The policy and guidelines adopted in 2001 governing the O3FLEX program encouraged voluntary air emission reductions that help keep an area in attainment with the 1-hour ozone standard, while contributing positively to achieve the health benefits envisioned under a proposed standard based on 8-hour averages. The O3FLEX Memorandum of Agreement expressly provided that it may also serve regional efforts to meet the Clean Air Act requirements, as appropriate, when the 8-hour ozone guidance was issued. During 2005 the new 8-hour standard was being implemented and the 1-hour standard was withdrawn for the Corpus Christi urban airshed.

The goal of this agreement is to encourage voluntary air emission reductions that help keep Nueces County and San Patricio County in attainment with the 8-hour ozone standard, thereby achieving the health benefits envisioned.

**Geographic Coverage of the 8-O3 Flex Plan**

The Tulsa Transportation Management Area (TTMA), which comprises all of Tulsa County

and portions of Creek, Osage, Rogers and Wagoner Counties, is the area covered by this 8-O3

Flex Program. (Figure 1-1) The TTMA is viewed locally as the boundary most appropriate

to a potential non-attainment area of the 8-hour ozone standard, supported by the density of

development and commuting patterns within this area. The TTMA includes the urbanized

area of the seven county Tulsa Metropolitan Statistical Area as defined by the Bureau of the

Census. Additionally, the TTMA is the geographic boundary of the earlier EAC and 1-hr

Ozone Flex Plan. The TTMA has been the study area used by ODEQ and INCOG for

numerous air pollution control planning activities, including the FAR, the Ozone Alert!

Program, 1-hour Ozone Flex, and the EAC Program. The TTMA is also the

transportation planning area for which INCOG has kept an extensive database for

transportation related activities. The Tulsa air shed and the TTMA are used interchangeably

in this document.

**PARTICIPATING STAKEHOLDERS.** An active Air Quality Committee was established in 1995 to review the ozone attainment issues for the Corpus Christi urban airshed, comprised of Nueces and San Patricio counties in the Texas Coastal Bend Region (see area map included in Appendix 5). The membership includes local government, business and industry, local universities, the military, and representation from the news media. The meetings are open to the public.

**APPLICABLE STANDARDS.** This Agreement is applicable under the current National Ambient Air Quality Standard for ozone based on 8-hour averages. The standard is that the average for the past three calendar years of the fourth highest daily maximum 8-hour average ozone level each year may not exceed 0.08 parts per million.

If the current 8-hour standard is withdrawn or is determined by the Environmental Protection Agency to be inapplicable in the Corpus Christi urban airshed at a future date, this agreement may be terminated or revised in accordance with state and federal law.

**SOURCES OF POLLUTANTS.** Scientific research performed by Texas A&M University - Kingsville, including emissions inventory activities and backward trajectories for high ozone episodes, indicates the primary sources of ozone precursors:

1. Inbound transport. Cluster analysis of high ozone episodes from 1995 through 2003 showed that a significant majority of the episodes were heavily influenced by inbound transport of ozone and ozone precursors from northeast of the Corpus Christi area. This information is detailed in the Conceptual Model of weather patterns attached as Appendix 2. Progress in reducing ambient ozone and ozone precursors in areas northeast of Nueces County and San Patricio County along and near the Texas coast and in Louisiana is needed to assist in controlling ambient ozone in the Corpus Christi urban airshed.

2. Stationary sources. The 1999 inventory contained in the 2002 Ozone Flex Plan was updated for this plan. Figure 1 represents the updated numbers. Point sources account for 58% of nitrogen oxide emissions and 39% of volatile organic compounds in the two county area. Within this category, electric generating facilities and other industrial facilities are the largest local sources of nitrogen oxide emissions.

3. Mobile sources. The updated calendar year 1999 emissions inventory indicates that on-road and off-road mobile sources produce 39% of nitrogen oxides and 32% of volatile organic compounds in the two county area.

**MONITORING.** The Texas Commission on Environmental Quality operates two Continuous Air Monitoring Stations (CAMS) in Corpus Christi. CAMS 4 is located at the State School at 902 Airport Road. CAMS 21 is located in West Guth Park at 9866 La Branch St. Ozone levels recorded at these two monitors are used to determine the attainment status of the area.

**TRENDS AND MEASURES OF SUCCESS.** Monitoring has shown a slight downtrend in annual fourth high daily 8-hour average ozone levels during the past ten years.

This improvement is attributed to the voluntary measures implemented under the provisions of the Flexible Attainment Region Agreement approved in 1996 and the O3FLEX Agreement approved in 2002. These voluntary measures were selected to stabilize ozone 1-hour averages, but the success of these measures is also reflected in 8-hour monitoring results.

The following Table 1 contains estimates of emissions reductions achieved as a result of the voluntary programs established in the 1996 Flexible Attainment Agreement and the 2002 O3FLEX Agreement that would be continued under this Agreement. Estimates for Stage One Vapor Recovery and Low RVP Gasoline include all reductions. Regulations now require Stage One for larger gasoline retail outlets; but the ongoing voluntary training activities include non-regulated facilities and result in increased compliance by regulated facilities. Low RVP gasoline is now required in summer months but not in October.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 1: Emission Reduction Estimates from Voluntary Controls Voluntary Control Strategy** | **VOC (Tons/Yr)** | | **NOx (Tons/Yr)** |
| Stage I Vapor Recovery | 766 | | --- |
| 7.8 RVP Gasoline April - September | | 622 | |
| 9.0 RVP Gasoline in October | | 88 | |
| TERP reductions | | 33.4 | |
| Graphic Arts BACT | | 57 | |
| Dry Cleaning BACT | | 226 | |
| Furniture Mfg. BACT | | 170 | |
| Auto Refinishing BACT | | 11 | |
| Sand blasting/painting BACT | | 20 | |
| Marine Loading Controls | | 2538 | |

**Tulsa Transportation Management Area Sources of Pollutants and Emissions**

**Inventories**

Emissions data developed to support the EAC modeling has been deemed by ODEQ to be the

most appropriate data set for the 8-O3Flex program. Emissions inventories used for the EAC

effort were base 1999 National Emissions Inventory (NEI) and performed by ODEQ. EAC

photochemical modeling efforts indicate that both Nitrogen Oxides (NOx) and Volatile

Organic Compounds (VOCs) have a significant influence on the ozone values in Oklahoma.

The inventories were conducted in the entire state.

**2.0 Action Plan - Planning**

**Measures and Voluntary Emission**

**Reduction Control Measures**

Local entities in the Tulsa TMA have joined with INCOG, the ODEQ and the EPA to create

a plan that improves air quality in a common-sense approach. The 8-O3 Flex Plan makes it

possible to design significant and practical mobile, business, industrial and public emission

reduction strategies through local partnership efforts while protecting the region’s economy.

This plan is designed to provide for the continued attainment of the eight-hour ozone

NAAQS using accelerated and reasonable control measures developed at the regional level.

Citizens, businesses and local governments in the Tulsa air shed will voluntarily implement

identified control measures to reduce ozone precursors. When available, estimates of NOx

and VOC reductions for the voluntary control measures in this document are provided. In

some cases, the voluntary emission reductions for selected strategies are not readily

quantifiable. If at all possible, these reductions will be provided as part of the first annual

review process.

All terms and conditions specified in the EPA 8-O3Flex Guidance are included in this plan.

The Action Plan identifies ‘first year planned control measures’ as well as additional

potential measures to be selected throughout the duration of the plan. Contingency control

measures have been identified and provided for implementation upon ‘triggered’ ozone

monitor design values.

In demonstration to the importance of air quality improvement through voluntary reductions,

this plan further provides a list of planned control measures to be implemented outside of the

first year but within the 5-year term of this agreement. Of significance, Terra Nitrogen,

Terra Industries, Inc. provides commitment to voluntary reduce NOx emissions from its

Tulsa area facility by approximately 425 tons per year. The installation of ultra low NOx

burner technology to an existing ammonia reformer will reduce the unit’s NOx emissions by

approximately 60% at a projected capital cost of two million dollars.

**Section 2**

**PLANNED FIRST YEAR CONTROL MEASURES**

The following control measures will be implemented within one year of the final signatory

date on this agreement. Upon project completion, estimated NOx and VOC emission

reductions will be calculated for the measures which can be quantified. The quantified

reductions and methodology will be submitted to EPA in the semi-annual progress report.

**Metropolitan Tulsa Transit Authority (MTTA) Clean Diesel Retrofit Project**

MTTA maintains a fleet of approximately 100 vehicles. Sixty-one are traditional

diesel fleet passenger busses used for fixed routes. Of these, MTTA has identified

twenty-six older model fixed route passenger busses as candidates for clean diesel

retrofit technologies. Through a $100,000 Federal Highway Department

reimbursement allocation of Congestion Mitigation and Air Quality (CMAQ) funds

by INCOG, MTTA will implement Clean Diesel Retrofit Technology projects on

these selected older model year passenger busses. The project will include diesel

oxidation catalyst retrofits for sixteen 1998 model year busses and diesel engine

rebuilds for approximately ten engine model year 2000 busses.

This project targets both VOC and NOx emission reductions. Emission reduction

estimates were determined using the EPA on-line Diesel Emissions Quantifier

(http://cfpub.epa.gov/quantifier/view/). Actual emissions reductions achieved will

be quantified upon project implementation and provided in the semi-annual progress

report.

**City of Tulsa Compressed Natural Gas (CNG) Infrastructure, Fleet Vehicles and**

**Refuse Truck Project**

The City of Tulsa maintains a fleet of approximately 2000 vehicles including light

and heavy duty as well as off and on road. Vehicles are fueled at several central

locations throughout the Tulsa metro area. A City of Tulsa CNG fueling station

*TULSA AREA 8-O3FLEX PLAN MARCH 6, 2008*

exists at a key location, however it is currently not operational due to outdated

equipment needing technology upgrades and re-certification. Through an $82,000

Federal Highway Department reimbursement allocation of Congestion Mitigation

and Air Quality (CMAQ) funds by INCOG, the City of Tulsa will purchase two

dedicated CNG fleet vehicles, one CNG Refuse Hauler, and will reinstate their CNG

compressor and dispensing station.

• The purchase and fleet implementation of one CNG refuse truck for

fleet utilization. This will be the first CNG refuse truck in the City of

Tulsa, replacing a 2000 model year Crane Carrier ISC 260 diesel.

• Two dedicated CNG fleet vehicles, retiring two older conventional

gasoline-fueled fleet vehicles.

• The upgrading and recertification of the City of Tulsa’s natural gas

compressor and CNG dispensing station.

• Promoting and active pursuit of CNG projects for the City of Tulsa,

including continued CNG implementation for refuse utilization.

This project targets both VOC and NOx emission reductions. Emission reduction

estimates will be determined using EPA MOBILE6 upon project implementation and

provided in the semi-annual progress report.

Description Technology Description *Approximate*

*VMT/Year*

NOx Reduced

(pounds/year)

VOC Reduced

(pounds/year)

*City of Tulsa CNG Refuse*

*Vehicle*

Remove 2000 model HDDV

Refuse Truck – Replacing with

CNG fuel 2008 ISC 260 *17,000* n/a n/a

*City of Tulsa Purchase of*

*2 CNG Fleet light duty*

*vehicles*

Remove two 1998 model fleet

vehicles – replacing with two

2007 CNG Honda Civics *12,000* n/a n/a

**Enhanced public awareness, outreach and regional participation in Tulsa area air**

**quality programs**

Implementing voluntary emissions reduction measures requires identifying measures

or changes in behavior that will result in reduced air emissions, and communicating

with people engaged in those behaviors to inform them of what they can do and why

they should do it. Public awareness, notification and participation programs are

critical to achieving the goal of this agreement and to maintain attainment of the

ozone standard. Activities will be planned and implemented in coordination with

INCOG staff, the INCOG Air Quality Committee, local governments and the

community within the Tulsa air shed.

These regional air quality programs include:

• Enhancements, growth and expanded participation of the Tulsa area Ozone Alert!

Program throughout all media venues including web sites, television, radio, civic and

neighborhood associations, schools and community organizations, weather

information channels, and weather radio

• Tulsa Area Outdoor Air Quality Educational curricula to be developed and made

available to school districts, teachers and students throughout the community

• Air quality public education and emission reduction information contributions will

be made to newsletters and trade journals of local civic and business groups.

• Tulsa Metro Area ***Green Traveler*** Program promoting car-pooling, green

transportation, bike trails, transit, and other alternative transportation options.

• Implementation of Ozone Alert! Day messages, alternate route, and congestion

minimization” messages on ODOT intelligent message system and variable highway

signs.

This strategy targets VOC and NOx emission reductions. Because of the complexities

and inconsistencies associated with measuring reductions from public education and

outreach programs, emission reduction quantifications will not be provided for this

project.

**Heavy Duty Vehicle Anti-Idling Public Education Program**

Local public education program developed and implemented to promote reduced and

limited fleet idling for emission reductions. Strategy may include promoting 5-

minute or less idling during summer months; education and promotion to diesel

fleets managers for installation of idle shutdown system that automatically turns the

engine off after 5 minutes of continuous idle operation. The outreach program will

include promotion of long-range alternative idle reduction strategies for heating and

air conditioning cab comfort, auxiliary power units, and truck stop electrification

system promotion.

Local heavy duty diesel fleets will be requested to sign a Memorandum of

Understanding (MOU) in commitment to reducing emissions from diesel vehicle

idling. Appendix C provides a sample/draft copy of the MOU.

This strategy targets NOx emission reductions as well as VOC reductions. Because

of the complexities in attempting to quantify public education programs, quantified

emission reductions from this project will be provided only on the basis of the fleet

commitments through MOUs.

**Transportation Systems Management (TSM) Projects**

This strategy will reduce transportation-related emissions by improving traffic flow

and reducing congestion throughout the Tulsa air shed. The combined project efforts

of signal improvements, signal coordination efforts and enhancements to bicycle and

pedestrian facilities will reduce energy consumption and vehicle emissions.

Appendix D identifies the specific traffic signal coordination projects to be

implemented within one year of the final signatory date of this agreement.

This is a VOC and NOx reduction strategy. Emission reduction estimates will be

quantified and provided in the semi-annual progress report following full

implementation of the project.

**PLANNED ADDITIONAL VOLUNTARY CONTROL MEASURES**

The following control measures will be voluntary implementation within the five-year term

of this agreement:

**Terra Nitrogen LP, Verdigris Plant: Reformer Furnace Project - Installation of Ultra**

**Low NOx Burners**

Terra Nitrogen’s manufacturing facilities produce ammonia, UAN, urea and

ammonium nitrate. Terra’s Verdigris Plant is located within the Tulsa air shed in

Claremore, Oklahoma and has a long history of community support through

environmental improvements. In outstanding proactive partnership with the Tulsa

area’s ozone-reducing strategies and this 8-O3Flex Plan, Terra Nitrogen will install

ultra low NOx burners on an older ammonia unit. The capital investment cost

projected is approximately $5,000 per ton of NOx reduced, and will effectively

reduce the unit’s NOx emissions by 425 tons per year. The burners on the existing

unit were installed in the 1970’s and are fully in compliance with local, state and

federal regulations. See Appendix B.

**Control Measure Projected NOx**

**Reduced**

**(tons/year)**

**Projected**

**Implementation**

**Date**

Terra Nitrogen LP, Verdigris Plant: Reformer Furnace

Project - Installation of Ultra Low NOx Burners

425 Dec. 2009

**City of Tulsa: Energy Conservation and Reduction Plan 2007**

The City of Tulsa will implement the strategy recommendations within its ‘Energy

Conservation and Efficiency Plan’. The plan is included in Appendix E.

**Control Measure Projected**

**NOx**

**Reduced**

**Projected**

**VOCs**

**Reduced**

City of Tulsa: Energy Conservation and Reduction Plan 2007 5 – 10% 5 – 10%

**Traffic Signal Energy Efficiency Projects**

The City of Tulsa is proactively exchanging its less-efficient traffic signals for

energy efficiency upgrades and LED technology. The City currently has 265

intersections using LED's. This project will include the modification of 165

additional traffic signals to utilize LED technology. NOx emission reductions are

targeted.

**Other Transportation Systems Management (TSM) Projects**

In addition to the TSM projects committed to within the first year of this plan,

additional TSM projects will further reduce transportation-related emissions by

improving traffic flow and reducing congestion throughout the Tulsa air shed.

Appendix D identifies the specific traffic signal coordination projects to be

considered for voluntary implementation with the five-year terms of this agreement.

This project targets both NOx and VOC emission reductions.

**OTHER POTENTIAL CONTROL MEASURES**

The following control measures will be considered for voluntary implementation within the

five-year term of this agreement:

**American Airlines Voluntary Implementation of Decision Matrix of VOC Solvent**

**Process Reactivity to minimize ozone-forming emissions**

The Environmental Protection Agency (EPA) is encouraging the application of

recent scientific information on the photochemical reactivity of volatile organic

compounds in developing VOC control measures. “It is generally understood that

not all VOCs are equal in their effects on ground-level ozone formation. By

distinguishing between more reactive and less reactive VOCs, however, EPA

believes that it may be possible to develop regulations that will decrease ozone

concentrations further or more efficiently than by controlling all VOCs equally”.

In a proactive effort to identify areas of ozone-forming hydrocarbon reduction,

American Airlines has elected to voluntarily implement a decision making process

for the selection of certain aerospace technology solvents.

When possible and in accordance with FAA regulations, American Airlines will

implement a decision matrix for solvent usage whereby new solvent alternatives will

be evaluated and used according to standards that will additionally include reactivity.

American Airlines also volunteers to maintain a speciated VOC emission inventory

for the purpose of identifying opportunities for reducing highly reactive VOCs.

Building on American Airlines’ initiative and voluntary commitment, a collaborative

effort will be made to educate, promote and encourage additional local companies

within the Tulsa air shed to also discriminate between VOCs, where possible, and to

thereby begin the process of developing internal speciated VOC emissions

inventories.

VOC emissions are targeted for this reduction strategy.

**Small engine catalyst; stationary natural gas compressor engine retrofit project**

Cooperative partnership: MIRATECH and local industries to be determined.

Voluntary installation and maintenance of one to five small natural gas compressor

engine catalyst elements to reduce NOx emissions in the Tulsa air shed.

Through voluntary Memorandum of Understanding (MOU) industrial engine

owner/operators will partner with MIRATECH for the implementation of this

project. The MOU will define that MIRATECH will provide the engine catalyst

elements and the engine operator provides a “catalyst-ready” engine: maintained per

the engine manufacturer’s recommendations for operation with a 3-way catalyst;

air/fuel ratio control system installed and operational; catalyst housing installed and

ready to accept catalyst elements; the operator takes ownership of the equipment and

its maintenance going forward.

Engines will be 4-stroke, rich burn, natural gas fueled stationary engines running

continuous duty (6000 – 8000 hours/year, typical of a stationary gas compressor

application) and located within the Tulsa air shed.

Emission Reduction Methodology: Engine Example – 200 bhp, 4-stroke rich burn

natural gas engine running 8000 hours per year. Uncontrolled NOx at 18 g/bhp-hr =

7.2 tons per year NOx output. Controlled NOx at 1.0 g/bhp-hr = 0.4 tons per year

NOx output.

Total estimated emission reduction from this five engine catalyst retrofit project is 35

tons/year of NOx emissions.

**PSO-AEP NOx Reduction Strategies**

**Carbon Capture project at Northeastern Station**

AEP PSO will be considering implementation of a new carbon capture control

technology in 2012 at their Northeastern Station power station, located in Oologah, a

coal-fired unit. As part of that project, PSO plans to install NOx control equipment

that is expected to produce at minimum a 50% reduction of the NOx emissions from

that unit. This project is contingent on successful operation of the same technology

on a smaller scale at a PSO coal unit in West Virginia, which should occur in 2008.

As available, the Carbon Capture project implementation and technology results will

be provided in Tulsa’s semi-annual progress reports

**Gas-fired Tulsa and Jenks Units low-NOx boiler optimization**

PSO continues its commitment to Tulsa’s ozone season reductions by optimizing the

NOx reductions at their gas-fired boilers at the Tulsa and Jenks power stations.

During the ozone season, these units will operate at the lowest and safest NOx rate

possible.

PSO-AEP has provided a letter of commitment to these NOx reduction strategies in

Appendix F. The low-NOx boiler optimization strategy is planned for

implementation at minimum, during each Tulsa ozone season throughout the

duration of this 8-O3Flex Agreement. The Carbon Capture project at Northeastern

Station is being considered for implementation in 2011 and is contingent upon

successful technology and 2008 proposed implementation of a smaller scale coal unit

in West Virginia.

**Alternative Fuel and Reduced-Emissions Vehicle Projects**

• Biodiesel Fuel Fleet Projects

• CNG Fuel Fleet Projects

• Hybrid-Electric Vehicle Promotion

**VOC infra-red camera for emissions leak detection Program**

Industrial deployment of infra-red cameras to assist in detecting VOC emissions for

the purpose of identifying voluntary emissions reductions in the Tulsa air shed.

**Area Business Energy Efficiency Projects**

Building on the City of Tulsa Energy Plan, a public education and outreach program

will be developed and implemented to encourage local businesses to seek energy

efficiency and conservation strategies. Businesses will be encouraged to perform

energy usage audits and asked to make a 5% (or more) energy reduction

commitment. Recent studies have shown that regional energy efficiency and

conservation programs can provide significant reduction in power plant emissions.

INCOG will encourage businesses to make these commitments through MOU and

submitted to INCOG.

**Additional Ozone Season Reductions through Voluntary Industrial Strategies**

• Promoting industrial turnarounds to be scheduled to benefit ozone season

emission reductions

• Local industry commitments to test backup generators in evening hours during

ozone season