APPENDIX E—POLLUTION PREVENTION INFORMATION

Introduction

The TCEQ encourages businesses to implement policies that are beneficial while complying with state and federal rules. This appendix contains best management practices (BMPs) for pollution prevention, devised by the TCEQ's Pollution Prevention and Education Section in order to help businesses improve performance and reduce air pollution from various sources. The purpose of these BMPs is to encourage businesses to move above and beyond regulatory requirements.

Marine Terminals

Steps that can reduce emissions at marine terminals:

- Institute a hose-connector management system to ensure consistent transfer of liquid, resulting in fewer leaks. Ensure that responsibilities are documented in operational procedures.
- Improve corporate policy on docked barges and make sure they meet terminal emission and operating standards. Ensure that vessel operators conform to maintenance standards for terminal relief valves and terminal closed-dome loading and unloading procedures.
- Improve VOC containment where vapor balance is less than completely effective when loading barges, tankers, railcars, and trucks. Use a VOC detector to ensure tight connections.
- Use combined heat and power (CHP) technology for energy recovery.
- Use CHP chillers to deliver refrigeration for tanks requiring condensers to reduce product loss. CHP technology can supply electricity, steam, and refrigeration from any fuel source with 80–90 percent efficiency.

Storage Tanks

Breathing Losses

Breathing losses are the escape of vapor from a tank vapor space that has expanded due to daily variation in temperature and pressure. Reduce breathing losses by reducing vapor space in the tank. In fixed-roof tanks, breathing losses can account for 10 to 95 percent of total annual emissions. Much of the breathing losses result from thermal expansion of the VOC-saturated vapor in the tank head space. To prevent these losses, reduce the tank head space by operating at a full level and constant rate

(fill rate = withdrawal rate). Keep the tank at a more constant temperature by painting it white to reflect more sunlight and by insulating it to reduce heat transfer between the tank liquids and the surrounding air. Supplemental cooling or heating from a CHP system can be used to keep the tank at constant temperature. Raise the vent temperature and consider raising the pressure at which the conservation vent opens to reduce emissions caused by thermal expansion of the tank vapor space. However, do not exceed the tank design pressure. Tanks that operate conservation vents at 2.5 psig or higher will often have low breathing losses, or none.

Working Losses

Working losses result from filling and emptying tanks and can be reduced significantly by implementing BMPs. Install vapor-return lines to send the displaced vapor from the tank being filled back to the liquid source (tank truck, railcar, or barge). Equalize vapor space between tanks in a tank farm using a common vent header. This would apply to tanks containing the same solvent or where cross-contamination is acceptable. The displaced vapor space of a tank being filled will fill the resulting vapor space of a tank being emptied. Equalize the fill rate and withdrawal rate to eliminate working losses.

Reducing the number of tank turnovers per year will reduce working loss emissions. Vapors displaced during filling and thermal outbreathing can be contained by installing a vapor holder (giving the tank a variable vapor space). The vapors from the holder can then be returned to the liquid storage tank during emptying and inbreathing.

Floating-Roof Landing Losses

In a floating-roof tank, the roof floats on the surface of the liquid inside the tank to reduce evaporative losses during normal operation. However, when the tank is drained to a level where its roof lands on its deck legs or other support mechanism, a vacuum breaker opens to prevent collapse of the roof and a vapor space underneath the roof is created. Liquid remaining in the bottom of the tank continuously emits vapors to replace those expelled by breathing (in the case of internal floating-roof tanks) or wind action (in the case of external floating-roof tanks). These emissions, referred to as *standing-idle losses,* occur daily as long as the tank roof remains landed. Significant air emissions and loss of product can occur during landing of floating roofs. Floating-roof tanks should be operated in a manner that minimizes the amount and length of time of roof landings.

Other Tank Options

Other options to consider:

- using insulating paint on the roofs of floating-roof tanks
- installing vapor-recovery systems

- using tank emissions for energy recovery in a CHP system

Cooling Towers

Ways to improve performance of cooling towers:

- Get as many passes as possible.
- Find creative ways to capture and collect water to be used as makeup water for the system.
- Replace old, leaking heat exchangers.
- Install backup heat exchangers to avoid plant shutdowns.
- Monitor cooling tower exhausts to provide real-time notification of heat-exchanger leaks.
- Reduce drift losses by using baffles or drift eliminators to conserve water, retain water-treatment chemicals in the system, and improve operating efficiency.
- Control blowdown manually or automatically by valves actuated by timers or by conductivity meters.

Glycol Units

Things to consider when dealing with glycol units:

- Replace gas pneumatics with air-system instruments.
- Install flash tank separators on glycol dehydrators.
- Implement directed inspection and maintenance at gas plants and booster stations.
- Join the EPA's Natural Gas STAR Program.
- Install vapor recovery units on natural gas liquid transfer lines from storage tanks to rail and truck transportation vehicles.

General BMPs for VOC Emissions Control

Tips on controlling miscellaneous VOC sources:

- Process waste products for resource recovery, or as salable by-products. Recover VOCs via nondestructive methods (e.g., membrane recovery, biofilter, or cryogenic recovery) at or near the point of generation.
- Implement product substitution, product conservation, and changes in product composition. Use alternative products that would do the same job but with less harmful environmental impact (e.g., low-VOC or water-based products).
- Modify process chemistry or equipment design, improve operational procedures, increased automation, and improve process controls.

- Recover potential emissions for use as feed to the original process or in another process within the facility.
- Practice good housekeeping, implement an effective preventive maintenance or leak detection and repair program (or both), institute training and awareness programs, have effective supervision, encourage employee participation, review production scheduling and planning, and implement accounting and allocation practices that reflect the true cost of wasted products.
- Recycle wash solvents elsewhere in the process, use a less-volatile cleaning agent, and design equipment and procedures to minimize the need for cleaning.
- Employ parts washers that use steam instead of conventional ones that use solvents.
- Prevent the losses of volatile materials to wastewater streams where they may reappear as VOCs and evaporate.
- Keep paint and paint thinner away from high-traffic areas to avoid spills. Recycle paint, paint thinner, and solvents.
- Train employees on proper painting and spraying techniques. Use effective spray equipment that delivers less overspray and more paint to the target (high-volume, low-pressure spray guns).
- Replace existing atmospheric blowdown stacks with vapor recovery systems for energy recovery.
- Estimate the cost to install a marine vapor loss control system. Consider both vapor recovery and a CHP configuration.
- Reduce refinery odor from sour water.
- Replace solvent-based paints with low-VOC or water-based paints.
- Improve material handling, storage, and management practices. Such improvements may result in substantial reductions in spills, fugitive emissions, and leaks.
- Mix paints and solvents in designated areas, preferably indoors with appropriate ventilation.
- Have absorbent and other cleanup items readily available for immediate cleanup of spills.
- Keep VOC saturated pads, rags, and gloves in closed and vapor tight containers.
- Do not transfer or convert pollution from one medium to another.
- Modify the underground drainage system and process water treatment system to improve water treatment and reduce air emissions.
- Burn recovered hydrocarbons for energy recovery in a CHP system.
- Enclose, cover, or contain painting and related activities to the maximum extent practical.

Sandblasting

Emissions from sandblasting areas can be controlled by enclosing, covering, or containing blasting and sanding areas completely. Use shrouded or vacuum-assisted tools that can prevent abrasives, dust, and paint chips from leaving the work area (e.g., dustless sanders and vacuum blasting robots).

Boilers and Process Heaters

Ways to improve boiler and heater operations:

- Develop, document, and implement a maintenance procedure.
- Measure the flue gas temperature. If it is too high, install heat-recovery equipment such as an economizer or absorption chiller to chill water.
- Measure the hydrocarbon concentration in the flue gas to ensure complete combustion.
- Clean the water and fire sides of the boiler to enhance heat transfer.
- Reduce excess air. It can lower boiler temperature.
- Install automatic combustion controls.
- Implement an environmental management system (EMS) that calls for continuous improvement of energy efficiency. Involve every employee in source reduction and minimizing waste.
- Improve water quality in the boiler tubes to decrease blowdowns.
- Harvest rainwater and use it in your boiler. Rainwater contains very few impurities and needs less demineralization and dealkalization.
- Reduce radiation and convection losses (*shell losses*) by improving insulation. Periodically measure shell temperatures.
- Repair steam leaks as quickly as possible.
- Recover condensate and feed it back to the boiler.

If you have questions about these pollution prevention practices, or for additional technical assistance, please contact the TCEQ's Pollution Prevention and Education Section at 512-239-3143.

ABBREVIATIONS

AEIR	annual emissions inventory report
AEIU	annual emissions inventory update
AMS	area and mobile source
API	American Petroleum Institute
AVO	audio /visual/olfactory
BTEX	benzene, toluene, ethylbenzene, and xylenes
Btu	British thermal unit(s)
CAS	Chemical Abstracts Service
CEMS	continuous emissions monitoring system(s)
CFR	Code of Federal Regulations (40 CFR *xx* = Title 40, Code of Federal Regulations, section *xx*)
CIN	control identification number
Cl_2	chlorine
CHP	combined heat and power
CO	carbon monoxide
COI	compound(s) of interest
CFR	Code of Federal Regulations
DRE	destruction and removal efficiency
EAS	Emissions Assessment Section
EE	emissions events
EGU	electric generation unit
EI	emissions inventory
EIQ	emissions inventory questionnaire
EPA	United States Environmental Protection Agency
EPN	emission point number
FCAA	federal Clean Air Act
FCCU	fluid catalytic cracking unit
GHG	greenhouse gas
GOR	gas/oil ratio
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HCN	hydrogen cyanide
HF	hydrogen fluoride
HRSG	heat recovery steam generator
HRVOC	highly reactive volatile organic compound
HVAC	heating, ventilation, and air conditioning
IEI	initial emissions inventory
lb	pound(s)
LDAR	leak detection and repair

MAERT	Maximum Allowable Emissions Rate Table
MEROX	mercaptan oxidation
MM	million
MSS	maintenance, startup, and shutdown
NAAQS	national ambient air quality standards
NAD83	North American Datum of 1983
NH_3	ammonia
NSCR	nonselective catalytic reduction
NO_x	oxides of nitrogen
OA	Office of Air
Pb	Lead
PBR	permit by rule
PEMS	predictive emissions monitoring system(s)
PM	particulate matter
$PM_{2.5}$	particulate matter no larger than 2.5 microns in diameter
PM_{10}	particulate matter no larger than 10 microns in diameter
ppd	pounds per day
ppm	parts per million
psi	pounds per square inch
psia	pounds per square inch, absolute
psig	pounds per square inch, gauge
RATA	relative accuracy test audit
RN	regulated entity reference number
RVP	Reid Vapor Pressure
SIC	Standard Industrial Classification
SCC	source classification code
SO_2	sulfur dioxide
SOCMI	synthetic organic chemical manufacturing industry
SMSS	scheduled maintenance, startup, and shutdown
SRU	sulfur recovery unit
STARS	State of Texas Air Reporting System
STEERS	State of Texas Environmental Electronic Reporting System
TAC	Texas Administrative Code (30 TAC *xx* = Title 30, Texas Administrative Code, Section *xx*)
TCAA	Texas Clean Air Act
TCEQ	Texas Commission on Environmental Quality
THSC	Texas Health and Safety Code
TOC	total organic carbon
TRI	Toxics Release Inventory
tpy	tons per year
—u	unclassified

UTM	Universal Transverse Mercator
VOC	volatile organic compound
VRU	vapor recovery unit

GLOSSARY

The definitions in this glossary are intended to assist you in understanding matters related to the annual emissions inventory. **Nothing in this glossary supersedes any information in any state or federal law, rule, or regulation. In the case of any discrepancy between information herein vs. information in a state or federal law, rule, or regulation, the law, rule, or regulation takes precedence.**

abatement code—A numeric code that identifies an abatement device. A list of abatement codes is available at the EAS Web page: <www.tceq.texas.gov/goto/ieas>.

abatement device—A piece of equipment or recognized operation that limits, controls, or abates emissions of certain contaminants associated with certain processes. Examples include baghouses, flares, scrubbers, condensers, vapor recovery units, and component fugitive Inspection and Maintenance programs. Synonymous with *control device.*

account—See Title 30, Texas Administrative Code (TAC), Section 101.1. For sources *where a permit is required under 30 TAC Chapter 122 (Federal Operating Permits),* all sources aggregated as a site. For all other sources, any combination of sources under common ownership or control and located on one or more properties that are contiguous, or contiguous except for intervening roads, railroads, rights-of-way, waterways, or similar divisions.

API gravity—The weight per unit volume of hydrocarbon liquids as measured by a system recommended by the American Petroleum Institute:

$$API\ \ gravity = \frac{141.5}{Specific\ \ Gravity} \times 131.5$$

attainment county—A county where levels of criteria air pollutants meet the national ambient air quality standards for the pollutants. Attainment areas are defined using federal pollutant limits set by the EPA. Refer to FCAA 107(d) for further explanations of "nonattainment" and "attainment" designations. Compare *nonattainment county*.

Chemical Abstracts Service number—A unique number assigned to a substance. Although the EAS identifies each substance with a *contaminant code* rather than with its CAS number, you should include the CAS number when adding a new contaminant to your emissions inventory. This additional information will be used for quality assurance.

component— A piece of equipment, including pumps, valves, compressors, connectors, and pressure relief valves, which has the potential to leak volatile organic compounds. Components are not considered individual facilities and must be grouped and represented as collective sources in the EI according to the guidance in Chapter 3 and Technical Supplement 3.

condensate—A liquid hydrocarbon with an API gravity greater than 40º API at 60º F (and a specific gravity less than 0.8251).

contaminant—A substance emitted into the air.

contaminant code—A contaminant's five-digit identifying code. A list is available at the EAS Web page: <www.tceq.texas.gov/goto/ieas>.

control device—See *abatement device.*

control identification number (CIN)—A label that uniquely identifies an abatement device; limited to 10 alphanumeric characters. Please note that no two separate abatement devices within an emissions inventory may share the same CIN.

destruction and removal efficiency (DRE)—A percentage that represents the number of molecules of a compound removed or destroyed relative to the number of molecules entering the system.

electric generation unit (EGU)—For the emissions inventory, a boiler (including an auxiliary steam boiler), internal combustion engine, or stationary gas turbine (including a duct burner used in a turbine exhaust duct) that generates electric energy for compensation.

emissions—Air contaminants generated by a facility. See also *contaminant*.

Emissions Assessment Section (EAS)—The section of the TCEQ's Office of Air responsible for the emissions inventory process.

emissions event—Any upset event or unscheduled maintenance, startup, or shutdown activity from a common cause that results in unauthorized emissions of air contaminants from one or more points at a regulated entity.

emissions inventory forms—The forms used to add new structural information to an EI or to supply material usage data. Blank forms, sample forms, and instructions are available at the EAS Web page: <www.tceq.texas.gov/goto/ieas>.

emissions inventory questionnaire (EIQ) —A computer printout that shows a site's self-reported data, including, but not limited to, account information, contact information, process structural data, facility identification data, control device data, emission point data, and path emissions for a given calendar year.

emissions inventory structure—The way that a site's facilities, abatement devices, and emission points are represented in the emissions inventory. Formerly *account structure*.

emission point—The geographical location (point) where emissions enter the air. An emission point is described by its group, profile and characteristics. Each emission point in the emissions inventory is uniquely identified by an **emission point number**.

emission point number (EPN)—A label that uniquely identifies a given emission point; limited to 10 characters. Please note that no two distinct emission points in an EI may share the same EPN. The EPNs on your EIQ must match those on your permit.

excess opacity event—An event where an opacity reading meets or exceeds 15 additional percentage points above an applicable opacity limit, averaged over a six-minute period.

expected maximum capacity—The projected greatest capacity of a facility based on its physical and operational design or configuration and planned operation.

facility—A discrete or identifiable structure, device, item, equipment, or enclosure that constitutes or contains a stationary source, including appurtenances other than emission-control equipment. A mine, quarry, well test, or road is not a facility. An individual fugitive component is not a facility.

facility identification number (FIN)—A label that uniquely identifies a given facility; limited to 10 alphanumeric characters. Please note that no two distinct facilities may share the same FIN. The FINs on your EIQ must match those on your permit.

Greenhouse gases (GHGs)— Carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6). **gas/oil ratio (GOR)**—The relation of gas in cubic feet to the production of oil in barrels.

hazardous air pollutant (HAP)—An air pollutant designated as hazardous by the EPA. HAPs are identified in federal Clean Air Act 112(b); the 1990 Act allows the EPA to modify the list as necessary. A current list can be found on the EPA's Web site. All HAPs that meet the reporting requirements must be listed individually (speciated) in your emissions inventory.

highly reactive volatile organic compounds (HRVOCs)—For emissions inventory purposes, the compounds ethylene, propylene, all isomers of butene, and 1,3-butadiene. This definition applies to all areas of the state, not just those counties subject to the HRVOC rules found in 30 TAC 115.

Maximum Allowable Emissions Rate Table (MAERT)—As defined in 30 TAC 116.10, a table included with a preconstruction permit issued under Chapter 116 that contains the allowable emission rates established by the permit for a facility.

micron—One-millionth of a meter. Also called *micrometer*.

nonattainment county—A defined region within the state designated by the EPA as failing to meet the national ambient air quality standard for a pollutant for which a standard exists. The EPA will designate the area as nonattainment under the provisions of FCAA 107(d). For the official list and boundaries of nonattainment areas, see 40 CFR Part 81 and pertinent *Federal Register* notices.

nonreactive organic compounds—A group of organic compounds that do not significantly contribute to ozone formation.

non-reportable emissions event—Any emissions event that in any 24-hour period does not result in an unauthorized emission from any emissions point equal to or in excess of the reportable quantity as defined in 30 TAC 101.1.

non-reportable scheduled maintenance, startup, shutdown activity—An SMSS activity that is recorded as required by 30 TAC 101.211.

ozone season—The period from May 1 through September 30 of a year as defined in Title 40, Code of Federal Regulations (40 CFR), Part 51.

path—A path consists of a facility (tracked by its FIN) that generates emissions; an associated emission point (tracked by its EPN) where emissions enter the atmosphere; and any abatement devices (tracked by CINs) that control emissions. All paths must consist of at least a FIN and an EPN. If emissions produced at a FIN are not abated before entering the atmosphere at the associated EPN, then the path consists only of a FIN and an EPN. If, however, an abatement device controls emissions between the FIN and the EPN, then the associated path consists of a FIN, a CIN, and an EPN.

percent max capacity—The ratio of a facility's annual operating capacity to the facility's maximum capacity:

$$Percent\ \ Max\ Capacity = \frac{Capacity_{\ actual}}{Capacity_{\ maximum}} \times 100$$

For a definition of $Capacity_{maximum}$, see *expected maximum capacity*.

percent time offline (PTO)—The ratio of the device's downtime to the annual operating time.

$$PTO = \frac{Hours\ Offline}{Annual\ \ Operating\ \ Hours} \times 100$$

permit by rule—State air authorization for activities that produce more than a *de minimis* level of emissions but less than other New Source Review permitting options.

particulate matter— Any material, except uncombined water, that exists as a solid or liquid in the atmosphere or in a gas stream at standard conditions.

$PM_{2.5}$—Portion of particulate matter with an aerodynamic diameter less than or equal to 2.5 microns. $PM_{2.5}$ is a subset of PM and PM_{10}.

PM_{10}—Portion of particulate matter with an aerodynamic diameter less than or equal to 10 microns. PM_{10} is a subset of PM.

potential to emit (PTE)—The maximum capacity of a facility or stationary source to emit a pollutant under its physical and operational design. Any physical or enforceable operational limitation on the capacity of the facility or stationary source to emit a pollutant, including the use of air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, should be treated as part of its design only if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions, as defined in 40 CFR 51.165(a)(1)(viii), do not count in determining a stationary source's potential to emit.

regulated entity—As defined at 30 TAC 101.1, all regulated units, facilities, equipment, structures, or sources at one street address or location that are owned or operated by the same person. The term includes any property under common ownership or control identified in a permit or used in conjunction with the regulated activity at the same street address or location. Owners or operators of pipelines, gathering lines, and flowlines under common ownership or control in a particular county may be treated as a single regulated entity for purposes of assessment and regulation of emissions events.

regulated entity reference number—A number that the Central Registry assigns to a location where a TCEQ-regulated activity occurs.

regulated pollutant—Includes any VOC; any pollutant subject to the federal Clean Air Act, Section 111; any pollutant listed as a hazardous air pollutant under FCAA Section 112; each pollutant for which a national primary ambient air quality standard has been promulgated (including carbon monoxide); and any other air pollutant subject to requirements under TCEQ rules, regulations, permits, orders of the Commission, or court orders.

reportable emissions event—Any emissions event that, in any 24-hour period, results in an unauthorized emission from any emissions point equal to or in excess of the reportable quantity as defined in 30 TAC 101.1.

reportable scheduled maintenance, startup, shutdown activity—An SMSS activity as defined in 30 TAC 101.1, where prior notice and a final report is submitted as required by 30 TAC 101.211.

scheduled maintenance, startup, shutdown (SMSS) activity—An activity as defined in 30 TAC 101.1 that is used in reporting required by Section 101.211.

site—As stated in 30 TAC 122.10, the total of all stationary sources located on one or more contiguous or adjacent properties, which are under common control of the same person (or persons under common control). A research-and-development operation and a collocated manufacturing facility are considered a single site if they each have the same two-digit Major Group Standard Industrial Classification (SIC) code (as described in the Standard Industrial Classification Manual, 1987) or if the research-and-development operation is a support facility for the manufacturing facility.

site centroid—The physical center of a site, represented in coordinate form (latitude and longitude or UTM). Formerly *account centroid*.

source—A point of origin of air contaminants, whether privately or publicly owned or operated.

source classification code—An eight-digit EPA-developed code that identifies a specific industrial process.

special inventory county—A county under special provisions related to emissions reporting. A list of these counties can be found in Chapter 1 in the Special Inventory Request section.

speciation—Categorization of the individual chemical substances, or species, within an emission.

State of Texas Air Reporting System (STARS)—The database where emissions inventory data are stored.

structure—The representation, in the TCEQ database, of the paths (formerly "links") in an EI. EI structure must reflect the processes as shown on the site's process flow diagram. For more information on proper EI structure, consult the appropriate sections of this document.

Title V permit—An operating permit required by Title V of the federal Clean Air Act as amended in 1990.

toxic—A chemical so designated by the EPA. Toxic chemicals are identified in 40 CFR 372.65.

volatile organic compounds (VOCs)—A group of compounds that photochemically react in the atmosphere to form ozone. The official definition is found in 40 CFR 51.100(s), except 51.100(s)(2–4), as amended on November 29, 2004 (69 *Federal Register* 69290).