day NOx, 102.25 tons/day CO
Affected Parties:	Owner/Operators of diesel powered vehicles and engines, Oil industry and distributors of diesel fuel.
Estimated Costs:	$0.09 per gallon
Cost Effectiveness:	HC:$4131/ton, NOx:$5735/ton, CO:$1606/ton

Comments:	EPA has stated that it may be possible to implement this measure only after: The state shows that the control is necessary to meet air quality standards, and that no other methods are available, or if other methods are available they are unreasonable or impracticable to implement. All price information is from a single source (additive maker Ethyl Corp.) and therefore may be not be representative of the actual costs of this control measure. This program may be difficult to implement in light of the significant problems California has had with their "clean diesel" program. The program may be difficult to enforce only on a regional level.
Staff Contact:	Bill Jordan, Mobile Source Division, Technology and Fuels Section (512) 239-2583, James Cheng, Mobile Source Division, Technology and Fuels Section (512) 239-5716

EMISSION CONTROL MEASURE (#12)
BIENNIAL INSPECTION/MAINTENANCE (I/M)

Control Measure Description:	Decentralized biennial vehicle inspections using the basic standard.
Control Measure Source:	Federal Clean Air Act, EPA guidance, Texas legislature
Rule Effectiveness: 18% **Control Efficiency:** 20% **Rule Penetration:** 90%	
Source of Projected Emissions:	Automobiles and light duty trucks.
Identified SCCs:	NA
Total Affected Emissions (adjusted 1999 EI):	99.76 tons per day
Affected Parties:	General public, commercial, private, and public vehicle fleet owners.
Estimated Costs:	The cost analysis procedure was obtained from the TNRCC mobile source division and approved by EPA. The assumptions used in the analysis include: $35 per inspection, 1.5 million vehicles inspected per year, 20% failure rate, $150 average repair, 1000 gallons per year average vehicle fuel use at $1.10 per gallon, and a 13% fuel savings. Cost per inspection will vary as it will be set by the market.
Cost Effectiveness:	Estimated VOC reduction is 27.35 tons per day or 10,052 tons per year. Estimated cost is $28,400,000 per year for a figure of $2810 per ton.
Comments:	The VOC reduction is primarily gasoline vapor which has a health effect screening level of 3500 ppb for a one hour average. Mean incremental reactivity for substances in gasoline is 2. There is no NOx increase associated with this program.
Staff Contact:	Beecher Cameron (512) 239-1495.

EMISSION CONTROL MEASURE (#13)
SMALL ENGINE EMISSION STANDARDS

Control Measure Description:	The federal government is setting exhaust emission standards for small internal combustion engines (25 horsepower and less). The standards take effect in January 1996 and are phased in over two years. The reduction is the difference between the credit received for 1999 and that projected for 2007.
Control Measure Source:	U.S. Environmental Protection Agency
Rule Effectiveness:	51.8%
Control Efficiency:	51.8%
Rule Penetration:	100%
Source of Projected Emissions:	Internal combustion engines 25 horsepower and less. These engines are used in a wide variety of applications, but the primary source of emissions is residential lawn and garden use. Light industrial uses include generators, pumps, and small forklifts.
Identified SCCs:	NA
Total Affected Emissions (Adjusted 1999 EI):	90.74 tons per day VOC 13.15 tpd NOx
Affected Parties:	Primarily engine manufacturers. Engines will be manufactured for lower emissions. No add-on devices will be necessary.
Estimated Costs:	EPA has estimated that the cost increase for engines meeting new emission standards will be approximately $5 per engine. TNRCC did not find any figures for cost per ton. In order to arrive at a cost per ton figure, TNRCC has computed the approximate number of engines that must be replaced to reduce VOC emissions by one ton and multiplied that number by the $5 cost increase per engine. Other assumptions include a 20 gram per horsepower-hour emission differential between older and complying four cycle engines and a 197 gram per hp-hr for two-cycle. Estimated hours of use each year are 60 and the average power rating is 3 horsepower.
Cost Effectiveness:	Estimated VOC reduction is 47.00 tons per day by 2007. This is a 51.8% reduction. Percentage of reduction will continue to rise to projected high of 90% in 2010. Cost per ton of VOC reduced is estimated at $740. Cost effectiveness does not include any estimated fuel savings from the leaner running engines.

Comments:	There is a NOx increase from the implementation of these standards. NOx should increase approximately 13 tpd in 2007 over the projected inventory to a figure of 26.13 tpd. This rule will likely provide incentive for some manufacturers to change their equipment from two-cycle to four-cycle engines or electric motors. This is the most significant change for users of the equipment. The VOC reduction is primarily gasoline vapor which has a health effect screening level of 3500 ppb for a one hour average. Mean incremental reactivity for the substances in gasoline is 2.
Staff Contact:	Beecher Cameron (512) 239-1495.

EMISSION CONTROL MEASURE (#14)
ANNUAL INSPECTION/MAINTENANCE (I/M)

Control Measure Description:	Centralized annual vehicle inspections using the enhanced standard with I/M 240.
Control Measure Source:	Federal Clean Air Act and EPA guidance
Rule Effectiveness:	36%
Control Efficiency:	40%
Rule Penetration:	90%
Source of Projected Emissions:	Automobiles and light duty trucks.
Identified SCCs:	NA
Total Affected Emissions (adjusted 1999 EI):	99.76 Tons per Ozone Day
Affected Parties:	General public, commercial, private, and public vehicle fleet owners.
Estimated Costs:	The cost analysis procedure was obtained from the TNRCC mobile source division and approved by EPA. The assumptions used in the analysis include: $28 per inspection, 3 million vehicles inspected per year, 20% failure rate, $150 average repair, 1000 gallons per year average vehicle fuel use at $1.10 per gallon, and a 13% fuel savings. An annual I/M program is estimated to yield an additional 3% reduction benefit over the biennial program. The cost per inspection increases to $28 to cover construction of additional stations.
Cost Effectiveness:	Estimated VOC reduction is 56.73 tons per day or 20,707 tons per year. Estimated cost is $88,000,000 per year for a figure of $4250 per ton.
Comments:	The VOC reduction is primarily gasoline vapor which has a health effect screening level of 3500 ppb for a one hour average. Mean incremental reactivity for substances in gasoline is 2. There is no NOx increase associated with this program.
Staff Contact:	Beecher Cameron (512) 239-1495.

EMISSION CONTROL MEASURE (#15)
EMISSION STANDARDS FOR LOCOMOTIVES
PROPOSED FEDERAL REGULATION

Control Measure Description: This regulation proposes two tiers of emission standards for locomotives that are freshly manufactured after 1/1/2000. The first tier standards will apply to locomotives manufactured from 1/1/2000 through 12/31/2004. The second tier standards will apply to locomotives manufactured after 1/1/2005.

EPA also expects to propose standards for locomotive engines originally manufactured between 1/1/1973 and 12/31/1999 when they are remanufactured after 1/1/2000.

Control Measure Source: Section 213(a)(5) of the Clean Air Act amendments. The rule is expected to be proposed in Spring of 1995.

Rule Effectiveness:
Control Efficiency:
Rule Penetration:

Source of Projected Emissions: Newly manufactured locomotives after January 1, 2000, and remanufactured locomotives originally manufactured between January 1, 1973 and December 31, 1999.

Identified SCCs: NA

Total Affected Emissions (adjusted 1999 EI): 1.14 TPD of VOC, 17.64 TPD of NOx

Affected Parties: Manufacturers and rebuilders of locomotives

Estimated Costs:

Cost Effectiveness:

Comments: The Tier 1 standards are expected to reduce NOx emissions from newly manufactured locomotives by 50 percent from uncontrolled levels. NOx standards from pre-2000 remanufactured locomotives are expected to f\reduce these emissions by approximately one third from uncontrolled levels.

The Tier II standards are expected to reduce NOx emissions from freshly manufactured locomotives by two thirds and PM emissions by approximately one half from uncontrolled emissions.

This rule will primarily reduce NOx, however, EPA expects to also set standards for hydrocarbon (HC), carbon monoxide (CO), particulate matter (PM), and smoke emissions as part of the emission standards. These standards are anticipated to approximately equal present emission levels, there by constraining any increase in emissions of these pollutants that could otherwise occur as a result of the decrease in NOx.

Staff Contact: Andrea Griswold (512) 239-1761

EMISSION CONTROL MEASURE (#16)
NON METRO AREA TRANSIT
(EXPRESS BUS SERVICE)

Control Measure Description: To provide transit service to the metropolitan area that is not currently serviced by the public transit system. This analysis looks into expanding the express bus service to accommodate outlying areas.

Control Measure Source: Metropolitan Transit Authority of Harris County, Texas: Transit Services Program FY 1994-1998.

Rule Effectiveness: N/A
Control Efficiency: N/A
Rule Penetration: N/A

Source of Projected Emissions: Bus emissions from an increase in transit service for areas not currently served by transit. Emissions benefit achieved by reducing emissions from single occupant vehicles. Benefit may be partially offset by the increase in bus emissions.

Identified SCCs: N/A

Total Emissions affected in 1990 EI: 99.76 tons per ozone day

Affected Parties: Those outlying areas that are not currently served by the public mass transportation system. This has the potential of affecting areas in the Houston/Galveston nonattainment.

Estimated Costs: The cost assumes an increase in transit service by providing more express bus service to areas not currently served by transit. Passengers, miles per route, and number of routes were calculated and then combined with annual cost to arrive at a cost/ton.

Cost Effectiveness:
VOC: $1,014,862/ton
CO: $ 138,120/ton
NOx: $ 727,472/ton

Comments: Legislative authority may be needed in order to carry out the non-metro area transit. Since transit is contingent upon sales tax levied, only those areas that are in the sales tax area receive transit service.

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EMISSION CONTROL MEASURE (#17)
VEHICLE SCRAPPAGE

Control Measure Description: This control measure allows stationary sources to purchase high polluting vehicles that are identified by emissions testing and meet certain criteria in the Houston/Galveston nonattainment area. By purchasing these vehicles, stationary source can earn credits, which they can use to comply with federal and state regulations and to obtain offsets for future growth.

Control Measure Source: TNRCC, 30 TAC 114.29

Rule Effectiveness:
Control Efficiency:
Rule Penetration:

Source of Projected Emissions: High emitting, registered vehicles in the Houston/Galveston nonattainment area that have been driven for the past year.

Identified SCCs: N/A

Total Affected Emissions (adjusted 1999 EI): 99.67 TONS per Ozone Day

Affected Parties: The owners of vehicles that qualify to be scrapped, those entities that purchase the vehicles, and the entities that actually scrap the vehicles, such as a salvage yard, automotive dismantler or parts recycler.

Estimated Costs: To reduce 2 tpd of VOC (730 tons per year) and .64 tpd of NOx (234 tons per year), 13,140 vehicles would need to purchased. If each vehicle is purchased for $500, and assuming $50 per vehicle for an administrative fee, the total cost of the program would be approximately $7,227,000.

Cost Effectiveness: $ 9,900/ton of VOC in the first year
$30,885/ton of NOx in the first year
Assuming there is three years left in the remaining life of the vehicle that is scrapped, the cost spread over three years would be:
$ 3,300/ton of VOC
$10,295/ton of NOx

Comments: This is a variable program with its costs highly dependent upon how much credit a stationary source wants/needs and the purchase price of the scrapped vehicles.

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EMISSION CONTROL MEASURE (#18)
ELECTRIC LAWN AND GARDEN EQUIPMENT

Control Measure Description:	This measure would require that lawn and garden equipment sold after January 1, 1999 in the Houston/Galveston nonattainment area be electric powered. Depending on the application, some internal combustion equipment would still be sold. Another version of the measure might provide local tax incentives to promote the purchase of electric equipment.
Control Measure Source:	TNRCC
Rule Effectiveness:	15%
Control Efficiency:	100% Equipment would be zero emission. Some emissions would be transferred to power plants.
Rule Penetration:	15% EPA guidance indicates that 20% of the lawn and garden inventory is replaced each year. The price of electric equipment may slow purchases.
Source of Projected Emissions:	Internal combustion engines 25 horsepower and less. These engines are used in a wide variety of applications, but the primary source of emissions is residential lawn and garden use. Light industrial uses include pumps, and small forklifts.
Identified SCCs:	NA
Total Affected Emissions (adjusted 1999 EI):	90.74 tons per day VOC 13.15 tpd NOx
Affected Parties:	Retailers would be required to stock electric equipment for most sales. Consumers may lose some convenience.
Estimated Costs:	Estimated hours of use each year are 60 and the average power rating is 3 horsepower or 2.24 kW. Other estimates include a $60 increase in the price of an electric mower over a comparable powered gasoline model, an inventory of 717,000 mowers in the HGA nonattainment area, and a 15% average inventory turnover each year.
Cost Effectiveness:	Total cost of $7,763,000 per yr and a VOC reduction of 13.61 tons per day or 4968 tons per year. Cost effectiveness is $1563 per ton VOC reduced.

Comments:	There will be a slight increase in VOC emissions from electric power generation through the increased demand of the new equipment. The relative efficiency of the generating station makes this an insignificant number. There will also be an slight increase in NOx emissions from the power plants of 0.0005 tons per day or 0.1945 tons per year. Manufacturers who already produce a large selection of electric powered equipment may be placed in a competitive advantage by this type of regulation. By providing ample lead time before implementation, other manufacturers will have time to expand their product line. The VOC reduction is primarily gasoline vapor which has a health effect screening level of 3500 ppb for a one hour average. Mean incremental reactivity for the substances in gasoline is 2.
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Area Sources

EMISSION CONTROL MEASURE (#19)
ARCHITECTURAL COATINGS

Control Measure Description:	EPA was involved in regulation negotiation (reg-neg) for the development of a national architectural & industrial maintenance (AIM) coatings rule, which initially was expected to provide overall emission reductions of 25%. EPA now indicates that the reduction will be only about 15%. In order to take credit for reductions greater than the anticipated 15% reduction, the TNRCC must develop a rule to include about 30 coating categories with limits which are more stringent than those in the national rule. The rule would need to be statewide for maximum rule effectiveness.
Control Measure Source:	Reg-neg for EPA's national AIM coatings rule.
Rule Effectiveness: N/A **Control Efficiency:** Under evaluation **Rule Penetration:** N/A	
Source of Projected Emissions: Industrial, commercial, and household use of AIM coatings. **Identified SCCs:** N/A **Total Affected Emissions (adjusted 1999 EI):** 26.35 Tons per Ozone Day	
Affected Parties:	This statewide rule would target the manufacturers of AIM coatings. Retailers and wholesalers would also be affected by the rule to the extent that they would be prohibited from selling or offering for sale any noncompliant AIM coatings.
Estimated Costs:	In some cases, compliant coatings are readily available. In other cases, the coating manufacturers would have to reformulate their coatings to meet the AIM rule. The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to consumers. The cost of reformulated coatings is unknown.
Cost Effectiveness:	Unable to calculate since the cost of compliance is unknown.
Comments:	In order of decreasing emission rates, VOCs emitted from typical surface coating processes consist of miscellaneous aliphatic VOCs [mineral spirits & naphthas] (20.4%); toluene (11.2%); MEK (8.6%); acetone (8.1%); xylene (8.0%); ethylene glycol monobutyl ether (7.0%); other glycol ethers (8.6%); propanol (6.1%); ethanol (5.5%); butyl acetate (2.8%); butanol (2.6%); ethyl acetate (2.3%); methanol (2.3%); MIBK (2.3%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions in AIM coatings.
Staff Contact:	Eddie Mack (239-1488)

EMISSION CONTROL MEASURE (#21)
OTHER SPECIAL PURPOSE COATINGS

Control Measure Description:	EPA was involved in regulation negotiation (reg-neg) for the development of a national architectural & industrial maintenance (AIM) coatings rule, which initially was expected to provide overall emission reductions of 25%. EPA now indicates that the reduction will be only about 15%. In order to take credit for reductions greater than the anticipated 15% reduction, the TNRCC must develop a rule to include about 30 coating categories with limits which are more stringent than those in the national rule. The rule would need to be statewide for maximum rule effectiveness. EPA has been unable to define exactly what "other special purpose coatings" are, but these coatings appear to be included in the AIM rule.
Control Measure Source:	Reg-neg for EPA's national AIM coatings rule.
Rule Effectiveness:	N/A
Control Efficiency:	Under evaluation
Rule Penetration:	N/A;
Source of Projected Emissions:	Industrial, commercial, and household use of "other special purpose coatings."
Identified SCCs:	N/A
Total Affected Emissions (adjusted 1999 EI):	4.55 Tons per Ozone Day
Affected Parties:	This statewide rule would target the manufacturers of AIM coatings (including "other special purpose coatings"). Retailers and wholesalers would also be affected by the rule to the extent that they would be prohibited from selling or offering for sale any noncompliant AIM coatings.
Estimated Costs:	In some cases, compliant coatings are readily available. In other cases, the coating manufacturers would have to reformulate their coatings to meet the rule. The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to consumers.
Cost Effectiveness:	Unable to calculate since the cost of compliance is unknown. A very cost-effective option is to delete these categories from the 1996 emissions inventory, which would in effect provide a 100% reduction in these emissions.
Comments:	In order of decreasing emission rates, VOCs emitted from typical surface coating processes consist of miscellaneous aliphatic VOCs [mineral spirits & naphthas] (20.4%); toluene (11.2%); MEK (8.6%); acetone (8.1%); xylene (8.0%); ethylene glycol monobutyl ether (7.0%); other glycol ethers (8.6%); propanol (6.1%); ethanol (5.5%); butyl acetate (2.8%); butanol (2.6%); ethyl acetate (2.3%); methanol (2.3%); MIBK (2.3%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions in AIM coatings.
Staff Contact:	Eddie Mack (239-1488)

EMISSION CONTROL MEASURE (#22)
TRAFFIC MARKINGS

Control Measure Description:	EPA was involved in regulation negotiation (reg-neg) for the development of a national architectural & industrial maintenance (AIM) coatings rule, which initially was expected to provide overall emission reductions of 25%. EPA now indicates that the reduction will be only about 15%. In order to take credit for reductions greater than the anticipated 15% reduction, the TNRCC must develop a rule to include about 30 coating categories with limits which are more stringent than those in the national rule. The rule would need to be statewide for maximum rule effectiveness. Traffic markings are included in EPA's AIM coatings rule.
Control Measure Source:	Reg-neg for EPA's national AIM coatings rule.
Rule Effectiveness:	N/A
Control Efficiency:	Under evaluation
Rule Penetration:	N/A;
Source of Projected Emissions:	TxDOT; city and county road departments; and parking lot striping companies.
Identified SCCs:	N/A
Total Affected Emissions (adjusted 1999 EI):	2.18 Tons per Ozone Day
Affected Parties:	This statewide rule would target the manufacturers of AIM coatings (including traffic markings). Retailers and wholesalers would also be affected by the rule to the extent that they would be prohibited from selling or offering for sale any noncompliant AIM coatings. TxDOT, city & county road departments, and parking lot striping companies would also be affected.
Estimated Costs:	Waterborne traffic markings are available and are currently being used by TxDOT. In other cases, the coating manufacturers would have to reformulate their coatings to meet the rule. The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to their customers.
Cost Effectiveness:	Unable to calculate since the cost of compliance is unknown. Expected to be fairly cost-effective since TxDOT has voluntarily switched to compliant waterborne coatings.
Comments:	In order of decreasing emission rates, VOCs emitted from typical surface coating processes consist of miscellaneous aliphatic VOCs [mineral spirits & naphthas] (20.4%); toluene (11.2%); MEK (8.6%); acetone (8.1%); xylene (8.0%); ethylene glycol monobutyl ether (7.0%); other glycol ethers (8.6%); propanol (6.1%); ethanol (5.5%); butyl acetate (2.8%); butanol (2.6%); ethyl acetate (2.3%); methanol (2.3%); MIBK (2.3%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions in AIM coatings.
Staff Contact:	Eddie Mack (239-1488)

EMISSION CONTROL MEASURE (#23)
PARKING MANAGEMENT
(EMPLOYER-BASED)

Control Measure Description: A program to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use; and programs and ordinances to facilitate non-automobile travel, etc. Parking management strategies can include preferential parking for HOV, public sector pricing, and control of parking supply.

Control Measure Source: Loudon, William R., Deborah A. Dagang, and Robert Dulla, "The Effectiveness of Transportation Control Measures in Reducing Congestion and Improving Air Quality." Air and Waste Management Association. Denver, CO. June 1993.

Rule Effectiveness: N/A
Control Efficiency: N/A
Rule Penetration: Unknown at this time

Source of Projected Emissions: Vehicles driving to and from the work site in areas with high concentrations of emissions, especially during peak use.

Identified SCCs: N/A

Total Emissions affected in 1990 EI: 99.76 tons per ozone day

Affected Parties: This program primarily effects persons riding in single-occupant vehicles parking in dense or highly congested areas.

Estimated Costs: Cost includes providing enforcement action to the parking program.

Cost Effectiveness:
VOC: $101,430/ton
CO: $10,605/ton
NOx: $47,540/ton

Comments: Parking management strategies are most effective when implemented in dense CBDs that have limited available parking. If there is an excess of parking, this will diminish the effectiveness of the parking management program. Parking Management can be an effective tool for local government to reduce traffic and associated emissions in congested areas by encouraging travelers to use modes other than driving alone. Three strategies can be applied with the public sector: preferential parking policies for high occupancy vehicles (HOV); public sector pricing policies; and control of parking supply.

Parking management has the potential of reducing peak period trips by 6.25% and off-peak trips by 2.6%. This is due to the elimination of trips.

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04-27-95

EMISSION CONTROL MEASURE (#24)
TELECOMMUTING
(HOME-BASED WORK SITE)

Control Measure Description: Telecommuting is working at a location other than one's usual office, and therefore avoiding the trip to the office, while performing the same duties as would otherwise be performed in the central office. For this analysis, home as the work site was evaluated.

Control Measure Source: United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington D.C., March 1992.

Information obtained to estimate certain aspects of this program were derived from staff's estimation of the programs start-up and daily operating costs.

Rule Effectiveness: N/A
Control Efficiency: N/A
Rule Penetration: unknown at this time

Source of Projected Emissions: This program could either be for the entire Houston/Galveston ozone nonattainment area or could be in areas of higher concentration of vehicular traffic.

Since we are analyzing this program from an at-home perspective, we have calculated emissions generated from a secondary use of the vehicle.

Identified SCCs: N/A

Total Emissions affected in 1990 EI: 99.76 tons per ozone day

Affected Parties: Telecommuting is widely used by many employers, both large and small, on a national scale. Telecommuting is favored because it allows the employee to work at home on a flexible schedule. This could be used as part of the ETR program.

Estimated Costs: Equipment and computer hook-up have been calculated as part of the overall cost of the program. The cost effectiveness below considers VMT saved minus secondary use of vehicle plus cost to employer. The calculation also takes into consideration volume and average trip length.

Cost Effectiveness:
VOC: $86,088/ton
CO: $11,591/ton
NOx: $49,580/ton

Comments: A reduction in vehicle trips due to this program could and would have positive air quality benefits to the area. Positive air quality benefits include reduced trips and VMT during peak and non-peak periods and reduced hot and cold starts. Unfortunately, a thorough survey of employees and employers would need to be conducted in order to assist in the evaluation of this program.

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04-27-95

EMISSION CONTROL MEASURE (#25)
FLEXIBLE WORK SCHEDULES

Control Measure Description: To reduce the volume of commute travel during peak periods and to change work schedules to provide greater flexibility.

Control Measure Source: United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington D.C., March 1992.

Rule Effectiveness: N/A
Control Efficiency: N/A
Rule Penetration: unknown at this time

Source of Projected Emissions: Vehicular emissions from employees continuing to drive to work except at different times. Overall emissions may rise or fall depending on success of program. Congestion relief will probably have a positive air quality benefit on VOC's but may have a negative effect on NOx reductions.

Identified SCCs: N/A

Total Emissions affected in 1990 EI: 99.76 tons per ozone day

Affected Parties: Flexible work schedules are widely used by many employers, both large and small nationwide. This TCM allows the employee to work a full time schedule with the flexibility to arrange the hours. This program could be used in the Houston/Galveston nonattainment area or could be modified to the highest congested areas, for example Harris County.

Estimated Costs: Cost for this program has not yet been determined because of the lack of information about employee involvement. Set schedules are not easily obtainable due to the flexibility of the program.

Cost Effectiveness:
VOC: $49,515/ton
NOx: neg. benefit
CO: $ 5,765/ton

Comments: This program can be combined with the ETR program. Flexible work schedules may provide greater flexibility in arrival and departure times to support ridesharing activities. Positive air quality impacts include reduced peak period congestion. Negative impacts may be that flexible work schedules cause some transit users to drive alone, thus offsetting the initial benefit.

Changing the time the employee arrives at the work site could change the concentration of ozone precursors being emitted from those vehicles. This might aid in the reduction of ozone. Unfortunately, the pollution reduction benefits are so small for the cost associated with this program.

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05-01-95

EMISSION CONTROL MEASURE (#26)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAHPIC PROCESSSES: Publication Flexography)

Control Measure Description:	Use of catalytic incinerators to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness:	99%
Control Efficiency	98%
Rule Penetration:	
Source of Projected Emissions:	Solvent use in inks and general process.
Identified SCCs:	405003, 40500301, 405005, 40500501, A245040000
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of publication flexography facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 10 TPY= $4,000; 25 TPY= $4,000; 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Catalytic Incinerators:10 TPY (10% LEL only)= $110,000; 25 TPY (10% LEL)= $120,000-$170,000; 50 TPY (25% LEL only)= $110,000-$150,000 & (10% LEL)= $180,000-$250,000; 100 TPY (25% LEL)= $150,000-$220,000 & (10% LEL)= $250,000-$370,000; 1,000 TPY (25% LEL)= $340,000 & (10% LEL)= $690,000.
Cost Effectiveness:	10 TPY (10% LEL)= $ 3,900; 25 TPY (10% LEL)= $2,500-$2,800; 50 TPY (25% LEL)= $ 980-$1,100 & (10% LEL)= $1,800-$2,000; 100 TPY (25% LEL)= $1,200- 1,300 & (10% LEL)= $1,400-$1,600; 1000 TPY (25% LEL)= $180 & (10% LEL)= $350. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink**: Benzisothiazolinon, ethylenediamine, ammonium hydroxide, antimicrobial agents, isopropanol, toluene, **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene. **Wash Solution**: ethylene glycol monethyl ether, amines, ammonia. "Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, 512-239-1054

EMISSION CONTROL MEASURE (#27)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAHPIC PROCESSSES: Publication Flexography)

Control Measure Description:	Use of carbon adsorption system to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness: 99% **Control Efficiency:** 95% **Rule Penetration:**	
Source of Projected Emissions: Solvent use in inks and general process. **Identified SCCs:** 405003, 40500301, 405005, 40500501, A245040000 **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Operators of publication flexography facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Carbon Adsorption Systems:50 TPY (25% LEL only)= $77,000 & (10% LEL)= $77,000; 100 TPY (25% LEL)= $110,000 & (10% LEL)= $110,000; 1,000 TPY (25% LEL)= $330,000 & (10% LEL)= $330,000.
Cost Effectiveness:	50 TPY (25% LEL)= $760 & (10% LEL)= $780; 100 TPY (25% LEL)= $450 & (10% LEL)= $460; 1000 TPY (25% LEL)= $120 & (10% LEL)= $120. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink**: Benzisothiazolinon, ethylenediamine, ammonium hydroxide, antimicrobial agents, isopropanol, toluene, **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene. **Wash Solution**: ethylene glycol monethyl ether, amines, ammonia. "Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#28)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAHPIC PROCESSSES:
Packaging Flexography)

Control Measure Description:	Use of thermal incinerators to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness:	99%
Control Efficiency:	98%
Rule Penetration:	
Source of Projected Emissions:	Solvent use in inks and general process.
Identified SCCs:	405003, 40500301, 405005, 40500501, A245040000
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of packaging flexography facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 10 TPY= $4,000; 25 TPY= $4,000; 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Thermal Incinerators:10 TPY= $99,000; 25 TPY= $99,000; 50 TPY= $120,800; 100 TPY= $130,800; 1,000 TPY= $360,000
Cost Effectiveness:	10 TPY= $3,500-$4,800; 25 TPY $2,500-$3,000; 50 TPY= $1,200-$2,400; 100 TPY= $850-$2,000; 1000 TPY= $170-$480. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink**: Benzisothiazolinon, ethylenediamine, ammonium hydroxide, antimicrobial agents, isopropanol, toluene, n-propanol, n-propyl acetate, ethyl alcohol, n-heptane. **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene, isopropanol, methyl isobutyl ketone, diethylene glycol ether, methyl ethyl ketone. **Wash Solution**: ethylene glycol monethyl ether, amines, ammonia. "Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#29)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Packaging Flexography)

Control Measure Description:	Use of catalytic incinerators to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness: 99% **Control Efficiency:** 98% **Rule Penetration:**	
Source of Projected Emissions: Solvent use in inks and general process. **Identified SCCs:** 405003, 40500301, 405005, 40500501, A245040000 **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Operators of packaging flexography facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 10 TPY= $4,000; 25 TPY= $4,000; 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Catalytic Incinerators:10 TPY (10% LEL only)= $110,000; 25 TPY (10% LEL)= $120,000-$170,000; 50 TPY (25% LEL only)= $110,000-$150,000 & (10% LEL)= $180,000-$250,000; 100 TPY (25% LEL)= $150,000-$220,000 & (10% LEL)= $250,000-$370,000; 1,000 TPY (25% LEL)= $340,000 & (10% LEL)= $690,000.
Cost Effectiveness:	10 TPY (10% LEL)= $ 3,900; 25 TPY (10% LEL)= $2,500-$2,800; 50 TPY (25% LEL)= $ 980-$1,100 & (10% LEL)= $1,800-$2,000; 100 TPY (25% LEL)= $1,200- 1,300 & (10% LEL)= $1,400-$1,600; 1000 TPY (25% LEL)= $180 & (10% LEL)= $350. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink**: Benzisothiazolinon, ethylenediamine, ammonium hydroxide, antimicrobial agents, isopropanol, toluene, n-propanol, n=propyl acetate, ethyl alcohol, n-heptane. **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene, isopropanol, methyl isobutyl ketone, diethylene glycol ether, methyl ethyl ketone. **Wash Solution**: ethylene glycol monethyl ether, amines, ammonia. "Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#30)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Packaging Flexography)

Control Measure Description:	Use of carbon adsorption system to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness: 99% **Control Efficiency:** 95% **Rule Penetration:**	
Source of Projected Emissions: Solvent use in inks and general process. **Identified SCCs:** 405003, 40500301, 405005, 40500501, A245040000 **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Operators of packaging flexography facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Carbon Adsorption Systems:50 TPY (25% LEL only)= $77,000 & (10% LEL)= $77,000; 100 TPY (25% LEL)= $110,000 & (10% LEL)= $110,000; 1,000 TPY (25% LEL)= $330,000 & (10% LEL)= $330,000.
Cost Effectiveness:	50 TPY (25% LEL)= $760 & (10% LEL)= $780; 100 TPY (25% LEL)= $450 & (10% LEL)= $460; 1000 TPY (25% LEL)= $120 & (10% LEL)= $120. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink**: Benzisothiazolinon, ethylenediamine, ammonium hydroxide, antimicrobial agents, isopropanol, toluene, n-propanol, n-propyl acetate, ethyl alcohol, n-heptane. **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene, isopropanol, methyl isobutyl ketone, diethylene glycol ether, methyl ethyl ketone. **Wash Solution**: ethylene glycol monethyl ether, amines, ammonia. "Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#31)
CONTROL OF TRUCK MOVEMENTS

Control Measure Description: Controlling or restricting heavy duty trucks from certain hours of the day in certain areas or on certain facility types (excluding freeway).

Control Measure Source: United State Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington D.C., March 1992.

Rule Effectiveness: N/A
Control Efficiency: N/A
Rule Penetration: unknown at this time

Source of Projected Emissions: Emissions generated from heavy duty trucks operating during peak periods.

Identified SCCs: N/A

Total Emissions affected in 1990 EI: 99.76 tons per ozone day

Affected Parties: Truck drivers, freight and delivery companies operating in the eight county Houston/Galveston nonattainment area.

Estimated Costs: Estimated costs to this program include enforcement of truck movements in the peak hours.

Cost Effectiveness:
VOC: $47,628/ton
CO: $ 6,608/ton
NOx: $ 554/ton

Comments: Controlling movements in certain areas can be very beneficial in reducing congestion and the associated pollution generated from this control. Shifting peak period truck movements could have a negative effect on air quality. If the trucks are being banned from peak hour use, this shifts traffic to different operating hours which may cause problems in those time periods. This could result in slightly negative air quality impacts.

Also, removing trucks from peak use could increase overall facility operating speeds which may lead to lower VOC levels but slightly higher NOx levels.

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05-01-95

EMISSION CONTROL MEASURE (#32)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Packaging Gravure)

Control Measure Description:	Use of thermal incinerators to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness:	99%
Control Efficiency	98%
Rule Penetration:	
Source of Projected Emissions:	Solvent use in inks and general process.
Identified SCCs:	405003, 40500301, 405005, 40500501, A2425030000
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of packaging gravure facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 10 TPY= $4,000; 25 TPY= $4,000; 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Thermal Incinerators:10 TPY= $99,000; 25 TPY= $99,000; 50 TPY= $120,800; 100 TPY= $130,800; 1,000 TPY= $360,000
Cost Effectiveness:	10 TPY= $3,500-$4,800; 25 TPY $2,500-$3,000; 50 TPY= $1,200-$2,400; 100 TPY= $850-$2,000; 1000 TPY= $170-$480. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink, varnish**: Toluene, xylene, mineral spirits, acetone, methyl ethyl ketone, methyl isobutyl ketone, ethyl acetate, isopropyl acetate, n-propyl acetate, butyl acetate, n-butyl acetate, ethylene glycol monoethyl ether, methanol, ethanol, isopropanol, tri-decanol. **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene, isopropanol."Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#33)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Publication Gravure)

Control Measure Description:	Use of thermal incinerators to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness: 99% **Control Efficiency:** 98% **Rule Penetration:**	
Source of Projected Emissions: Solvent use in inks and general process. **Identified SCCs:** 405003, 40500301, 405005, 40500501, A2425030000 **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Operators of publication gravure facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 10 TPY= $4,000; 25 TPY= $4,000; 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Thermal Incinerators:10 TPY= $99,000; 25 TPY= $99,000; 50 TPY= $120,800; 100 TPY= $130,800; 1,000 TPY= $360,000
Cost Effectiveness:	10 TPY= $3,500-$4,800; 25 TPY $2,000-$3,000; 50 TPY= $1,200-$2,400; 100 TPY= $850-$2,000; 1000 TPY= $170-$480. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink, varnish**: Toluene, xylene, hexane, heptane, mineral spirits, lactol spirits, petroleum naptha, VM&P naptha, & alcohols. **Wash solvent**: Toluene, aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, isopropanol."Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact: Thomas C. Ortiz, (512) 239-1054	

EMISSION CONTROL MEASURE (#34)
CONTROL OF EXTENDED VEHICLE IDLING
RESTRICT DRIVE THRUS AND TOLL BOOTHS

Control Measure Description: Measures to reduce the amount of time which vehicles spend in idle mode as part of their overall operation. This includes drive-thru and toll booth operations, as well as heavy-duty diesel idling.

Control Measure Source: United States Environmental Protection Agency Office of Air and Radiation, "Transportation Control Measures Information Documents," Washington D.C., March 1992.

Rule Effectiveness: N/A
Control Efficiency: N/A
Rule Penetration: unknown at this time

Source of Projected Emissions: Tailpipe emissions generated as a result of vehicle idling. Includes passenger (LDG and LDD) and heavy duty vehicles. Reductions in idle time emissions are the product of the idle emission rate, in grams per hour, and the number of hours per day in reduced idling time. Sources of projected emissions include drive-thru, toll booth, curbside, and heavy-duty bus/truck idle.

Identified SCCs: N/A

Total Emissions affected in 1990 EI: 99.76 tons per ozone day

Affected Parties: Controls on construction and operation of drive-thru facilities such as banks and fast food restaurants; controls on toll booth design and operation; controls on extended vehicle idling during layover time, particularly of diesel engines used by transit vehicles, delivery trucks, and interstate freight trucks.

Estimated Costs: These costs are based on hours of operation, equipment costs, start up costs, salaries for potential employees, etc.

Cost Effectiveness:
Toll booths: VOC $57,155/ton CO $6,705/ton NOx $178,583/ton
Drive Thru Windows: VOC $31,062/ton CO $3,644/ton NOx $97,056/ton
Heavy Duty Diesel Idling: VOC $5,285/ton CO $714/ton NOx $1,178/ton

Comments: Laws can be enacted to limit idle time of heavy-duty vehicles if the vehicle is not performing useful work. Time limits can be set by the legislature. Also, drive-up window design can be modified as to minimize idling or queue time. New technologies for toll booth operations minimize or eliminate idle time completely.

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5-01-95

EMISSION CONTROL MEASURE (#35)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Product Gravure)

Control Measure Description:	Use of catalytic incinerators to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness:	99%
Control Efficiency:	98%
Rule Penetration:	
Source of Projected Emissions:	Solvent use in inks and general process.
Identified SCCs:	405003, 40500301, 405005, 40500501, A2425030000
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of product gravure facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 10 TPY= $4,000; 25 TPY= $4,000; 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Catalytic Incinerators:10 TPY (10% LEL only)= $110,000; 25 TPY (10% LEL)= $120,000-$170,000; 50 TPY (25% LEL only)= $110,000-$150,000 & (10% LEL)= $180,000-$250,000; 100 TPY (25% LEL)= $150,000-$220,000 & (10% LEL)= $250,000-$370,000; 1,000 TPY (25% LEL)= $340,000 & (10% LEL)= $690,000.
Cost Effectiveness:	10 TPY (10% LEL)= $ 3,900; 25 TPY (10% LEL)= $2,500-$2,800; 50 TPY (25% LEL)= $ 980-$1,100 & (10% LEL)= $1,800-$2,000; 100 TPY (25% LEL)= $1,200- 1,300 & (10% LEL)= $1,400-$1,600; 1000 TPY (25% LEL)= $180 & (10% LEL)= $350. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink, varnish**: Toluene, xylene, mineral spirits, acetone, methyl ethyl ketone, methyl isobutyl ketone, ethyl acetate, isopropyl acetate, n-butyl acetate, ethylene glycol monoethyl ether, methanol, ethanol, isopropanol, tri-decanol. **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene, isopropanol."Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#36)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Packaging Gravure)

Control Measure Description:	Use of catalytic incinerators to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness: 99% **Control Efficiency:** 98% **Rule Penetration:**	
Source of Projected Emissions: Solvent use in inks and general process. **Identified SCCs:** 405003, 40500301, 405005, 40500501, A2425030000 **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Operators of packaging gravure facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 10 TPY= $4,000; 25 TPY= $4,000; 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Catalytic Incinerators:10 TPY (10% LEL only)= $110,000; 25 TPY (10% LEL)= $120,000-$170,000; 50 TPY (25% LEL only)= $110,000-$150,000 & (10% LEL)= $180,000-$250,000; 100 TPY (25% LEL)= $150,000-$220,000 & (10% LEL)= $250,000-$370,000; 1,000 TPY (25% LEL)= $340,000 & (10% LEL)= $690,000.
Cost Effectiveness:	10 TPY (10% LEL)= $ 3,900; 25 TPY (10% LEL)= $2,500-$2,800; 50 TPY (25% LEL)= $ 980-$1,100 & (10% LEL)= $1,800-$2,000; 100 TPY (25% LEL)= $1,200- 1,300 & (10% LEL)= $1,400-$1,600; 1000 TPY (25% LEL)= $180 & (10% LEL)= $350. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink, varnish**: Toluene, xylene, mineral spirits, acetone, methyl ethyl ketone, methyl isobutyl ketone, ethyl acetate, isopropyl acetate, n-propyl acetate, butyl acetate, n-butyl acetate, ethylene glycol monoethyl ether, methanol, ethanol, isopropanol, tri-decanol. **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene, isopropanol."Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#37)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Publication Gravure)

Control Measure Description:	Use of carbon adsorption system to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness:	99%
Control Efficiency:	95%
Rule Penetration:	
Source of Projected Emissions:	Solvent use in inks and general process.
Identified SCCs:	405003, 40500301, 405005, 40500501, A2425030000
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of publication gravure facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Carbon Adsorption Systems:50 TPY (25% LEL only)= $77,000 & (10% LEL)= $77,000; 100 TPY (25% LEL)= $110,000 & (10% LEL)= $110,000; 1,000 TPY (25% LEL)= $330,000 & (10% LEL)= $330,000.
Cost Effectiveness:	50 TPY (25% LEL)= $760 & (10% LEL)= $780; 100 TPY (25% LEL)= $450 & (10% LEL)= $460; 1000 TPY (25% LEL)= $120 & (10% LEL)= $120. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink, varnish**: Toluene, xylene, hexane, heptane, mineral spirits, lactol spirits, petroleum naptha, VM&P naptha, & alcohols. **Wash solvent**: Toluene, aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, isopropanol."Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#38)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Packaging Gravure)

Control Measure Description:	Use of carbon adsorption system to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness:	99%
Control Efficiency:	98%
Rule Penetration:	
Source of Projected Emissions:	Solvent use in inks and general process.
Identified SCCs:	405003, 40500301, 405005, 40500501, A2425030000
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of packaging gravure facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Carbon Adsorption Systems:50 TPY (25% LEL only)= $77,000 & (10% LEL)= $77,000; 100 TPY (25% LEL)= $110,000 & (10% LEL)= $110,000; 1,000 TPY (25% LEL)= $330,000 & (10% LEL)= $330,000.
Cost Effectiveness:	50 TPY (25% LEL)= $760 & (10% LEL)= $780; 100 TPY (25% LEL)= $450 & (10% LEL)= $460; 1000 TPY (25% LEL)= $120 & (10% LEL)= $120. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink, varnish**: Toluene, xylene, mineral spirits, acetone, methyl ethyl ketone, methyl isobutyl ketone, ethyl acetate, isopropyl acetate, n-propyl acetate, butyl acetate, n-butyl acetate, ethylene glycol monoethyl ether, methanol, ethanol, isopropanol, tri-decanol. **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene, isopropanol."Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#39)
(GRAPHIC ARTS: ROTOGRAVURE & FLEXOGRAPHIC PROCESSES: Product Gravure)

Control Measure Description:	Use of carbon adsorption system to control VOC emissions & total enclosure capture systems. 30 TAC §115.432 will be impacted by this requirement.
Control Measure Source:	"Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Rule Effectiveness: 99% **Control Efficiency:** 98% **Rule Penetration:**	
Source of Projected Emissions: Solvent use in inks and general process. **Identified SCCs:** 405003, 40500301, 405005, 40500501, A2425030000 **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Operators of product gravure facilities
Estimated Costs:	Plant size (ton/year of total solvent use):Total Enclosure (1991 $): 50 TPY= $6,800; 100 TPY= $6,800; 1,000 TPY= $19,000 Carbon Adsorption Systems:50 TPY (25% LEL only)= $77,000 & (10% LEL)= $77,000; 100 TPY (25% LEL)= $110,000 & (10% LEL)= $110,000; 1,000 TPY (25% LEL)= $330,000 & (10% LEL)= $330,000.
Cost Effectiveness:	50 TPY (25% LEL)= $760 & (10% LEL)= $780; 100 TPY (25% LEL)= $450 & (10% LEL)= $460; 1000 TPY (25% LEL)= $120 & (10% LEL)= $120. (without enclosure cost) "Alternative VOC Control Technique Options for Small Rotogravure and Flexographic Facilities", EPA-600/R-92-20 October 1992.
Comments:	**Ink, varnish**: Toluene, xylene, mineral spirits, acetone, methyl ethyl ketone, methyl isobutyl ketone, ethyl acetate, isopropyl acetate, n-butyl acetate, ethylene glycol monoethyl ether, methanol, ethanol, isopropanol, tri-decanol. **Wash solvent**: aliphatic and aromatic hydrocarbons, ethanol, mineral spirits, acetone, toluene, isopropanol."Printing Industry and Use Cluster Profile", USEPA 744-R-94-003 June 1994.
Staff Contact:	Thomas C. Ortiz, (512) 239-1054

EMISSION CONTROL MEASURE (#40)
(Offset Lithographic Printing - Fountain Solution)

Control Measure Description:	Require the installation of magnets within the fountain solution tank. This would impact the compliance options found in §115.442. Assumption that 3% IPA fountain solution is used for startup & without refrigeration.
Control Measure Source:	"Draft Offset Lithographic Printing Control Techniques Guideline", USEPA, Chemicals and Petroleum Branch, Research Triangle Park, North Carolina.
Rule Effectiveness:	99%
Control Efficiency:	
Rule Penetration:	
Source of Projected Emissions:	Offset printers will reduce the amount of fountain solution used thus reducing VOCs and sources will be able to use solutions with lower VOC content.
Identified SCCs:	405004, 40500401, 40500411, 40500412, 40500413
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Industries: Printing Industry (SIC 27); Nonattainment areas: D/FW, El Paso, & H/G; Associations: Printing Industries Association of Texas & Printing Industries of the Gulf Coast.
Estimated Costs:	**Capital** Costs: Heatset Web Model Plants: (5 units= $1,750); (11 units= $3,850); (22 units= $7,700); (40 units= $14,000) Heatset Web Model Plants: (5 units= $1,750); (11 units= $3,850); (22 units= $7,700); (40 units= $14,000) Non-heatset Sheet Model Plants: (3 units= $1,050); (5 units= $1,750); (16 units= $5,600); (36 units= $12,600) Newspaper (non-heatset web) Model Plants: (6 units= $2,100); (9 units= $3,150); (17 units= $5,950); (33 units= $11,550); (68 units= $23,800); (110 units= $38,500). **Annual** Costs: Heatset Web Model Plants: (5 units= $355); (11 units= $781); (22 units= $1,561); (40 units= $2,839) Heatset Web Model Plants: (5 units= $355); (11 units= $781); (22 units= $1,561); (40 units= $2,839) Non-heatset Sheet Model Plants: (3 units= $213); (5 units= $355); (16 units= $1,135); (36 units= $2,555) Newspaper (non-heatset web) Model Plants: (6 units= $426); (9 units= $639); (17 units= $1,206); (33 units= $2,342); (68 units= $4,825); (110 units= $7,806). ("Draft Offset Lithographic Printing Control Techniques Guideline", p.6-16)
Cost Effectiveness:	Heatset Web Model Plants:(5 units= $30); (11 units= $38); (22 units= $30); (40 units= $30) Non-Heatset Web Model Plants: (5 units= $21); (11 units= $22); (22 units= $22); (40 units= $22) Non-heatset Sheet Model Plants:(3 units= $1,050); (5 units= $921); (16 units= $903); (36 units= $906) (Facility size breakdown in "Draft Offset Lithographic Printing Control Techniques Guideline", p.6-16 and emission reduction estimates from p.5-9)

EMISSION CONTROL MEASURE (#41)
(Offset Lithographic Printing - Add-on Controls to dryers)

Control Measure Description:	Require the installation of catalytic oxidizers with 95% VOC destruction efficiency for all heatset web offset lithographic printing presses. This action replaces the compliance requirement found in §115.442(2).
Control Measure Source:	Draft "Offset Lithographic Printing Control Techniques Guideline", USEPA, Chemicals and Petroleum Branch, September 6, 1991.
Rule Effectiveness: 99% **Control Efficiency:** 95% **Rule Penetration:**	
Source of Projected Emissions:	total VOC emissions from press operation.
Identified SCCs:	40500101 or 40500199
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Industries: Printing Industry (SIC 27); Nonattainment areas: D/FW, El Paso, & H/G; Associations: Printing Industries Association of Texas & Printing Industries of the Gulf Coast.
Estimated Costs:	Heatset Web Model Plants:(4-6 units= $191,697); (6-16 units= $392,639); (12-32 units= $748,930); & (32-48 units= $931,492)
Cost Effectiveness:	Heatset Web Model Plants:(4-6 units= $7921); (6-16 units= $ 7366); (12-32 units= $ 7025); & (32-48 units= $ 4806)
Comments:	**Ink, varnish**: Petroleum distillates, vegetable oils, resin, rosin, dryer, pigments containing barium and copper. **Fountain Solution**: Isopropanol, 2-butoxy ethanol and other glycol ethers, gum arabic, phosphoric acid, ethylene glycol. The cost effectiveness estimates above do not include direct and indirect carryover of VOCs from cleaning solvents and fountain solutions into the heatset dryers. For automatic blanket wash systems, direct capture averaged around 40% for the test facilities when the vapor pressure of the cleaning material is less than 10mm Hg @ 20°C. Direct capture of VOC from fountain solutions was about 70%. Indirect capture is probable yet too difficult to estimate. .
Staff Contact:	Thomas C. Ortiz (512) 239-1054

EMISSION CONTROL MEASURE (#42)
(Offset Lithographic Printing - Fountain Solution)

Control Measure Description:	Require the operation of waterless plates in lithographic printing. This would impact the compliance options found in §115.442 (1)(A)(C)(D)(E).
Control Measure Source:	"Printing Industry and Use Cluster Profile", USEPA, Prevention, Pesticides, and Toxic Substances, EPA 744-R-94-003, June 1994.
Rule Effectiveness: 99%	
Control Efficiency:	
Rule Penetration:	
Source of Projected Emissions:	Offset printers will no longer use fountain solution for print operations.
Identified SCCs:	405004, 40500401, 40500411, 40500412, 40500413
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Industries: Printing Industry (SIC 27); Nonattainment areas: D/FW, El Paso, & H/G; Associations: Printing Industries Association of Texas & Printing Industries of the Gulf Coast.
Estimated Costs:	Capital Costs: $40,000 processors, $60,000-$100,000 chillers. Annual maintenance: increased plate use due to durability decreases. Operating Costs: increased cost of waterless inks & increased energy costs in chiller operation Social & Indirect Costs: technology has increased energy requirements and the waterless plate development is solvent based. ("Printing Industry and Use Cluster Profile", p.2-99.) There are also changeover costs which will vary from facility to facility.
Cost Effectiveness:	Heatset Web Model Plants:(4-6 units= $1,428-$2,000); (6-16 units= $653-$915); (12-32 units= $326-$457); & (32-48 units= $179-$251) Non-Heatset Web Model Plants: (4-6 units= $1,030-$1,443); (6-16 units= $471-$660); (12-32 units= $235-$329); & (32-48 units= $129-$181) Non-heatset Sheet Model Plants: (1-4 units= $83,333-$116,666); (2-8 units= $43,478-$60869); (8-24 units= $13,333-$18,666); & (24-48 units= $5,917-$8284) (Facility size breakdown in "Draft Offset Lithographic Printing Control Techniques Guideline")

Comments:	**Heatset Web Fountain Solution**: Isopropanol, 2-butoxy ethanol and other glycol ethers, gum arabic, phosphoric acid, ethylene glycol **Nonheatset Web Fountain Solution**: Isopropanol, 2-butoxy ethanol, gum arabic, dextrin, phosphate dipropylene glycol, synthetic cellulose. **Nonheatset Sheet Fed Fountain Solution**: Isopropanol, 2-butoxy ethanol and other glycol ethers, gum arabic, phosphoric acid, ethylene glycol. "Printing Industry and Use Cluster Profile" USEPA, June 1994.
Staff Contact:	Thomas C. Ortiz (512) 239-1054

EMISSION CONTROL MEASURE (#43)
(Offset Lithographic Printing - Cleaning Solvents for Non-Heatset & Sheetfed Processes Only)

Control Measure Description:	Require the use of lithographic ink that can be cleaned with water. This particular technology comes from the Deluxe Corporation who had used the ink in over 40 of their facilities since 1993.
Control Measure Source:	"Alternative Control Techniques Document: Offset Lithographic Printing" USEPA, Office or Air Quality Planning and Standards, EPA 453/R-94-054, June 1994.
Rule Effectiveness: 99% **Control Efficiency:** **Rule Penetration:**	
Source of Projected Emissions: Cleaning solutions that are used during press operation. **Identified SCCs:** 405004, 40500401, 40500411, 4050012, 40500413 **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Industries: Printing Industry (SIC 27); Nonattainment areas: D/FW, El Paso, & H/G; Associations: Printing Industries Association of Texas & Printing Industries of the Gulf Coast.
Estimated Costs: **Cost Effectiveness:**	
Comments:	**Sheetfed**: aliphatic and aromatic hydrocarbons, mineral spirits, acetone, methylene chloride, xylene, toluene, glycol ethers, vegetable oils, fatty acids, surfactants. **Nonheatset Web**: aliphatic and aromatic hydrocarbons, mineral spirits, acetone, glycol ethers, vegetable oils, fatty acids. "Printing Industry and Use Cluster Profile", USEPA, June 1994.
Staff Contact: Thomas C. Ortiz (512) 239-1054	

EMISSION CONTROL MEASURE (#44)
(Offset Lithographic Printing - Cleaning Solvents 2)

Control Measure Description:	Solvents used in lithographic printing shall have a VOC content of 900 grams or less of VOC per liter and a VOC composite partial pressure of 10 mm Hg @ 20°C.
Control Measure Source:	South Coast Air Quality Management District Rule 1171 Solvent Cleaning Operation (adopted August 2, 1991) Rule 1171 (c)(1)(E)(ii).
Rule Effectiveness: 99% **Control Efficiency:** **Rule Penetration:**	
Source of Projected Emissions: Cleaning solutions that are used during press operation. **Identified SCCs:** 405004, 40500401, 40500411, 4050012, 40500413 **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Industries: Printing Industry (SIC 27); Nonattainment areas: D/FW, El Paso, & H/G; Associations: Printing Industries Association of Texas & Printing Industries of the Gulf Coast.
Estimated Costs: **Cost Effectiveness:**	
Comments: "The use of cleaning material with a VOC composite partial vapor pressure less than 10 mm Hg @ 20°C would result in comparable emission reduction to using cleaning materials that contain less than 30 weight VOC." (Alternate Control Techniques: Offset Lithographic Printing, p.6) "The VOC composite partial vapor pressure of most cleaning materials used to meet the SCAQMD requirement is less than 10 mm Hg @ 20°C. The VOC composite partial pressure of solvents used in automatic blanket washing systems is commonly less than 6 mm Hg @ 20°C. "(Alternate Control Techniques: Offset Lithographic Printing, p.6) **Sheetfed**: aliphatic and aromatic hydrocarbons, mineral spirits, acetone, methylene chloride, xylene, toluene, glycol ethers, vegetable oils, fatty acids, surfactants. **Heatset Web**: all of the above plus isopropanol. **Nonheatset Web**: aliphatic and aromatic hydrocarbons, mineral spirits, acetone, glycol ethers, vegetable oils, fatty acids. "Printing Industry and Use Cluster Profile", USEPA, June 1994.	
Staff Contact: Thomas C. Ortiz (512) 239-1054	

EMISSION CONTROL MEASURE (#45)
(Offset Lithographic Printing - Add-on Controls to dryers)

Control Measure Description:	Require the addition of activated carbon canisters on the outlet of the filter exhaust of any condenser filter systems installed on heatset offset lithographic printing presses. This action adds to the compliance requirement found in §115.442(2).
Control Measure Source:	Draft "Offset Lithographic Printing Control Techniques Guideline", USEPA, Chemicals and Petroleum Branch, September 6, 1991.
Rule Effectiveness:	99%
Control Efficiency:	adds 5% to the required 90% control efficiency.
Rule Penetration:	
Source of Projected Emissions:	total VOC emissions from press operation.
Identified SCCs:	40500101 or 40500199
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Industries: Printing Industry (SIC 27); Nonattainment areas: D/FW, El Paso, & H/G; Associations: Printing Industries Association of Texas & Printing Industries of the Gulf Coast.
Estimated Costs:	Heatset Web Model Plants:(4-6 units= $229,316); (6-16 units= $383,877); (12-32 units= $735,968); & (32-48 units= $1,085,771)
Cost Effectiveness:	Heatset Web Model Plants:(4-6 units= $ 9758); (6-16 units= $ 7425); (12-32 units= $ 7124); & (32-48 units= $ 5778)
Comments:	**Ink, varnish**: Petroleum distillates, vegetable oils, resin, rosin, dryer, pigments containing barium and copper **Fountain Solution**: Isopropanol, 2-butoxy ethanol and other glycol ethers, gum arabic, phosphoric acid, ethylene glycol. The cost effectiveness estimates above do not include direct and indirect carryover of VOCs from cleaning solvents and fountain solutions into the heatset dryers. For automatic blanket wash systems, direct capture averaged around 40% for the test facilities when the vapor pressure of the cleaning material is less than 10mm Hg @ 20°C. Direct capture of VOC from fountain solutions was about 70%. Indirect capture is probable yet too difficult to estimate.
Staff Contact:	Thomas C. Ortiz (512) 239-1054

EMISSION CONTROL MEASURE (#46)
(Offset Lithographic Printing - Add-on Controls to dryers)

Control Measure Description:	Require the installation of thermal incinerators with 98% VOC destruction efficiency for all heatset web offset lithographic printing presses. This action replaces the compliance requirement found in §115.442(2).
Control Measure Source:	Draft "Offset Lithographic Printing Control Techniques Guideline", USEPA, Chemicals and Petroleum Branch, September 6, 1991.
Rule Effectiveness:	99%
Control Efficiency:	98% (currently 90%)
Rule Penetration:	
Source of Projected Emissions:	total VOC emissions from press operation.
Identified SCCs:	40500101 or 40500199
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Industries: Printing Industry (SIC 27); Nonattainment areas: D/FW, El Paso, & H/G; Associations: Printing Industries Association of Texas & Printing Industries of the Gulf Coast.
Estimated Costs:	Heatset Web Model Plants:(4-6 units= $174,123); (6-16 units= $368,733); (12-32 units= $568,469); & (32-48 units= $632,737)
Cost Effectiveness:	Heatset Web Model Plants:(4-6 units= $ 7195); (6-16 units= $ 6918); (12-32 units= $ 5332); & (32-48 units= $ 3264)
Comments:	**Ink, varnish**: Petroleum distillates, vegetable oils, resin, rosin, dryer, pigments containing barium and copper. **Fountain Solution**: Isopropanol, 2-butoxy ethanol and other glycol ethers, gum arabic, phosphoric acid, ethylene glycol. The cost effectiveness estimates above do not include direct and indirect carryover of VOCs from cleaning solvents and fountain solutions into the heatset dryers. For automatic blanket wash systems, direct capture averaged around 40% for the test facilities when the vapor pressure of the cleaning material is less than 10mm Hg @ 20°C. Direct capture of VOC from fountain solutions was about 70%. Indirect capture is probable yet too difficult to estimate.
Staff Contact:	Thomas C. Ortiz (512) 239-1054

EMISSION CONTROL MEASURE (#47)
FURNITURE & FIXTURES SURFACE COATING

Control Measure Description:	The TNRCC has an existing rule which was based upon an EPA Control Techniques Guideline (CTG) document. In order to take credit for additional emission reductions, the TNRCC could revise its existing rule to include more stringent coating limits than those in the current rule. The use of enclosed gun cleaners and/or high-transfer efficiency application equipment could also be required in order to increase the control efficiency. In addition, EPA has proposed an MACT standard for the wood furniture industry which may provide emission reductions beyond those achieved by the TNRCC's current rule (reductions are undetermined at this time).
Control Measure Source:	EPA's draft Control Techniques Guideline (CTG) document; negotiations for TNRCC's current rule.
Rule Effectiveness:	99%
Control Efficiency:	up to about 30% (currently 20%)
Rule Penetration:	75% (currently 75%)
Source of Projected Emissions:	Furniture/fixtures surface coating
Identified SCCs:	N/A
Total Affected Emissions (adjusted 1999 EI):	2.64 Tons per Ozone Day
Affected Parties:	This rule would target companies which apply coatings to wood furniture/fixtures. Coating manufacturers would also be affected because they would have to produce compliant coatings for sale to affected companies.
Estimated Costs:	In some cases, compliant coatings may be readily available. In other cases, the coating manufacturers would have to reformulate their coatings to meet the rule (although the reformulated coatings may not achieve the same quality of finish as current coatings). The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to the affected companies, who in turn will pass the coating costs on to consumers. Known costs are: approximately $120 per month for a spray gun cleaner; and $500-1000 per HVLP spray gun or equivalent.
Cost Effectiveness:	A change in the TNRCC coating limits is likely to have a high cost per ton of VOC reduced since many companies would be unable to find acceptable compliant coatings and therefore would be forced to install expensive add-on control equipment. There are likely to be technical problems with changing coating application equipment; however, enclosed gun gleaners are expected to be relatively cost-effective. For Beaumont/Port Arthur (BPA), a cost-effective option is extension of the existing Reg. V rule to BPA. Taking credit for EPA's MACT (when actual reductions are known) is another option.

Comments:	In order of decreasing emission rates, VOCs emitted from typical wood furniture surface coating processes consist of toluene (26.5%); xylene (15.0%); ethanol (10.2%); butanol (10.2%); MIBK (7.3%); IPA (5.7%); MEK (5.6%); butyl acetates (5.3%); aromatics other than xylene & toluene (3.4%); miscellaneous aliphatic VOCs (3.2%); ethyl acetate (2.9%); glycol ethers (1.7%); miscellaneous VOCs (3.0%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions in surface coating unless an affected facility elects to install a combustion-type control device in lieu of using compliant coatings. Since this rule would affect area sources, the coating limits would need to be set at an achievable level so that add-on controls would not be necessary.
Staff Contact:	Eddie Mack 239-1488

EMISSION CONTROL MEASURE (#48)
MACHINERY & EQUIPMENT SURFACE COATING

Control Measure Description:	The TNRCC has an existing rule which was based upon an EPA Control Techniques Guideline (CTG) document. In order to take credit for additional emission reductions, the TNRCC could revise its existing rule to include more stringent coating limits than those in the current rule. The use of enclosed gun cleaners and/or high-transfer efficiency application equipment could also be required in order to increase the control efficiency.
Control Measure Source:	EPA's CTG document.
Rule Effectiveness: **Control Efficiency:** **Rule Penetration:**	99% up to about 65% (currently 55.6%) 75% (currently 75%)
Source of Projected Emissions:	Coatings and solvents used in surface coating of machinery and equipment. (Note: these are product coatings, rather than architectural & industrial maintenance (AIM) coatings)
Identified SCCs:	N/A
Total Affected Emissions (adjusted 1999 EI):	1.84 Tons per Ozone Day
Affected Parties:	This rule would target companies which apply coatings to machinery and equipment. Coating manufacturers would also be affected by the rule because they would have to produce compliant coatings for sale to the affected companies.
Estimated Costs:	In some cases, compliant coatings may be readily available. In other cases, the coating manufacturers would have to reformulate their coatings to meet the rule (although the reformulated coatings may not achieve the same quality of finish as current coatings). The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to the affected companies, who in turn will pass the coating costs on to consumers. Known costs are: approximately $120 per month for a spray gun cleaner; and $500-1000 per high-volume low-pressure (HVLP) spray gun or equivalent.
Cost Effectiveness:	A change in coating limits is likely to have a very high cost per ton of VOC reduced since many companies would be unable to find acceptable compliant coatings and therefore would be forced to install expensive add-on control equipment. There are likely to be technical problems with changing coating application equipment; however, enclosed gun gleaners are expected to be relatively cost-effective.

Comments:	In order of decreasing emission rates, VOCs emitted from typical surface coating processes consist of miscellaneous aliphatic VOCs [mineral spirits & naphthas] (20.4%); toluene (11.2%); MEK (8.6%); acetone (8.1%); xylene (8.0%); ethylene glycol monobutyl ether (7.0%); other glycol ethers (8.6%); propanol (6.1%); ethanol (5.5%); butyl acetate (2.8%); butanol (2.6%); ethyl acetate (2.3%); methanol (2.3%); MIBK (2.3%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions in surface coating unless an affected facility elects to install a combustion-type control device in lieu of using compliant coatings. Since this rule would affect area sources, the coating limits would need to be set at an achievable level so that add-on controls would not be necessary.
Staff Contact:	Eddie Mack 239-1488

EMISSION CONTROL MEASURE (#49)
MISCELLANEOUS METAL PARTS & PRODUCTS SURFACE COATING

Control Measure Description:	The TNRCC has an existing rule which was based upon an EPA Control Techniques Guideline (CTG) document. In order to take credit for additional emission reductions, the TNRCC could revise its existing rule to include more stringent coating limits than those in the current rule. The use of enclosed gun cleaners and/or high-transfer efficiency application equipment could also be required in order to increase the control efficiency.
Control Measure Source:	EPA's CTG document.
Rule Effectiveness:	99%
Control Efficiency:	up to about 65% (currently 55.6%)
Rule Penetration:	75% (currently 75%)
Source of Projected Emissions:	Coatings and solvents used in surface coating of miscellaneous metal parts and products.
Identified SCCs:	4-02-025-xx and 4-02-026-xx
Total Affected Emissions (adjusted 1999 EI):	1.43 Tons per Ozone Day
Affected Parties:	This rule would target companies which apply coatings to miscellaneous metal parts and products. Coating manufacturers would also be affected by the rule because they would have to produce compliant coatings for sale to the affected companies.
Estimated Costs:	In some cases, compliant coatings may be readily available. In other cases, the coating manufacturers would have to reformulate their coatings to meet the rule (although the reformulated coatings may not achieve the same quality of finish as current coatings). The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to the affected companies, who in turn will pass the coating costs on to consumers. Known costs are: approximately $120 per month for a spray gun cleaner; and $500-1000 per high-volume low-pressure (HVLP) spray gun or equivalent.
Cost Effectiveness:	A change in coating limits is likely to have a very high cost per ton of VOC reduced since many companies would be unable to find acceptable compliant coatings and therefore would be forced to install expensive add-on control equipment. There are likely to be technical problems with changing coating application equipment; however, enclosed gun gleaners are expected to be relatively cost-effective.

Comments:	In order of decreasing emission rates, VOCs emitted from typical surface coating processes consist of miscellaneous aliphatic VOCs [mineral spirits & naphthas] (20.4%); toluene (11.2%); MEK (8.6%); acetone (8.1%); xylene (8.0%); ethylene glycol monobutyl ether (7.0%); other glycol ethers (8.6%); propanol (6.1%); ethanol (5.5%); butyl acetate (2.8%); butanol (2.6%); ethyl acetate (2.3%); methanol (2.3%); MIBK (2.3%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions in surface coating unless an affected facility elects to install a combustion-type control device in lieu of using compliant coatings. Since this rule would also affect area sources, the coating limits would need to be set at an achievable level so that add-on controls would not be necessary.
Staff Contact:	Eddie Mack 239-1488

EMISSION CONTROL MEASURE (#50)
FACTORY FINISHED WOOD

Control Measure Description:	The TNRCC has an existing rule which was based upon an EPA Control Techniques Guideline document. In order to take credit for additional emission reductions, the TNRCC could revise its existing rule to include more stringent coating limits than those in the current rule. The use of enclosed gun cleaners and/or high-transfer efficiency application equipment could also be required in order to increase the control efficiency.
Control Measure Source:	EPA's CTG document.
Rule Effectiveness:	99%
Control Efficiency:	up to about 65% (currently 55.6%)
Rule Penetration:	75% (currently 75%)
Source of Projected Emissions:	Coatings and solvents used in surface coating of factory finished wood
Identified SCCs:	N/A
Total Affected Emissions (adjusted 1999 EI):	1.27 Tons per Ozone Day
Affected Parties:	This rule would target companies which apply coatings to factory finished wood (flat wood paneling). Coating manufacturers would also be affected by the rule because they would have to produce compliant coatings for sale to the affected companies.
Estimated Costs:	In some cases, compliant coatings may be readily available. In other cases, the coating manufacturers would have to reformulate their coatings to meet the rule (although the reformulated coatings may not achieve the same quality of finish as current coatings). The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to the affected companies, who in turn will pass the coating costs on to consumers. Known costs are: approximately $120 per month for a spray gun cleaner; and $500-1000 per HVLP spray gun or equivalent.
Cost Effectiveness:	A change in coating limits is likely to have a very high cost per ton of VOC reduced since many companies would be unable to find acceptable compliant coatings and therefore would be forced to install expensive add-on control equipment. There are likely to be technical problems with changing coating application equipment; however, enclosed gun gleaners are expected to be relatively cost-effective.

Comments:	In order of decreasing emission rates, VOCs emitted from typical factory finished wood surface coating processes consist of toluene (26.5%); xylene (15.0%); ethanol (10.2%); butanol (10.2%); MIBK (7.3%); IPA (5.7%); MEK (5.6%); butyl acetates (5.3%); aromatics other than xylene & toluene (3.4%); miscellaneous aliphatic VOCs (3.2%); ethyl acetate (2.9%); glycol ethers (1.7%); miscellaneous VOCs (3.0%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions unless an affected facility elects to install a combustion-type control device in lieu of using compliant coatings. Since this rule would affect area sources, the coating limits would need to be set at an achievable level so that add-on controls would not be necessary.
Staff Contact:	Eddie Mack 239-1488

EMISSION CONTROL MEASURE (#51)
SHEET, STRIP, AND COIL SURFACE COATING

Control Measure Description:	The TNRCC has an existing rule which was based upon an EPA Control Techniques Guideline (CTG) document. In order to take credit for additional emission reductions, the TNRCC could revise its existing rule to include more stringent coating limits than those in the current rule. The use of enclosed gun cleaners and/or high-transfer efficiency application equipment could also be required in order to increase the control efficiency.
Control Measure Source:	EPA's CTG.
Rule Effectiveness: **Control Efficiency:** **Rule Penetration:**	99% up to about 65% (currently 55.9%) 75% (currently 75%)
Source of Projected Emissions:	Coatings and solvents used in sheet, strip, and coil surface coating
Identified SCCs:	N/A
Total Affected Emissions (adjusted 1999 EI):	6.09 Tons per Ozone Day
Affected Parties:	This rule would target companies which apply coatings to metal sheets, strips, and coils. Coating manufacturers would also be affected because they would have to produce compliant coatings for sale to the affected companies.
Estimated Costs:	In some cases, compliant coatings may be readily available. In other cases, the coating manufacturers would have to reformulate their coatings to meet the rule (although the reformulated coatings may not achieve the same quality of finish as current coatings). The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to the affected companies, who in turn will pass the coating costs on to consumers. Known costs are: approximately $120 per month for a spray gun cleaner; and $500-1000 per HVLP spray gun or equivalent.
Cost Effectiveness:	A change in coating limits is likely to have a very high cost per ton of VOC reduced since many companies would be unable to find acceptable compliant coatings and therefore would be forced to install expensive add-on control equipment. There are likely to be technical problems with changing coating application equipment; however, enclosed gun gleaners are expected to be relatively cost-effective.

Comments:	In order of decreasing emission rates, VOCs emitted from typical surface coating processes consist of miscellaneous aliphatic VOCs [mineral spirits & naphthas] (20.4%); toluene (11.2%); MEK (8.6%); acetone (8.1%); xylene (8.0%); ethylene glycol monobutyl ether (7.0%); other glycol ethers (8.6%); propanol (6.1%); ethanol (5.5%); butyl acetate (2.8%); butanol (2.6%); ethyl acetate (2.3%); methanol (2.3%); MIBK (2.3%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions in surface coating unless an affected facility elects to install a combustion-type control device in lieu of using compliant coatings. Since this rule would affect area sources, the coating limits would need to be set at an achievable level so that add-on controls would not be necessary.
Staff Contact:	Eddie Mack 239-1488

EMISSION CONTROL MEASURE (#52)
CONSUMER PRODUCTS

Control Measure Description:	A consumer products rule was adopted by the TNRCC (effective 5/27/94) as a part of the Rate of Progress State Implementation Plan. VOC content standards for 26 different consumer products were established totaling an estimated 11.3% reduction. Further emission reductions of consumer products could be achieved by placing stricter standards on existing products and by adopting additional regulations of product categories not currently regulated. A recent EPA survey identifies over 200 different types of consumer products, leaving over 170 for potential control. California Air Resources Board (CARB) estimates that VOC emissions from consumer products accounted for 15% of California's non vehicular emissions in 1990.
Control Measure Source:	Title 17, California Code of Regulations, Division, Chapter 1, Subchapter 8.5, Article 2, Consumer Products, Sections 94507-94517.
Rule Effectiveness:	99%
Control Efficiency:	30%-80% (based on CARB estimates)
Rule Penetration:	100%
Source of Projected Emissions:	The evaporation of solvents, propellants, and other organic ingredients emitted from the usage of consumer products.
Identified SCCs:	n/a
Total Affected Emissions (adjusted 1999 EI):	Houston/Galveston: 24.34 Tons per Ozone Day Beaumont/Port Arthur: 2.35 Tons per Ozone Day
Affected Parties:	Industrial manufacturers of consumer products
Estimated Costs:	STAPPA/ALAPCO (Source Category Summery Paper, draft 7/9/93) reports that the total annual cost to the entire consumer products industry is estimated to range from 11 to 360 million dollars. The estimated annual costs for reformulating a single product to meet CARB's regulations ranges from $16,000 to $400,000 per product. Assumptions were made that manufacturers would reformulate to a similar complying product form with no additional capital or raw material costs and that products would be marketed nationally.
Cost Effectiveness:	Cost effectiveness ranges from a net savings of $100 per ton of VOC removed to $3400 per ton of VOC removed according to the San Diego AQMD (STAPPA/ALAPCO, 7/9/93).

Comments:	Reactivity and toxicity vary among the different product categories. There is no effect on NO_x emissions as a result of VOC reductions in consumer products. Emission estimates were based on EPA's EI guidelines while emission reductions were based on CARB's estimated percentage reductions applied to Texas' total emissions. Assumptions were made that 100% of VOCs evaporate into the atmosphere and that consumers in Texas behave the same as consumers in California. Further work is needed in identifying emissions from specific consumer product subcategories in order to adequately address potential future reductions. Total emissions affected does not include Hairsprays or Automotive Windshield Washer Fluid since these two categories are being evaluated separately.
Staff Contact:	Brian Foster (512) 239-1930

EMISSION CONTROL MEASURES (#53)
CONSUMER PRODUCTS - HAIRSPRAYS

Control Measure Description:	A consumer products rule was adopted by the TNRCC (effective 5/27/94) as a part of the Rate of Progress State Implementation Plan. VOC content standards were established for 26 different consumer products, including hairsprays (80% by weight). In a 1990 consumer products survey, California Air Resources Board (CARB) estimated that hairsprays emitted more VOCs than any other consumer product category, accounting for approximately 46% of the 16 products being proposed for regulation. In order to further reduce VOC emissions from hairsprays, the existing Texas rule would have to be revised. California has adopted a future standard of 55% VOC effective January 1, 1998. It is reported that the technology is being developed to comply with this future limit specifically by the reformulation of the resin component and by the use of innovative technologies.
Control Measure Source:	Title 17, California Code of Regulations, Division, Chapter 1, Subchapter 8.5, Article 2, Consumer Products, Sections 94507-94517.
Rule Effectiveness: 99% **Control Efficiency:** 26% **Rule Penetration:** 100%	
Source of Projected Emissions:	The evaporation of solvents, propellants, and other organic ingredients emitted from the usage of hairsprays.
Identified SCCs: n/a **Total Affected Emissions (adjusted 1999 EI):**	Houston/Galveston: 6.36 Tons per Ozone Day Beaumont/Port Arthur: 0.62 Tons per Ozone Day
Affected Parties:	Industrial manufacturers of consumer products
Estimated Costs:	Individual analysis for each consumer product category is not readily available due to the complexity of the market.
Cost Effectiveness:	The cost effectiveness for consumer product regulation in general ranges from a net savings of $100 per ton of VOC removed to $3400 per ton of VOC removed (STAPPA/ALAPCO draft 07/09/93).
Comments:	Reactivity of hairsprays is as follows: Ethanol (Maximum Incremental Reactivity) 1.34, (Reactivity Points) 2; Butane 1.02, 1; Propane 0.48, 1. Dimethyl phthalate, a plasticizer used to modify hardness, is classified as a hazardous air pollutant. There is no effect on NO_x emissions as a result of VOC reductions in consumer products. Emission estimates for hairspray usage in Texas were based on California's emission data (CARB Staff Report, August 1990) applied to Texas' population. Assumptions were made that 100% of VOCs evaporate into the atmosphere and that consumers in Texas behave the same as consumers in California. Further work is needed in identifying emissions from specific consumer product subcategories in order to adequately address potential future reductions.
Staff Contact:	Brian Foster (512) 239-1930

EMISSION CONTROL MEASURES (#54)
CONSUMER PRODUCTS - AUTOMOTIVE WINDSHIELD WASHER FLUID

Control Measure Description:	A consumer products rule was adopted by the TNRCC (effective 5/27/94) as a part of the Rate of Progress State Implementation Plan. VOC content standards were established for 26 different consumer products, including automotive windshield washer fluid (23.5% by weight). In a 1990 consumer products survey, California Air Resources Board (CARB) estimated that automotive windshield washer fluids were the second largest emitting product category, accounting for approximately 24% of the 16 products being proposed for regulation. In order to further reduce VOC emissions from automotive windshield washer fluid, the existing Texas rule would have to be revised. Because of the need for adequate freeze protection during the winter months, reduction of VOCs from automotive washer fluid would be limited to the Gulf Coast area of Texas until an acceptable non VOC washer fluid is developed.
Control Measure Source:	Title 17, California Code of Regulations, Division, Chapter 1, Subchapter 8.5, Article 2, Consumer Products, Sections 94507-94517.
Rule Effectiveness: 99% **Control Efficiency:** 66% **Rule Penetration:** 100%	
Source of Projected Emissions:	The evaporation of solvents from the usage of automobile windshield washer fluid.
Identified SCCs: n/a **Total Affected Emissions (adjusted 1999 EI):**	Houston/Galveston: 3.07 Tons per Ozone Day Beaumont/Port Arthur: 0.30 Tons per Ozone Day
Affected Parties:	Industrial manufacturers of automotive windshield washer fluid.
Estimated Costs:	Individual analysis for each consumer product category is not readily available due to the complexity of the market.
Cost Effectiveness:	The cost effectiveness for consumer product regulation in general ranges from a net savings of $100 per ton of VOC removed (associated with the dilution of windshield washer fluid) to $3400 per ton of VOC removed (STAPPA/ALAPCO draft 07/09/93).

Comments:	Reactivity of automotive windshield washer fluid compounds is as follows: Methanol - Maximum Incremental Reactivity (MIR) 0.56, Reactivity Points 1; Isopropanol - MIR 0.54, Reactivity Points 1. Methanol is classified as a hazardous air pollutant. There is no effect on NO_x emissions as a result of VOC reductions in consumer products. Emission estimates for windshield washer fluid were based on EPA's emission factor of 0.6 pounds/capita/year and assumes that all VOCs evaporate into the atmosphere (Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Vol.1, EPA, May 1991). While EPA's emission factor specifically identifies windshield washer fluid, other subcategories are very broad. Further work is needed in identifying emissions from specific consumer product subcategories in order to adequately address potential future reductions.
Staff Contact:	Brian Foster (512) 239-1930

EMISSION CONTROL MEASURE (#55)
(AGRICULTURAL PESTICIDE APPLICATION)

Control Measure Description:	VOC emissions from the application of agricultural pesticides could be reduced through a variety of measures, which might include; restricting the use of high VOC emitting pesticides in certain areas during certain seasons (depending on the availability of alternative products), use of low VOC content products, use of improved efficiency application equipment (eg. ultra-low volume sprayers, electrostatic applicators), drift reduction training for applicators, encouraging manufacturers to reformulate their products without volatile organic solvent when practical, and the promotion of Integrated Pest Management techniques. These measures could be voluntary or enforceable.
Control Measure Source:	Control of VOC Emissions From the Application of Agricultural Pesticides, EPA Alternative Control Technology Document, EPA-453/R-92-011, March 1993
Rule Effectiveness: NA **Control Efficiency:** **Rule Penetration:** NA	
Source of Projected Emissions: Agricultural pesticide application **Identified SCCs:** NA **Total Affected Emissions (adjusted 1999 EI):**	Some fraction of the 3.48 and 0.50 Tons per Ozone Day reported, respectively, in the H/Ga and B/PA control measure catalogs.
Affected Parties:	Users, manufacturers, and distributors of agricultural pesticides.

Estimated Costs:	Use of low VOC content products, when effective substitutes are available, should not result in additional costs. Costs for alternative application methods are unknown but would include the cost of equipment, applicator training, equipment maintenance and calibration. Reformulation will only be practical for certain pesticides. Costs to manufacturers that reformulate will include expenses related to any EPA required studies for reregistration, and to changes in manufacturing and packaging. Many manufacturers are already reformulating organic solvent based pesticides (under pressure from other states to minimize VOC emissions, from DOT which is placing restrictions on the transport of flammable chemicals, and amidst concerns about applicator and worker chemical exposure). Integrated Pest Management costs will vary depending on individual circumstances, but studies have shown IPM can be a profitable practice as overall pesticide usage is reduced.
Cost Effectiveness: unknown	

Comments: The state of California has tracked pesticide use, by chemical and by area, since 1990. Both "general" and "restricted" use pesticides are tracked since both types are used by agricultural applicators and both can contain VOCs. The state has also required pesticide manufacturers to determine the VOC content of these products. From this detailed use reporting and VOC content information, the state will develop a 1990 baseline inventory of estimated pesticide emissions.

EPA, in the California FIP, proposed a plan to use this inventory to rank the pesticides on the list according to VOC content. The ranking would continue until the sum of the % VOC content of those ranked totaled to 40-70% of the total base year emissions. The VOC content of the last pesticide to be ranked would represent the "new VOC limit". Use of those pesticides with VOC content above the new limit would be restricted. EPA estimates this plan would reduce VOC emissions from pesticides by 20-45%.

The state, in response to EPA, has proposed an alternate, more flexible plan. The 1990 baseline inventory will be used to first educate users and promote voluntary changes in pest management practices (eg. substitution of low VOC products, adoption of new application techniques, promotion of IPM, etc.) Only after these approaches have been given a chance to work will regulatory approaches, such as placing restrictions on the sale and distribution of high VOC content products, be considered. The state goal is to achieve a 20% pesticide VOC emission reduction by the year 2005.

TNRCC does not currently regulate the use of agricultural pesticides. The Texas Dept. of Agriculture registers "restricted" use pesticides for use in the state and oversees certification and training of applicators. Licensed applicators must maintain a "Pesticide Application Record" in which the amount and type of restricted use pesticide that is applied, the location, time of day, wind conditions, etc. are recorded. This information, however, which the licensed applicator must keep for two years, is not collected or tracked by the TDA. Furthermore, use of "general" use pesticides is not recorded at all. Consequently, it would be difficult to obtain an accurate pesticide emission inventory for Texas.

A coordinated effort by TNRCC/TDA to gather this type of data for the H/Ga and B/PA nonattainment areas is needed in order to target our emission reduction strategies to those chemicals/areas that will result in the greatest improvement. The Agricultural Extension Service, in 1990 and 1993, surveyed its extension agents to compile pesticide use data for all Texas counties. The 1990 survey results are available.

Example VOCs include xylene and toluene. Since VOC composition will vary among pesticides, determination of specific VOCs is not possible without obtaining use data for those areas of interest.

Staff Contact: Ann Brotherman (512) 239-6255

EMISSION CONTROL MEASURE (#56)
(NAPHTHA DRY CLEANERS)

Control Measure Description:	The proposed measure lowers the exemption level based on Naphtha consumption from 3,500 gallons per year to 2,000 gallons per year.
Control Measure Source:	CTG, NSPS Subpart JJJ, SCAQMD and Bay Area rules.
Rule Effectiveness: 99% **Control Efficiency:** 80% **Rule Penetration:** 90%	
Source of Projected Emissions:	Petroleum dry cleaning facilities.
Identified SCCs:	N/A
Total Affected Emissions (Adjusted 1999 EI):	
Affected Parties:	Owners or operators of petroleum dry cleaning facilities in the H/G and B/PA areas. It is expected that over 40% of the approximately 200 petroleum dry cleaning facilities in the H/G will be subject to the rule.
Estimated Costs:	Cost required to implement the proposed control measure ranges between $25,000 to $35,000. Significant savings, however, are expected to result from the installation of the control equipment. The operating cost of the facility would significantly be reduced due to the recovery dryer's lower demand for steam and electricity and the savings that will result from the recovered solvent. It is estimated that a small size facility would be able to pay back the capital cost of its control equipment in seven years using the generated savings only.
Cost Effectiveness:	The cost effectiveness is estimated at $300 saved per ton of emissions reduced.
Comments:	Naphtha solvents are a mixture of mainly C_8 to C_{12} hydrocarbons that are similar to Kerosene. These hydrocarbons can be further subdivided into three molecular structures: aliphatics, alicyclics, and aromatics.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#57)
(MUNICIPAL SOLID WASTE LANDFILLS)

Control Measure Description:	The proposed measure lowers the exemption level based on annual emissions of non-methane organic compounds (NMOC) from 150 Mg per year to 50 Mg per year.
Rule Source:	Proposed NSPS subpart WWW, SCAQMD FIP.
Rule Effectiveness:	99%
Control Efficiency:	70%
Rule Penetration:	95%
Source of Projected Emissions:	Municipal Solid Waste Landfills.
Identified SCCs:	N/A
Total Affected Emissions (Adjusted 1999 EI):	
Affected Parties:	Municipalities and commercial Operators of municipal solid waste landfills. It is expected that over 50% of the 74 landfills in the Houston/Galveston area and the 6 landfills in the Beaumont/Port Arthur will be subject to the rule.
Estimated Costs:	The capital cost to install a gas collection and treatment system and a control device can be as high as 3 million dollars.
Cost Effectiveness:	A base figure of $1,000 per ton of NMOC reduced, is used as an average cost of controls for new and existing MSWLF. In a study sponsored by EPA titled, "Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines", and in the preamble of the proposed NSPS, cost estimates ranging from $500 per ton to $2,800 per ton of NMOC reduced were reported. These cost figures do not take into account the profits that can be generated from energy recovery or sales of natural gas. ECOGAS Incorporation provided TNRCC with cost data for an average size landfill. The data show a total capital cost of $3 million. The amount of liquid natural gas sales that can be generated from this size landfill is about $600,000 annually. The data presented suggested a pay back period of 5 years.
Comments:	Typical NMOC generated from landfills are Ethane, Toluene, Methylene Chloride, Hydrogen Sulfide, EthylBenzene, Xylene, 1,2 - Dimethyl Benzene, Limonene.
Staff Contact:	Gus Eghneim (512) 239-1965

Point Sources

EMISSION CONTROL MEASURE (#58)
GENERAL SURFACE COATING APPLICATION

Control Measure Description:	Emissions reported under this category will most likely be from one of the following: miscellaneous metal parts/products coatings (current rule already in effect), architectural & industrial maintenance (AIM) coatings (EPA national rule being developed), wood parts/products coatings (current rule in Houston/Galveston), or plastic parts coatings (no rule in place, but EPA has issued an ACT guidance document). Additional investigation is being pursued to determine how much of the category is already controlled.
Control Measure Source:	
Rule Effectiveness: **Control Efficiency:** **Rule Penetration:**	
Source of Projected Emissions: **Identified SCCs:** **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	
Estimated Costs: **Cost Effectiveness:**	
Comments:	
Staff Contact: Eddie Mack (239-1488)	

EMISSION CONTROL MEASURE (#59)
METAL CAN SURFACE COATING

Control Measure Description: The TNRCC has an existing rule which was based upon an EPA Control Techniques Guideline (CTG) document. In order to take credit for additional emission reductions, the TNRCC could revise its existing rule to include more stringent coating limits than those in the current rule. The use of enclosed gun cleaners and/or high-transfer efficiency application equipment could also be required in order to increase the control efficiency.

Control Measure Source: EPA's CTG document.

Rule Effectiveness: 99%
Control Efficiency: up to about 65% (currently 55.2%)
Rule Penetration: 75% (currently 75%)

Source of Projected Emissions: Coatings and solvents used in surface coating of metal cans.
Identified SCCs: 4-02-017-xx
Total Affected Emissions (adjusted 1999 EI): 3.0 Tons per Ozone Day

Affected Parties: This rule would target companies which apply coatings to metal cans. Coating manufacturers would also be affected by the rule because they would have to produce compliant coatings for sale to the affected companies.

Estimated Costs: In some cases, compliant coatings may be readily available. In other cases, the coating manufacturers would have to reformulate their coatings to meet the rule (although the reformulated coatings may not achieve the same quality of finish as current coatings). The actual cost of this research & development is impossible to accurately quantify. Manufacturers who must reformulate their coatings will pass the cost on to the affected companies, who in turn will pass the coating costs on to consumers. Known costs are: approximately $120 per month for a spray gun cleaner; and $500-1000 per high-volume low-pressure (HVLP) spray gun or equivalent.

Cost Effectiveness: A change in coating limits is likely to have a very high cost per ton of VOC reduced since many companies would be unable to find acceptable compliant coatings and therefore would be forced to install expensive add-on control equipment. There are likely to be technical problems with changing coating application equipment; however, enclosed gun gleaners are expected to be relatively cost-effective.

Comments: In order of decreasing emission rates, VOCs emitted from typical surface coating processes consist of miscellaneous aliphatic VOCs [mineral spirits & naphthas] (20.4%); toluene (11.2%); MEK (8.6%); acetone (8.1%); xylene (8.0%); ethylene glycol monobutyl ether (7.0%); other glycol ethers (8.6%); propanol (6.1%); ethanol (5.5%); butyl acetate (2.8%); butanol (2.6%); ethyl acetate (2.3%); methanol (2.3%); MIBK (2.3%). Several of these (toluene, xylene, MEK, MIBK) are classified as air toxics under Title III. There is no effect on NOx emissions as a result of VOC reductions in surface coating unless an affected facility elects to install a combustion-type control device in lieu of using compliant coatings. Since this rule would also affect area sources, the coating limits would need to be set at an achievable level so that add-on controls would not be necessary.

Staff Contact: Eddie Mack 239-1488

EMISSION CONTROL MEASURE (#60)
SURFACE COATING - COATING OVENS

Control Measure Description:	Emissions reported under this category will most likely be from one of the following: surface coating of miscellaneous metal parts/products, fabric, paper, large appliances, cans, coils, flatwood products, and metal furniture (current rules already in effect); surface coating of wood parts/products (current rules in Houston/Galveston; MACT standards forthcoming); or surface coating of plastic parts (no rules in place, but EPA has issued an ACT guidance document). Additional investigation is being pursued to determine how much of the category is already controlled. Rules would not be developed which target coating ovens; rather, appropriate credit would be taken for any emission reductions associated with any rule changes to the various surface coating rules.
Control Measure Source:	
Rule Effectiveness: **Control Efficiency:** **Rule Penetration:**	
Source of Projected Emissions: **Identified SCCs:** **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	
Estimated Costs: **Cost Effectiveness:**	
Comments:	
Staff Contact: Eddie Mack 239-1488	

EMISSION CONTROL MEASURE (#61)
CHEMICAL MANUFACTURING - LOADING RACKS; TRANSPORTATION & MARKETING - TANK TRUCKS/CARS LOADING; PETROLEUM STORAGE TANK - LOADING RACKS

Control Measure Description: The TNRCC has existing rules for land-based VOC loading operations (§§115.211-115.219). In order to take credit for additional emission reductions, the TNRCC could revise its existing rule to include a 95% control efficiency rather than the 90% control level of the current rule.

Control Measure Source: Negotiations for TNRCC's current rule.

Rule Effectiveness: 99%
Control Efficiency: 95% (currently 90%)
Rule Penetration: N/A

Source of Projected Emissions: VOC loading racks
Identified SCCs: 4-06-001-xx (transportation & marketing - tank trucks/cars loading); 4-08-999-95 and 4-08-999-99 (chemical manufacturing - loading racks); 4-04-002-50 (petroleum storage tank - loading racks)
Total Affected Emissions (adjusted 1999 EI): 2.00 TPOD (transportation & marketing - tank trucks/cars loading)
+ 15.84 TPOD (chemical manufacturing - loading racks)
+ 1.85 TPOD (petroleum storage tank - loading racks)
= 19.69 TPOD

Affected Parties: This rule would target land-based facilities which load VOCs into transport vessels (tank trucks, railcars) in HGA and/or BPA.

Estimated Costs: Industry has vehemently protested any raising of the control efficiency as not being cost-effective.

Cost Effectiveness:

Comments: Many VOCs loaded appear on the list of HAPs, including benzene, toluene, hexane, ethylbenzene, naphthalene, cumene, xylenes, n-hexane, 2,2,4-trimethylpentane, methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK), and methyl tert-butyl ether (MTBE). In many cases, affected facilities have installed combustion-type VOC control devices, resulting in NOx emission increases.

Staff Contact: Eddie Mack 239-1488

EMISSION CONTROL MEASURE (#62)
MARINE VESSEL LOADING (POINT & AREA SOURCES)

Control Measure Description:	The TNRCC has an existing rule for Houston/Galveston (HGA) which was developed by the marine vessel loading workgroup in 1993-1994. In order to take credit for additional emission reductions, the TNRCC could revise its existing rule to include a 95% control efficiency rather than the 90% control level of the current rule. The rule could be extended to Beaumont/Port Arthur (BPA) at either the 90% or 95% control level. The exemption level could also be lowered from 100 to 25 TPY, but this will not generate additional creditable emission reductions since previous calculations already took this credit. Also, EPA has proposed an MACT standard for marine vessel loading of gasoline and crude oil which may provide reductions beyond those achieved by the TNRCC's current rule (reductions are undetermined at this time).
Control Measure Source:	EPA's draft MACT standard; negotiations for TNRCC's current rule.
Rule Effectiveness:	99%
Control Efficiency:	95% (currently 90%)
Rule Penetration:	100%
Source of Projected Emissions:	Marine vessel loading
Identified SCCs:	4-08-999-97 (marine vessels: loading rack)
Total Affected Emissions (adjusted 1999 EI):	3.79 (area) + 5.62 (point) = 9.41 TPOD
Affected Parties:	This rule would target facilities which load VOCs into marine vessels in HGA and/or BPA.
Estimated Costs:	According to industry representatives, the cost to equip a single marine terminal (in BPA) with controls may be as high as $8,000,000. Industry has vehemently protested any lowering of the exemption level or raising of the control efficiency as not being cost-effective.
Cost Effectiveness:	For BPA, a cost-effective option is extension of the existing Reg. V rule to BPA. Taking credit for EPA's MACT (when actual reductions are known) is another option.

Comments:	Many compounds found in gasoline vapor also appear on the list of HAPs, including benzene, toluene, hexane, ethylbenzene, naphthalene, cumene, xylenes, n-hexane, 2,2,4-trimethylpentane, and methyl tert-butyl ether (MTBE). Other HAPs are also emitted from marine vessel loading operations. In many cases, affected facilities will install combustion-type VOC control devices, resulting in NOx emission increases.
Staff Contact:	Eddie Mack 239-1488

EMISSION CONTROL MEASURE (#63)
OIL & GAS PRODUCTION
(GLYCOL DEHYDRATORS)

Control Measure Description:	The proposed measure will require natural gas glycol dehydrators used in natural gas/gasoline processing to control VOC emissions by installing a condenser and a separator (or flash tank), or equivalent control device to achieve a minimum control efficiency of 95% by weight. Natural gas glycol dehydration units used in natural gas production and natural gas pipeline transportation will be required to control VOCs depending on the level of controlled emissions of the entire site where the unit is located. For VOC emissions at or above 25 TPY and below 50 TPY, the required control efficiency will be 80% by weight. For VOC emissions at or above 50 TPY and below 75 TPY, the required control efficiency will be 85% by weight. For VOC emissions at or above 75 TPY, the required control efficiency will be 90% by weight.
Control Measure Source:	TNRCC
Rule Effectiveness:	99%
Control Efficiency:	95% for processing, varies for transportation & production
Rule Penetration:	N/A for point source, unknown for area source
Source of Projected Emissions:	Natural gas glycol dehydration units.
Identified SCCs:	3-10-002-02
Total Affected Emissions (adjusted 1999 EI):	Some fraction of the 9.15 point source and 5.12 area source Tons per Ozone Day reported in the H/Ga control measure catalog, and some fraction of the 0.46 point source 2.80 area source Tons per Ozone Day reported in the B/PA control measure catalog.
Affected Parties:	All operators of natural gas glycol dehydration units in the H/Ga and B/PA areas at sites which emit 25 TPY or greater VOCs.
Estimated Costs:	Economic costs are estimated to be $25,000 for control equipment and testing. A cost benefit of $5,000 per vapor recovery system is possible due to the installed control devices which could generate income and fuel savings from the recovered natural gas liquids and vapors from the natural gas glycol dehydration process.
Cost Effectiveness:	Approximately $100/ton. Cost data provided by Texas Mid-Continental Oil & Gas Association
Comments:	VOC emissions include benzene, toluene, ethylbenzene, and xylene. EPA is scheduled to propose by 6/95 and promulgate by 6/96 a MACT standard which targets glycol dehydrator reboiler vents.
Staff Contact:	Ann Brotherman (512) 239-6255

EMISSION CONTROL MEASURE (#64) (BREWERIES)

Control Measure Description:	Breweries will implement practices to minimize spillage in filling operations, keg cleaning and waste beer processing. Wastewater streams and components shall be covered at all times and routed to a treatment system capable of a VOC reduction efficiency equivalent to that obtained from the use of properly operated biotreatment unit. Emissions from the fermentation tanks will be reduced by the use of a condensor. Coding of bottles, cans, cases, and kegs will incorporate the use of low VOC containing inks or an ink-free laser coding process.
Control Measure Source:	for wastewater: extension of the applicability of the wastewater rule (§ 114.140-149) to breweries, for wastewater, fermentation and ink coding: a phone conversation with Bay Area Air Quality Management District, San Francisco, Calif., provided information on existing controls and processes at a San Francisco brewery owned by the same parent company as the Houston brewery. At this facility, ethanol emissions from wastewater and fermentation tanks are being controlled, and the ink coding process has been replaced by a laser coding system.
Rule Effectiveness:	for wastewater: 99%, for fermentation tank vents: 99%
Control Efficiency	for wastewater: 95%, for Fermentation tank vents: 85%
Rule Penetration:	NA
Source of Projected Emissions:	Emissions from beer spillage, wastewater streams, fermentation tanks and ink coding of bottles, cans, cases, and kegs.
Identified SCCs:	302-009-98, 03, 04
Total Emissions in Food & Agriculture (PT) in 1990 EI:	1.35 TPOD
Total Affected Emissions (Adjusted 1999 EI):	some fraction of the approximately 0.2 Tons per Ozone Day emitted by this brewery.
Affected Parties:	Operators of major source breweries in the H/GA area.
Estimated Costs:	Unknown
Cost Effectiveness:	Unknown

Comments: VOC emissions from filling operations have only recently been studied, but estimates are that 20-40% of total brewery VOC emissions (ethanol) result from spillage. These emissions were not reported in the 1990 EI.

VOCs from beer spillage, wastewater streams and fermentation tanks are predominately ethanol. VOCs from ink coding processes include methanol and methyl ethyl ketone.

A search of the Houston point source inventory yielded five accounts under the category of "food and agriculture"; two snack chip manufacturers, a cookie and cracker manufacturer, a coffee roasting facility, and a brewery. Reported VOC emissions from both snack chip manufacturers are well below 1 TPY. VOC emissions from the cookie manufacturer were reported in 1990 at 212 TPY, due primarily to ethanol emissions from yeasted sponge dough. In May 1994, this facility installed a catalytic oxidizer which achieves 95% control of the sponge dough oven emissions. Total facility emissions are now expected to approximate 21 TPY of VOCs. The coffee roasting facility reported VOC emissions of 26 TPY in 1990 and approx. 13 TPY in 1992. The majority of these emissions come from two continuous roasting ovens, each equipped with a catalytic afterburner, which are described as having a VOC destruction efficiency of 80%.

Staff Contact: Ann Brotherman (512)-239-6255

EMISSION CONTROL MEASURE (#65)
(PULP & PAPER)

Control Measure Description:	The proposed MACT standards would require the control of hazardous air pollutant (HAP) emissions. Whereas volatile organic compound (VOC) emissions are not specifically targeted by the MACT, the control technologies upon which the standards are based will similarly reduce VOC emissions. The MACT Phase 1 standards (the only ones that have been proposed to date), address pulping of wood chips, evaporation of weak spent cooking liquor, pulp bleaching and wastewater processes (excluding those related to pulp bleaching). Pulping operations will be required to reduce HAP emissions by at least 98% based upon the use of combustion. Bleaching operations will reduce HAP emissions by 99% based upon the use of a scrubber. Pulping process wastewater HAPs will be reduced by 90% based upon the use of steam stripping; the resulting wastewater HAP emissions are then routed to a control device achieving at least 98% reduction (based upon the use of combustion), for an overall control efficiency of 88%. All pulping and bleaching emissions subject to the standards must be captured and contained by enclosing all open processes and routing emissions through a closed vent system. The MACT also includes monitoring and recordkeeping requirements.
Control Measure Source:	Proposed MACT standard
Rule Effectiveness:	for pulping: 99%, for bleaching: 100%, for wastewater: 99%
Control Efficiency:	for pulping: 99%, for bleaching: 99%, for wastewater: 87%.
Rule Penetration:	NA
Source of Projected Emissions:	Pulping and bleaching vents and pulping wastewater streams.
Identified SCCs:	307-001-01, 02, 03, and 07 (related to pulping). No specific SCC codes were located for bleaching or pulping wastewater. These type emissions probably reported under "fugitive" SCCs 3-07-888-01, 02, 03, 04, 05, and 98.
Total Emissions affected in 1990 EI:	some fraction of the 6.59 and 1.76 Tons per Ozone Day listed in the control measure catalogs for H/GA and B/PA, respectively.
Affected Parties:	Operators of mill processes in the H/GA and B/PA areas.

Estimated Costs:	Costs vary depending on the size of the mill, the extent to which pulping processes are already enclosed, and control device selection. For pulping vents; total capital investment may range from $170,000 to $2,100,000, total annual costs may range from $58,000 to $450,000. For bleaching vents; total capital investment may range from $400,000 to $7,000,000, total annual costs may range from $160,000 to $7,500,000. For wastewater; total capital investment may range from $1,620,000 to $4,600,000; total annual costs may range from $840,000 to $4,600,000. (Cost data from Pulp & Paper MACT Background Information Document.)
Cost Effectiveness:	Difficult to determine since cost estimates and specific mill reduction estimates range so widely. Industry estimates show a combined mill reduction of approx. 1100 tpy due to MACT 1 standards.
Comments:	The quantity and composition of emissions vary depending upon the type of processes and equipment used as well as on wood type (hardwood or softwood). VOCs include methanol, acetone, hexane, toluene, methyl ethyl ketone, and various terpenes. MACT Phase 1 standards are expected to be promulgated April 1996 (although there is some speculation that this date may slide to Fall 1997. Mills then have 3-4 years to comply. MACT 2, which targets recovery furnaces and black liquor oxidation units, is expected to be proposed Oct.1995. MACT 3 (paper machines, and non-chemical pulping) and MACT 4 (boilers) are also being developed.
Staff Contact:	Ann Brotherman (512) 239-6255

EMISSION CONTROL MEASURE (#66)
(STATIONARY EXTERNAL COMBUSTION)

Control Measure Description:	Optimized combustion practices
Control Measure Source:	Vendor information
Rule Effectiveness:	N/A
Control Efficiency:	
Rule Penetration:	N/A
Source of Projected Emissions:	Boilers, process heaters, incinerators, dryers, and kilns
Identified SCCs:	1-01-001-01 through 1-05-002-14
Total Affected Emissions (adjusted 1999 EI):	14.29 tons per ozone day
Affected Parties:	Operators of boilers, process heaters, incinerators, dryers, and kilns
Estimated Costs:	$10,000-20,000 capital cost per unit for CO/O_2 trim (already required for certain units under NO_x RACT rule) $50,000 capital cost, $10,000 annual cost per unit for continuous VOC monitoring
Cost Effectiveness:	N/A

Comments: External combustion sources are typically fired with natural gas or fuel oil. VOC emissions are produced from unburned organics present in the fuel, and result from poor combustion conditions such as inefficient fuel-air mixing, low temperatures, and short residence time. Since these same conditions cause CO emissions to increase, continuous monitoring of CO may be used as a surrogate for VOC emissions. CO CEMS is already required for large boilers and process heaters under the NO_x RACT rule. Combustion modifications for NO_x control can result in CO and VOC increases.

Devices such as O_2 analyzers and CO or O_2 trim, which optimize fuel combustion efficiency, are readily available. However, these systems cannot be considered as VOC controls, since they give only a qualitative indication of VOCs produced during combustion.

It is important to note that VOCs emitted from natural gas-fired external combustion units consist mainly of nonreactive methane and ethane. VOCs reported in the 1990 EI have not consistently reflected this distinction. Taking this into account will greatly affect baseline emissions and cost-effectiveness figures.

Staff Contact: Mike Magee 239-1511

EMISSION CONTROL MEASURE (#67)
MISCELLANEOUS MANUFACTURING INDUSTRIES

Control Measure Description:	Additional storage tank controls
Control Measure Source:	N/A
Rule Effectiveness:	N/A
Control Efficiency:	
Rule Penetration:	N/A
Source of Projected Emissions:	Storage tanks in miscellaneous service
Identified SCCs:	3-99-999-93 through 3-99-999-98
Total Affected Emissions (adjusted 1999 EI):	10.16 tons per ozone day
Affected Parties:	Miscellaneous chemical manufacturing
Estimated Costs:	N/A
Cost Effectiveness:	N/A
Comments:	A single emission point at a source in the 1990 EI accounted for 9.19 tons per ozone day (90% of the VOC emissions for this category). Using 90% RE in projecting the emissions to 1999 resulted in a nine-fold increase in VOCs from the 1990 base year. Zero emissions have been reported for this emission point since 1992, when it was controlled by incineration. The remaining VOCs in this category (0.97 tons per ozone day) are essentially storage tank emissions. An evaluation of the creditability of the reduction is being conducted. Feasibility of additional controls has not yet been researched.
Staff Contact:	Mike Magee 239-1511

EMISSION CONTROL MEASURE (#68)
PRIMARY METAL PRODUCTION

Control Measure Description:	N/A
Control Measure Source:	N/A
Rule Effectiveness:	N/A
Control Efficiency:	N/A
Rule Penetration:	N/A
Source of Projected Emissions:	Primary Metal Production
Identified SCCs:	3-03-001-01 through 3-03-900-14
Total Affected Emissions (adjusted 1999 EI):	1.68 tons per ozone day
Affected Parties:	Primary metal industries, chiefly foundries which produce castings and miscellaneous metal parts.
Estimated Costs:	N/A
Cost Effectiveness:	N/A
Comments:	This category has been removed from present consideration in the control measure catalog. A source entered the contaminant code for "nitrofene," a VOC, instead of the code for "nitrogen" in its 1990 EI, resulting in VOC emissions for this category being overreported by a factor of ten. After the EI staff corrected this error in the 1993 EI, the total VOC emissions for this category are now 0.17 tons per ozone day.
Staff Contact:	Mike Magee 239-1511

EMISSION CONTROL MEASURE (#69)
(CHEMICAL MANUFACTURING - FUGITIVE LEAKS)

Control Measure Description:	The proposed measure implements the MACT standards for fugitive emissions in the chemical manufacturing industry. The leak definitions for pumps and compressors are reduced from 10,000 ppm to 2,000 ppm. The standards also require monthly inspection of all accessible components.
Control Measure Source:	CTG, SOCMI HON, NSPS subpart VV
Rule Effectiveness:	99%
Control Efficiency	95%-96%
Rule Penetration:	N/A
Source of Projected Emissions:	Chemical Manufacturing Industry.
Identified SCCs:	301-001-80, 301-005-09, 301-031-80, 301-034-06, 14, 301-091-80, 301-100-80, 301-120-07, 17, 37, 301-124-80, 301-125-09, 14, 24, 29, 34, 50, 55, 301-127-80, 301-132-27, 301-133-80, 301-153-80, 301-156-80, 301-157-80, 301-158-80, 301-167-80, 301-169-80, 301-174-80, 301-176-80, 301-181-80, 301-190-80, 301-195-80, 301-197-09, 301-197-49, 301-202-80, 301-205-80, 301-206-80, 301-210-80, 301-211-80, 301-250-04, 301-251-80, 301-253-80, 301-254-09, 301-254-20, 301-301-80, 301-302-80, 301-303-80, 301-304-80, 301-305-80, 301-800-01, 301-888-01, 02, 03, 04, and 05.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of chemical manufacturing processes in the B/PA and H/G areas.
Estimated Costs:	This rule implements the MACT standards for fugitive emissions at chemical manufacturing operations. There is no incremental capital or operating cost associated with this rule.
Cost Effectiveness:	Economic impact analysis presented in the HON shows cost effectiveness values that indicate overall cost savings. These cost savings are generated by reducing the loss of valuable products in the form of emissions.
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#70)
(CHEMICAL MANUFACTURING - COOLING TOWERS)

Control Measure Description:	The proposed measure establishes a one part per million by weight (ppmv) VOC concentration rise as a leak definition for cooling tower systems. The measure further requires monthly inspection of the cooling water to detect VOC leaks and allows a maximum of 45 days for any leak to be repaired after it is detected. The proposed measure implements the MACT standards for cooling towers at SOCMI operations.
Control Measure Source:	TNRCC NSR, HON, "A Device for Measuring Volatile Organic-Carbon Emissions from Cooling-Tower Water", by W. D. Vernon et. al. of the El Paso Product Company R&D.
Rule Effectiveness: 99% **Control Efficiency:** 90% **Rule Penetration:** N/A	
Source of Projected Emissions: Cooling Towers in the chemical manufacturing industry. **Identified SCCs:** 301-176-18, 385-001-02. **Total Affected Emissions (adjusted 1999 EI):**	
Affected Parties:	Operators of cooling tower systems in the B/PA and H/GA areas.
Estimated Costs:	There is no capital cost associated with this rule. The cost is limited to on-going maintenance and leak repair activities.
Cost Effectiveness:	The cost effectiveness of the proposed control measure is estimated to range between $500 to $2,000 per ton of VOC reduced. Savings may result from the implementation of this rule. These cost savings are generated by reducing the loss of valuable products in the form of emissions.
Comments:	The SOCMI HON includes control requirements for cooling towers under SOCMI processes. Reactivity and toxicity of VOC emitted from cooling tower systems vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to cooling tower emissions.
Staff Contact: Gus Eghneim (512) 239-1965	

EMISSION CONTROL MEASURE (#71)
(CHEMICAL MANUFACTURING - INDUSTRIAL WASTEWATER)

Control Measure Description:	The proposed measure expands on the current TNRCC rule by implementing more of the HON standards for process wastewater in the SOCMI chemical manufacturing industry and extends its applicability to more non-SOCMI chemical manufacturing processes. The measure establishes a 95% removal efficiency for biotreatment units and a 99% removal efficiency for strippers. The rule also requires that all wastewater components be covered with either floating roofs or fixed roofs. The fixed roofs shall only be used in conjunction with a control device capable of achieving 98% control efficiency.
Control Measure Source:	SOCMI HON
Rule Effectiveness:	99%
Control Efficiency:	95%
Rule Penetration:	N/A
Source of Projected Emissions:	Chemical Manufacturing Industry.
Identified SCCs:	301-820-01 to 11.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of chemical manufacturing processes in the B/PA and H/G areas.
Estimated Costs:	This rule implements the MACT standards for process wastewater at chemical manufacturing operations.
Cost Effectiveness:	Economic impact analysis presented in the HON shows cost effectiveness values ranging from $430 per ton to $1,600 per ton of VOC removed.
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#72)
(FLARES)

Control Measure Description:	The proposed measure requires all industrial flares to operate in accordance with 40 CFR 60.18(c) through (f). All industrial flares shall achieve 98% control efficiency. When a flare gas contains 80% (or more) of propylene and/or ethylene, a control efficiency of 99% shall be achieved.
Control Measure Source:	40 CFR 60.18
Rule Effectiveness:	99%
Control Efficiency:	98-99%
Rule Penetration:	N/A
Source of Projected Emissions:	Flares under any emission category regulated or expected to be regulated by Chapter 115.
Identified SCCs:	201-900-99, 301-900-99, 303-900-21, 22, 23, and 24, 304-900-21, 22, 23, and 24, 305-900-23, 306-009-03, 04, and 05, 307-900-21, 22, and 23, 308-900-23, 309-900-23, 310-002-05, 399-900-21, 22, 23, and 24, 402-900-23, 490-900-21, 22, and 23.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of industrial flares in the B/PA and H/GA areas.
Estimated Costs:	Compliance with 40 CFR 60.18 requires that the flare gas flowrate and heating value be continuously monitored. The cost associated with this proposal would include the cost of purchasing and installing a GC analyzer or calorimeter, or performing frequent EPA reference test method 18, and installing a flow meter. The cost varies depending on the size of the flare and the frequency of stream switching. The capital cost could range between $0 to $100,000 and the operating cost could range between $10,000 to $100,000 per year.
Cost Effectiveness:	

Comments:	The SCC codes listed above cover the following industries: Stationary Internal Combustion, Chemical Manufacturing, Metal Production, Mineral Products, Petroleum Industry, Pulp & Paper and Wood Products, Rubber & Plastic Products, Fabricated Metal Products, Oil and Gas Production, Misc. Manufacturing Industries, Surface Coating Operations, and Organic Solvent Evaporation. Reactivity and toxicity of VOC emitted from industrial flares vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to flares emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#73) (INCINERATORS)

Control Measure Description: The proposed measure requires emission testing to establish demonstrated compliance parameter levels (such as inlet and exhaust temperatures, flowrates, etc..) for thermal and catalytic incinerators. These levels shall be established to insure 99% destruction efficiency for thermal incinerators and 95% destruction efficiency for catalytic incinerators.

Control Measure Source: "Air Pollution Control, A Design Approach" by C. D. Cooper and F. C. Alley, ISBN 0-88133-521-5.

Rule Effectiveness: 99%
Control Efficiency for Thermal Incinerators: 99%
Control Efficiency for Catalytic Incinerators: 95%
Rule Penetration: N/A

Source of Projected Emissions: Incinerators under any emission category regulated or expected to be regulated by Chapter 115.

Identified SCCs: 301-900-11, 12, 13, and 14, 303-900-11, 12, 13, and 14, 304-900-11, 12, 13, and 14, 305-900-11, 12, and 13, 306-009-01, 02, 03, 04, and 05, 307-900-11, 12, and 13, 308-900-11, 12, and 13, 309-900-11, 12, and 13, 399-900-11, 12, 13, and 14, 402-900-11, 12, and 13, 490-900-11, 12, and 13, 501-001-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, and 17, 502-001-01, 02, 03, 04, and 05, 502-005-05, and 06, 503-001-01, 02, 03, 04, 05, 06, 07, 08, 09, 503-002-01, 02, 03, 04, and 05, 503-005-01 and 06.

Total Affected Emissions (adjusted 1999 EI):

Affected Parties: Operators of industrial incinerators in the B/PA and H/GA areas.

Estimated Costs: Compliance with this rule does not require any capital expenditure. The operating cost include the cost of stack testing for the initial establishment and annual (or less frequent) verification of the demonstrated compliance parameter levels and additional quality assurance requirements. The operating cost varies depending on the size of the incinerator, the frequency of stream switching, and flowrate variability. The operating cost associated with this rule could range between $10,000 to $100,000 per year.

Cost Effectiveness:

Comments: The SCC codes listed above cover the following industries: Chemical Manufacturing, Metal Production, Mineral Products, Petroleum Industry, Pulp & Paper and Wood Products, Rubber & Plastic Products, Fabricated Metal Products, Misc. Manufacturing Industries, Surface Coating Operations, and Organic Solvent Evaporation, and Solid Waste Disposal.

Reactivity and toxicity of VOC emitted from industrial incinerators vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to incinerators emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.

Staff Contact: Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#74)
(CHEMICAL MANUFACTURING - NON-SOCMI PROCESS VENTS)

Control Measure Description:	The proposed measure raises the control efficiency for non-SOCMI processes from 90% to 98%
Control Measure Source:	SOCMI HON, NSPS subpart NNN
Rule Effectiveness:	99%
Control Efficiency:	98%
Rule Penetration:	N/A
Source of Projected Emissions:	Non-SOCMI process vents.
Identified SCCs:	301-005-06, 07, 08, and 09, 301-012-06, 301-023-21, 301-042-02 and 03, 303-001-07, 305-004-03.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of non-SOCMI chemical processes in the B/PA and H/GA areas. The SCC codes listed above cover the following industries: Carbon Black Production, Hydrofluoric and Sulfuric Acid Production, Lead Alkali Production, and metal production.
Estimated Costs:	This rule extends the applicability of the MACT standards for process vents to include non-SOCMI chemical operations. The control efficiency is attainable by use of thermal incinerators and open flares. Some combustion devices such as gas turbines, I. C. engines, and boilers can also be used if properly utilized. The cost of this rule proposal varies depending on the number of incinerators, flares, or other combustion devices that are currently present at each chemical plant and the availability to be used to attain such a control efficiency. The total capital cost of a thermal incinerator ranges between $100,000 to $2,000,000 while that of an open flare ranges between $50,000 to $500,000. The cost is very dependent on the design flowrate. The annual operating cost can be as high as $500,000 per year for incinerators and $300,000 per year for flares.
Cost Effectiveness:	
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those non-SOCMI processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each non-SOCMI SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#75)
(OIL & GAS PRODUCTION - FUGITIVE LEAKS)

Control Measure Description:	The proposed measure extends the applicability of the MACT standards for fugitive emissions to the oil & gas production facilities. The leak definitions for pumps and compressors are reduced from 10,000 ppm to 2,000 ppm. The standards also require monthly inspection of all accessible components.
Control Measure Source:	CTG, SOCMI HON, NSPS subpart KKK
Rule Effectiveness:	99%
Control Efficiency:	95%-96%
Rule Penetration:	N/A
Source of Projected Emissions:	The Oil & Gas Industry.
Identified SCCs:	310-002-07, 310-888-01, 02, 03, 04, 05.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of oil & gas production facilities in the B/PA and H/GA areas.
Estimated Costs:	This rule implements the MACT standards for fugitive emissions in the oil & gas production facilities.
Cost Effectiveness:	Economic impact analysis presented in the HON shows cost effectiveness values that indicate overall cost savings. These cost savings are generated by reducing the loss of valuable products in the form of emissions.
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#76)
(ORGANIC CHEMICAL STORAGE - FIXED ROOF)

Control Measure Description:	The proposed measure lowers the true vapor pressure exemption level from 1.5 psia to 0.5 psia and adopts specifications and a repair schedule for fixed roof tank seals. The proposed measure also raises the control efficiency of the vapor recovery system from 90% to 95%.
Control Measure Source:	SOCMI HON, NSPS subpart Ka and Kb, Draft CTG, Final ACT.
Rule Effectiveness:	99%
Control Efficiency:	95%
Rule Penetration:	N/A
Source of Projected Emissions:	Organic Chemical Storage.
Identified SCCs:	407-004-01, 97, 407-008-01 to 03, 05 to 18, 97, 98, 407-016-01, 03, 05 to 07, 09, 11 to 14, 97, 98, 407-020-01, 03, 05 to 07, 09, 11 to 14, 97, 98, 407-032-01 to 03, 05, 06, 97, 98, 407-036-01 to 07, 09 to 24, 97, 98, 407-040-01 to 05, 07 to 09, 97, 98, 407-044-01 to 09, 11, 13 to 24, 97, 98, 407-048-01, 02, 97, 98, 407-052-01, 03, 05, 07 to 11, 13, 15 to 17, 97, 98, 407-056-01 to 07, 09, 10, 97, 98, 407-060-01, 03 to 09, 11 to 15, 17 to 24, 97, 98, 407-064-01, 03, 97, 98, 407-068-01 to 04, 97, 98, 407-076-01, 02, 97, 98, 407-080-01, 97, 407-084-01, 04, 97, 98, 407-172-97, 98, 407-176-97, 98, 407-180-97, 98, 407-208-97, 98, 407-220-97, 98, 407-228-97, 98, 407-232-97, 407-816-99, 407-832-99, 407-848-01, 99, 407-860-03, 99, 407-864-99, 407-872-01, 99, 407-999-97, 99.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of chemical storage tanks in the B/PA and H/GA areas.
Estimated Costs:	The 95% control efficiency is attainable by use of thermal or catalytic incinerators, carbon adsorption, and open flares. Some combustion devices such as gas turbines, I. C. engines, and boilers can also be used if properly utilized. The cost varies depending on the number of incinerators, flares, or other control devices that are currently present at each plant and the availability to be used to attain such a control efficiency. The total capital cost of a thermal incinerator ranges between $100,000 to $2,000,000 while that of an open flare ranges between $50,000 to $500,000. The cost is very dependent on the design flowrate. The annual operating cost can be as high as $500,000 per year for incinerators and $300,000 per year for flares.
Cost Effectiveness:	This rule adopts the NSPS subpart Ka requirements for fixed roof storage tanks. Cost estimates presented in the draft CTG for fixed roof tanks show a coat effectiveness of $1,800 per ton of VOC reduced for a 40,000 gallon tank at 0.5 psia true vapor pressure.
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#77)
(PETROLEUM INDUSTRY - PROCESS VENTS)

Control Measure Description:	The proposed measure raises the control efficiency for catalytic cracking and distillation vents at petroleum refineries from 90% to 98%
Control Measure Source:	SOCMI HON, NSPS subpart NNN, §115.121
Rule Effectiveness:	99%
Control Efficiency:	98% (
Rule Penetration:	N/A
Source of Projected Emissions:	catalytic cracking and distillation vents at petroleum refineries.
Identified SCCs:	306-002-01 and 02, 306-003-01, 306-004-01 and 02.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of petroleum refining processes in the B/PA and HGA areas.
Estimated Costs:	This rule extends the applicability of the MACT standards for process vents at SOCMI operations to the refinery industry. The control efficiency is attainable by use of thermal incinerators and open flares. Some combustion devices such as gas turbines, I. C. engines, and boilers can also be used if properly utilized. The cost of this proposal varies depending on the number of incinerators, flares, or other combustion devices that are currently present at each plant and the availability of these devices to be used to attain such a control efficiency. The total capital cost of a thermal incinerator ranges between $100,000 to $2,000,000 while that of an open flare ranges between $50,000 to $500,000. The cost is very dependent on the design flowrate. The annual operating can be as high as $500,000 per year for incinerators and $300,000 per year for flares.
Cost Effectiveness:	
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected to those petroleum processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#78)
(PETROLEUM INDUSTRY - FUGITIVE LEAKS)

Control Measure Description:	The proposed measure extends the applicability of the MACT standards for fugitive emissions to the petroleum refining industry. The leak definitions for pumps and compressors are reduced from 10,000 ppm to 2,000 ppm. The standards also require monthly inspection of all accessible components.
Control Measure Source:	CTG, SOCMI HON, NSPS subpart GGG
Rule Effectiveness:	99%
Control Efficiency:	95%-96%
Rule Penetration:	N/A
Source of Projected Emissions:	Petroleum Refining Industry.
Identified SCCs:	306-008-01, 02, 03, 04, 05, 06, 07, 306-888-01, 02, 03, 04, 05.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of petroleum processes in the B/PA and H/GA areas.
Estimated Costs:	
Cost Effectiveness:	This rule implements the MACT standards for fugitive emissions in the petroleum refining industry. Economic impact analysis presented in the HON shows cost effectiveness values that indicate overall cost savings. These cost savings are generated by reducing the loss of valuable products in the form of emissions.
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#79)
(PETROLEUM STORAGE TANKS - FIXED ROOF)

Control Measure Description:	The proposed measure lowers the true vapor pressure exemption level from 1.5 psia to 0.5 psia and adopts specifications and a repair schedule for fixed roof tank seals. The proposed measure also raises the control efficiency of the vapor recovery system from 90% to 95%.
Control Measure Source:	SOCMI HON, NSPS subpart Ka and Kb, Draft CTG, Final ACT.
Rule Effectiveness:	99%
Control Efficiency:	95%
Rule Penetration:	N/A
Source of Projected Emissions:	Petroleum storage tanks.
Identified SCCs:	403-001-01 to 07, 403-001-50 to 54, 56, 57, 59, 61, 98,99, 403-010-01 to 21, 97 to 99, 404-001-01 to 09, 404-002-01 to 06, 404-003-01, 02.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of petroleum storage tanks in the B/PA and H/GA areas.
Estimated Costs:	The 95% control efficiency is attainable by use of thermal or catalytic incinerators, carbon adsorption, and open flares. Some combustion devices such as gas turbines, I. C. engines, and boilers can also be used if properly utilized. The cost varies depending on the number of incinerators, flares, or other control devices that are currently present at each plant and the availability to be used to attain such a control efficiency. The total capital cost of a thermal incinerator ranges between $100,000 to $2,000,000 while that of an open flare ranges between $50,000 to $500,000. The cost is very dependent on the design flowrate. The annual operating cost can be as high as $500,000 per year for incinerators and $300,000 per year for flares.
Cost Effectiveness:	This rule adopts the NSPS subpart Ka requirements for fixed roof storage tanks. Cost estimates presented in the draft CTG for fixed roof tanks show a cost effectiveness of $1,800 per ton of VOC reduced for a 40,000 gallon tank at 0.5 psia true vapor pressure.

Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (80)
(PETROLEUM STORAGE TANKS - FLOATING ROOF)

Control Measure Description:	The proposed rule lowers the true vapor pressure exemption level from 1.5 psia to 0.5 psia and adopts specifications and a repair schedule for floating roof tank seals. The proposed measure also raises the control efficiency of the vapor recovery system from 90% to 95%.
Control Measure Source:	SOCMI HON, NSPS subpart Ka and Kb, Draft CTG, Final ACT.
Rule Effectiveness:	99%
Control Efficiency:	95%
Rule Penetration:	N/A
Source of Projected Emissions:	Petroleum storage tanks.
Identified SCCs:	403-002-01 to 04, 07 to 09, 12, 16, 99, 403-011-01 to 20, 30 to 35, 40 to 45, 50 to 55, 97 to 99, 404-001-10 to 17, 30, 31, 40, 41, 60, 61, 70, 71, 404-002-07 to 10, 30, 31, 40, 41, 60, 61, 70, 71, 404-003-04 and 05.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of petroleum storage tanks in the B/PA and H/GA areas.
Estimated Costs:	The 95% control efficiency is attainable by use of thermal or catalytic incinerators, carbon adsorption, and open flares. Some combustion devices such as gas turbines, I. C. engines, and boilers can also be used if properly utilized. The cost varies depending on the number of incinerators, flares, or other control devices that are currently present at each plant and the availability to be used to attain such a control efficiency. The total capital cost of a thermal incinerator ranges between $100,000 to $2,000,000 while that of an open flare ranges between $50,000 to $500,000. The cost is very dependent on the design flowrate. The annual operating cost can be as high as $500,000 per year for incinerators and $300,000 per year for flares.
Cost Effectiveness:	This rule adopts the NSPS subpart Kb requirements for floating roof storage tanks. Cost estimates presented in the draft CTG for floating roof tanks show a cost effectiveness of $1,300 per ton of VOC reduced for a 40,000 gallon tank at 0.5 psia true vapor pressure.

Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#81)
(PETROLEUM STORAGE TANKS - UNDERGROUND TANKS)

Control Measure Description:	The proposed measure lowers the true vapor pressure exemption level from 1.5 psia to 0.5 psia and adopts specifications and a repair schedule for underground tank seals. The proposed measure also raises the control efficiency of the vapor recovery system from 90% to 95%.
Control Measure Source:	SOCMI HON, NSPS subpart Ka and Kb, Draft CTG, Final ACT.
Rule Effectiveness:	99%
Control Efficiency:	95%
Rule Penetration:	N/A
Source of Projected Emissions:	Underground storage tanks.
Identified SCCs:	404-004-02 to 04, 14, 97, 98.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of underground storage tanks in the B/PA and H/G areas.
Estimated Costs:	The 95% control efficiency is attainable by use of thermal or catalytic incinerators, carbon adsorption, or open flares. Some combustion devices such as gas turbines, I. C. engines, and boilers can also be used if properly utilized. The cost varies depending on the number of incinerators, flares, or other control devices that are currently present at each plant and the availability to be used in attaining such a control efficiency. The total capital cost of a thermal incinerator ranges between $100,000 to $2,000,000 while that of an open flare ranges between $50,000 to $500,000. The cost is very dependent on the design flowrate. The annual operating cost can be as high as $500,000 per year for incinerators and $300,000 per year for flares.
Cost Effectiveness:	This rule adopts the NSPS subpart Kb requirements for storage tanks. Cost estimates presented in the draft CTG for storage tanks show a cost effectiveness of $1,400 to $1,800 per ton of VOC reduced for a 40,000 gallon tank at 0.5 psia true vapor pressure.
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.

Staff Contact: Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#82)
(PETROLEUM INDUSTRY - COOLING TOWERS)

Control Measure Description:	The proposed measure establishes a one part per million by weight (ppmv) VOC concentration rise as a leak definition for cooling tower systems. The measure further requires monthly inspection of the cooling water to detect VOC leaks and allows a maximum of 45 days for any leak to be repaired after it is detected.
Control Measure Source:	TNRCC NSR, HON, "A Device for Measuring Volatile Organic-Carbon Emissions from Cooling-Tower Water", by W. D. Vernon et. al. of the El Paso Product Company R&D.
Rule Effectiveness:	99%
Control Efficiency:	90%
Rule Penetration:	N/A
Source of Projected Emissions:	Cooling Towers in the petroleum industry.
Identified SCCs:	306-007-01 and 02.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of cooling tower systems in the B/PA and H/GA areas. The SCC codes listed above are for the Petroleum Industry only.
Estimated Costs:	There is no capital cost associated with this measure. The cost is limited to on-going maintenance and leak repair activities.
Cost Effectiveness:	The cost effectiveness of the proposed control measure is estimated to range between $500 to $2,000 per ton of VOC reduced. Savings may result from the implementation of this rule. These cost savings are generated by reducing the loss of valuable products in the form of emissions.
Comments:	The SOCMI HON includes control requirements for cooling towers in SOCMI processes. Reactivity and toxicity of VOC emitted from cooling tower systems vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to cooling tower emissions.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#83)
(PETROLEUM INDUSTRY - INDUSTRIAL WASTEWATER)

Control Measure Description:	The proposed measure extends the applicability of the SOCMI HON standards for process wastewater to the petroleum refining industry. The measure establishes a 95% removal efficiency for biotreatment units and a 99% removal efficiency for strippers. The measure also requires that all wastewater components be covered with either floating roofs or fixed roofs. The fixed roofs shall only be used in conjunction with a control device capable of achieving 98% control efficiency.
Control Measure Source:	SOCMI HON
Rule Effectiveness:	99%
Control Efficiency:	95%
Rule Penetration:	N/A
Source of Projected Emissions:	Petroleum Refining Industry.
Identified SCCs:	306-005-03 to 06, 306-005-14 to 22.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of petroleum refinery processes in the B/PA and H/GA areas.
Estimated Costs:	
Cost Effectiveness:	This rule implements the MACT standards for process wastewater at the petroleum industry. Economic impact analysis presented in the HON for SOCMI chemical manufacturing shows cost effectiveness values ranging from $430 per ton to $1,600 per ton of VOC removed. A similar cost effectiveness range is expected for wastewater in the petroleum industry.
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#84) (CHEMICAL MANUFACTURING - SOCMI AIR OXIDATION, DISTILLATION & REACTOR VENTS)

Control Measure Description:	The proposed measure raises the control efficiency for SOCMI air oxidation, reactor, and distillation vents from 98% to 99% and lowers the exemption level from 0.011 SCM per minute to 0.005 SCM per minute.
Control Measure Source:	SOCMI HON, NSPS subpart NNN
Rule Effectiveness:	99%
Control Efficiency:	99%
Rule Penetration:	N/A
Source of Projected Emissions:	SOCMI air oxidation, reactor, and distillation processes.
Identified SCCs:	301-008-04, 301-018-91 and 92, 301-019-04, and 07, 301-031-02, 03, 04, and 05, 301-034-03, 04, 05, 11, and 12, 301-091-53, 301-100-03, 301-120-05, 06, 13, and 14, 301-124-05, 301-125-12, 21, 26, 27, 28, and 53, 301-133-02 and 03, 301-153-11 and 21, 301-156-03, 04, 06, and 07, 301-158-02, 03, 21, and 22, 301-167-02 and 03, 301-169-02, 301-174-02, 10, 11, and 21, 301-181-05, 301-190-04, 301-195-02, 03, 04, and 05, 301-197-45, 301-202-04 and 11, 301-205-03, 04, 05, 06, 07, 08, 09, 21, 22, 23, 24, 25, 26, 27, 28,29, 30, 31, 32, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, and 55, 301-210-02, 03, 04, and 05, 301-211-03, 22, 23, and 24, 301-250-02 and 03, 301-251-02 and 04, 301-253-02 and 06, 301-254-06, 07, 08, 12, and 13, 301-301-06, 301-303-02.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of SOCMI processes in the B/PA and H/GA areas.
Estimated Costs:	This measure requires an increase in control efficiency from 98% to 99%. Such efficiency is attainable by use of thermal incinerators (both regenerative and nonregenerative) which are generally more expensive and harder to maintain when compared to open flares. Some combustion devices such as gas turbines, I. C. engines, and boilers can also be used if properly utilized. The cost of this proposal varies depending on the number of incinerators or other combustion devices that are currently present at each chemical plant and their availability to be used to attain the 99% CE. The total capital cost of a thermal incinerator ranges between $100,000 to $2,000,000 and is dependent on the design flowrate. The annual operating cost can be as high as $500,000 per year.
Cost Effectiveness:	

Comments:	Compliance with this proposal may require a major investment if companies have already spent the necessary capital to comply with the HON and the existing vent gas rule of Chapter 115 where both rules require a 98% control efficiency. The compliance date for the vent gas rule is November, 1996 and for the HON is March, 1997. Reactivity and toxicity of VOC emitted from industrial incinerators vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those SOCMI processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SOCMI SCC code.
Staff Contact:	Gus Eghneim (512) 239-1965

EMISSION CONTROL MEASURE (#85) (CHEMICAL MANUFACTURING - SOCMI AIR OXIDATION, DISTILLATION & REACTOR VENTS)

Control Measure Description:	The proposed measure lowers the exemption level for SOCMI processes from 0.011 SCM per minute to 0.005 SCM per minute.
Control Measure Source:	SOCMI HON, NSPS subpart NNN
Rule Effectiveness:	99%
Control Efficiency:	98%
Rule Penetration:	N/A
Source of Projected Emissions:	SOCMI air oxidation, reactor, and distillation processes.
Identified SCCs:	301-008-04, 301-018-91 and 92, 301-019-04, and 07, 301-031-02, 03, 04, and 05, 301-034-03, 04, 05, 11, and 12, 301-091-53, 301-100-03, 301-120-05, 06, 13, and 14, 301-124-05, 301-125-12, 21, 26, 27, 28, and 53, 301-133-02 and 03, 301-153-11 and 21, 301-156-03, 04, 06, and 07, 301-158-02, 03, 21, and 22, 301-167-02 and 03, 301-169-02, 301-174-02, 10, 11, and 21, 301-181-05, 301-190-04, 301-195-02, 03, 04, and 05, 301-197-45, 301-202-04 and 11, 301-205-03, 04, 05, 06, 07, 08, 09, 21, 22, 23, 24, 25, 26, 27, 28,29, 30, 31, 32, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, and 55, 301-210-02, 03, 04, and 05, 301-211-03, 22, 23, and 24, 301-250-02 and 03, 301-251-02 and 04, 301-253-02 and 06, 301-254-06, 07, 08, 12, and 13, 301-301-06, 301-303-02.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Operators of SOCMI processes in the B/PA and H/GA areas.
Estimated Costs:	This measure implements the MACT standards for process vents at SOCMI operations. There is no incremental capital or operating cost associated with this measure.
Cost Effectiveness:	
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those SOCMI processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SOCMI SCC code.
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EMISSION CONTROL MEASURE (#86)
(TRANSPORTATION AND MARKETING - FUGITIVE LEAKS)

Control Measure Description:	The proposed measure establishes standards and monitoring requirements and a repair schedule for leaking components at gasoline terminals and all other loading and unloading racks. The requirements mirror the fugitive emissions control requirements for the petroleum refining and chemical processes.
Control Measure Source:	TNRCC Chapter 115.212, SOCMI HON, NSPS subpart XX
Rule Effectiveness: 99% **Control Efficiency:** 93% **Rule Penetration:** N/A	
Source of Projected Emissions:	Transportation & Marketing Operations.
Identified SCCs:	306-888-01, 02, 03, 04, and 05.
Total Affected Emissions (adjusted 1999 EI):	
Affected Parties:	Loading and unloading operations in the B/PA and H/GA areas.
Estimated Costs:	
Cost Effectiveness:	This rule implements the MACT standards for fugitive emissions in the SOCMI chemical manufacturing. Economic impact analysis presented in the HON shows cost effectiveness values that indicate overall cost savings. These cost savings are generated by reducing the loss of valuable products in the form of emissions.
Comments:	Reactivity and toxicity of VOC vary significantly and are dependent on the process. Reactivity and toxicity should be selected for those processes which contribute the most to emissions. The processes can be identified by analyzing the reported emissions associated with each SCC code.
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EMISSION CONTROL MEASURE (#87)
STATIONARY INTERNAL COMBUSTION

Control Measure Description:	Catalytic oxidation, reduction
Control Measure Source:	Vendor information
Rule Effectiveness: 98% **Control Efficiency:** 85% **Rule Penetration:** 90%	
Source of Projected Emissions:	Gas-fired, stationary, reciprocating internal combustion (IC) engines and gas turbines
Identified SCCs:	2-01-001-01 through 2-88-888-03
Total Affected Emissions (Adjusted 1999 EI):	10.14 tons per ozone day
Affected Parties:	Gas-fired, stationary, reciprocating IC engines and gas turbines
Estimated Costs:	$12/hp for IC engine catalytic oxidation system; costs not available for gas turbines **(information being prepared by vendor)**
Cost Effectiveness:	**(information being prepared by vendor)**

Comments: Oxidation catalysts represent established technology to control VOC (and CO) emissions from IC engines and gas turbines. Non-selective catalytic reduction (NSCR), a cost-effective and readily available control technology for controlling NO_x from rich-burn engines only, can be configured for optimal NO_x, VOC and CO reductions. Determining the 1990 VOC baseline may be difficult for several reasons. VOC emission factors used for the 1990 EI are not very reliable due to the extreme variability of emissions from these units. Also, there is very little test data available to document actual VOC emissions. It is important to note that VOCs emitted from natural gas-fired internal combustion units consist mainly of nonreactive methane and ethane. VOCs reported in the 1990 EI have not consistently reflected this distinction. Taking this into account will greatly affect baseline emissions and cost-effectiveness figures.

In addition, there are technical problems associated with use of oxidation catalysts on both rich-burn and lean-burn IC engines. With lean-burn engines, exhaust temperatures are typically too low for adequate oxidation catalyst performance. With rich-burn engines, lowering the exhaust gas oxygen concentration below 0.5%, as required to operate NSCR for NO_x control, can create a twofold increase in VOC emissions from the engine. This further complicates assigning a VOC baseline value before controls are applied.

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