

The Texas Commission on Environmental Quality (commission) adopts the amendments to §117.460 and §117.465, and corresponding revisions to the state implementation plan (SIP). Sections 117.460 and 117.465 are adopted *with changes* to the proposed text as published in the August 27, 2004, issue of the *Texas Register* (29 TexReg 8249).

The amended sections will be submitted to the United States Environmental Protection Agency (EPA) as revisions to the SIP.

BACKGROUND AND SUMMARY OF THE FACTUAL BASIS FOR THE ADOPTED RULES

On April 19, 2000, the commission adopted rules, published in the May 5, 2000, issue of the *Texas Register* (25 TexReg 4101), that require new water heaters, small boilers, and process heaters statewide to meet specific nitrogen oxides (NO_x) emission limits. These rules were part of a SIP control strategy for attainment with the ozone national ambient air quality standard.

Under the adopted rules, manufacturers, distributors, retailers, and installers of natural gas-fired water heaters with a maximum rated capacity of no more than 75,000 British thermal units per hour (Btu/hr), designated as a "Type 0 unit" in the adopted rules, are required to meet the emission specifications in §117.465. Specifically, Type 0 units manufactured, distributed, sold, or installed on or after January 1, 2005, are required to meet a 10 nanogram per joule (ng/J) heat output limit for NO_x.

Type 0 water heaters can be classified as conventional, power-vent, and direct-vent units. The commission's proposed definitions stated that a power-vent unit is a unit that has a mechanically

induced draft to vent flue gas to a side wall, and that a direct-vent unit is a unit that has a sealed combustion venting system that both draws combustion air from and vents combustion products to the outside air. The commission revised these definitions in response to comments, and the changes are addressed in the RESPONSE TO COMMENTS section of this preamble.

Since the adoption of the current rule, two American National Standards Institute (ANSI) standards (the flammable vapor ignition resistance standard and the lint, dirt, and oil standard); the United States Department of Energy (DOE) energy efficiency standard; and the EPA insulation foam ban have been implemented. The ANSI lint, dirt, and oil standard and the flammable vapor ignition resistance standard were effective on July 1, 2003, and were established for gas-fired water heater safety reasons. The DOE energy efficiency standard was effective on January 20, 2004. The EPA foam ban was effective on January 1, 2003, and affects gas-fired water heaters, as water heater manufacturers have historically used hydrochlorofluorocarbon as a blowing agent for creating foam insulation. The implementation of these standards has delayed the progression of the water heater technology and design for the commission's currently adopted rule's 10 ng/J emission limit that requires a low-NO_x burner. Therefore, a design will not be available for sale on the market by the January 1, 2005, compliance date that meets both the 10 ng/J NO_x emission limit and maintains the current level of safety, efficiency, and reliability as required in the ANSI, DOE, and EPA standards. The incorporation of the low-NO_x design development and subsequent ANSI, DOE, and EPA testing will require a delay in the commission's adopted rule effective date.

The commission originally proposed a one-year delay for conventional Type 0 water heaters with a capacity equal to or less than 50 gallons, and a two-year delay for conventional Type 0 water heaters with a capacity that exceeds 50 gallons. Subsequent to the initiation of the rulemaking proposal, the commission received a petition from the Gas Appliance Manufacturers Association (GAMA) on June 22, 2004, regarding the water heater rules. GAMA petitioned the commission to adopt a rule that would amend §117.465 to delay implementation of the 10 ng/J NO_x emission limit for some categories of gas water heaters and to provide an exclusion for two other specific categories of water heaters. For conventional water heaters with storage volumes of 50 gallons or less, the petitioner requested a delay in the implementation of the 10 ng/J NO_x emission limit from January 1, 2005, to January 1, 2006. For conventional water heaters with storage volumes greater than 50 gallons, the petitioner requested a delay in the implementation of the 10 ng/J NO_x emission limit from January 1, 2005, to January 1, 2007. In addition, the petitioner requested that power-vent and direct-vent water heaters be excluded from the 10 ng/J NO_x emission limit, but still require them to continue to comply with the current 40 ng/J NO_x emission limit. GAMA formally withdrew the petition on July 2, 2004.

Based on the comments received and uncertainties in the testing results for the ANSI, DOE, and EPA standards, the commission adopts language to allow a two-year delay for all conventional Type 0 units, giving manufacturers an additional year beyond what was requested in the petition for units with storage volumes of 50 gallons or less. This rulemaking has been, and continues to be driven by the strategies employed by California's South Coast Air Quality Management District (SCAQMD). To the extent that SCAQMD is extending compliance dates, and in conjunction with a desire to remain in a position to observe results of this program, the commission maintains that the exemption as adopted will allow

Texas to reap the maximum benefit from lessons learned in California. As part of its independent research efforts, the commission has conducted discussions with water heater manufacturers, users, suppliers, and other interested persons. It has become clear that there remains uncertainty about the time frame within which conventional water heaters, which operate in compliance with the previously adopted emission standards, will be available for public consumption. In adopting the two-year exemption, the commission will avoid the real threat of a significant impact on the market in the event that people are unable to obtain compliant conventional water heaters. Although manufacturers have previously indicated that a compliant water heater may be available following a one-year extension, the lack of any support submitted to suggest that compliant conventional water heaters will be ready for distribution has led the commission to desire that a buffer be instituted to ensure that negative consequences will not result and adequate time will exist for the water heaters to be readied for distribution. The commission remains intent on instituting these new standards in order to control emissions for attainment purposes, and is balancing this interest against the necessity to ensure that the market won't be affected by unavailable water heaters, in order to reach a fair and reasonable solution.

The adopted amendments to Chapter 117 will exclude power-vent and direct-vent units from the 10 ng/J emission limit. These units are already more expensive than conventional gas-fired water heaters, and the low-NO_x requirements could make them economically unfeasible for a consumer to purchase.

Current estimates show that approximately 0.099% of the gas water heaters that are sold annually in the State of Texas are power-vent units. Similarly, estimates show that approximately 0.12% of the gas water heaters that are sold annually in the State of Texas are direct-vent units. Therefore, the exclusion of direct-vent and power-vent units will have minimal impact on existing NO_x emissions when

compared to the conventional units. The commission estimates that the statewide emission reductions that would no longer be anticipated as a result of the adopted exclusion will be 0.002 ton per day (tpd) in 2007, 0.006 tpd in 2010, and 0.012 tpd in 2015. The commission will continue to evaluate the annual water heater sales estimates to ensure that any increased costs resulting from low-NO_x water heaters do not result in a significant market shift toward excluded units. As discussed more fully in the RESPONSE TO COMMENTS section of this preamble, the adopted amendments will not impact the commission's commitments to maintain the EPA reasonably available control measure requirements as specified in the Texas SIP.

Using GAMA and American Gas Association (AGA) assumptions and incorporating a two-year delay of the 10 ng/J NO_x emission limit for all Type 0 water heaters, the commission calculated a 2007 statewide emission reduction of 0.53 tpd by the end of 2007, 2.13 tpd by 2010, and 5.33 tpd by 2016. The 2007 statewide emission reduction reflected in the SIP model for the April 19, 2000, water heater rule is 1.0 tpd. Therefore, the 2007 shortfall is the difference between the modeled reductions (1.0 tpd) and the reductions that will be realized with the two-year delay (0.53 tpd) which is 0.47 tpd. The commission will use reductions from the Texas Emissions Reduction Program funding to substitute for the 0.47 tpd shortfall. While the proposed rules incorporated a delay for conventional water heaters, the commission also solicited comments on the alternative of exempting all conventional water heater units from the 10 ng/J emission limit upon adoption of the rules. The commission also solicited comments on the emission reductions that would be lost due to the originally proposed one- and two-year delays for conventional water heaters.

In addition, the commission solicited comments on the consumer cost difference between conventional gas-fired water heaters that meet the 40 ng/J emission limit and water heaters that meet the 10 ng/J emission limit, excluding costs not associated with the low-NO_x technology, and the availability of conventional gas-fired water heaters to meet that emission limit. The commission also solicited comments on the following anticipated consumer costs of a conventional gas-fired water heater that meets the 10 ng/J emission limit compared to the costs of an equivalent hot-water production capacity electric water heater: purchase costs, installation costs, and annual operating costs (on a per gallon of hot water basis).

The commission solicited comments on the impacts of extending the compliance dates or exempting conventional gas-fired water heaters from the 10 ng/J emission limit on the SIPs for the Dallas/Fort Worth, Houston/Galveston/Brazoria, and Beaumont/Port Arthur ozone nonattainment areas and the San Antonio, Austin/San Marcos, and Northeast Texas Early Action Compact (EAC) areas. The commission also solicited comments on what alternatives were available to compensate for the loss of credit if the conventional water heater units were exempt from the 10 ng/J emission limit with a resulting loss of NO_x reduction credit for each SIP. Finally, the commission solicited comments on the possibility of a shift in consumer products from conventional water heaters to power-vent and direct-vent units as they are exempt from the 10 ng/J emission limit and would not require the additional cost of a low-NO_x design. These comments are addressed in the RESPONSE TO COMMENTS section of this preamble.

SECTION BY SECTION DISCUSSION

Section 117.460, Definitions

The commission adopts the amendment to §117.460 that adds definitions for “Direct-vent unit” and “Power-vent unit” and renumbers the subsequent definitions accordingly. In the RESPONSE TO COMMENTS section of this preamble, the commission revised the definitions of “Direct-vent unit” and “Power-vent unit” to be consistent with SCAQMD definitions. The amendment to §117.460 also corrects the reference of the “TCAA” to “Texas Health and Safety Code, Chapter 382 (also known as the Texas Clean Air Act).” Finally, the amendment spells out the acronym terms and deletes the acronyms where they are not used again in the definitions for “Type 0 unit,” “Type 1 unit,” “Type 2 unit,” and “Water heater.”

Section 117.465, Emission Specifications

The commission adopts the amendment to §117.465 that restructures subsection (a) to establish a separate schedule for water heaters by specifying the requirements for boilers and process heaters in subsection (a), and by adding a subsection (b) specifying the requirements for water heaters. The amendment also eliminates paragraphs (3) and (4) because there no longer is a separate schedule for Type 0 water heaters based on storage volume. The amendment adds a paragraph (3) to clarify that the emission specifications for power-vent and direct-vent units manufactured on or after January 1, 2007, remain at 40 ng/J.

Amended §117.465(b) adds the emission specifications and effective dates for water heaters. These emission specifications incorporate a two-year delay for the 10 ng/J emission limit for Type 0 units.

The amendment also reflects that the direct-vent and power-vent units will not be subject to the 10 ng/J emission limit.

Finally, the commission adopted the amendment to §117.465 that makes administrative changes from “shall” to “must” throughout the section to conform to the drafting guidelines in the *Texas Legislative Council Drafting Manual*, October 2002.

FINAL REGULATORY IMPACT ANALYSIS DETERMINATION

The commission reviewed the rulemaking action in light of the regulatory analysis requirements of Texas Government Code, §2001.0225, and determined that the rulemaking action does not meet the definition of a “major environmental rule” as defined in that statute. A “major environmental rule” is a rule the specific intent of which is to protect the environment or reduce risks to human health from environmental exposure and that may adversely affect in a material way the economy, productivity, competition, jobs, the environment, or the public health and safety of the state or a sector of the state. The primary purpose of this rulemaking action is to extend the compliance date for the 10 ng/J NO_x emission limit relating to the manufacture, distribution, and sale of conventional water heaters with a maximum rated capacity of no more than 75,000 Btu/hr from January 1, 2005, to January 1, 2007. Another purpose of this rulemaking action is to exclude power-vent and direct-vent water heaters from the 10 ng/J emission limit. All water heaters must still meet the 40 ng/J emission limit in the existing rules. The original rules, adopted on April 19, 2000, did not constitute a major environmental rulemaking action, and the adopted amendments to the existing rules are minor in nature. Therefore,

this rulemaking does not constitute a major environmental rule, and is not subject to a formal regulatory impact analysis.

In addition, this rulemaking action does not meet any of the four applicability criteria of a “major environmental rule” as defined in the Texas Government Code. Texas Government Code, §2001.0225 applies only to a major environmental rule the result of which is to: 1) exceed a standard set by federal law, unless the rule is specifically required by state law; 2) exceed an express requirement of state law, unless the rule is specifically required by federal law; 3) exceed a requirement of a delegation agreement or contract between the state and an agency or representative of the federal government to implement a state and federal program; or 4) adopt a rule solely under the general powers of the agency instead of under a specific state law.

The rulemaking action, which extends certain compliance dates and includes two minor exclusions *vis a vis* previously adopted rules, implements requirements of 42 United States Code (USC). More detailed discussions on the application of federal law to the substantive water heater rules are contained in the REGULATORY IMPACT ANALYSIS DETERMINATION section of the proposed and adopted versions of the previous rulemaking action pertaining to water heaters (December 31, 1999, issue of the *Texas Register* (24 TexReg 12007) and May 5, 2000, issue of the *Texas Register* (25 TexReg 4101) respectively). Furthermore, there is no contract or delegation agreement that covers the topic that is the subject of this action. Finally, this rulemaking action was not developed solely under the general powers of the agency, but is authorized by specific sections of Texas Health and Safety Code, Chapter 382 (also known as the Texas Clean Air Act), and the Texas Water Code, which are cited in the

STATUTORY AUTHORITY section of this preamble, including Texas Health and Safety Code, §§382.011, 382.012, and 382.017. Therefore, this rulemaking action does not exceed a standard set by federal law, exceed an express requirement of state law, exceed a requirement of a delegation agreement, nor is adopted solely under the general powers of the agency.

Based upon the foregoing, this rulemaking action is not subject to the regulatory analysis provisions of Texas Government Code, §2001.0225.

TAKINGS IMPACT ASSESSMENT

The commission completed a takings impact assessment for the rulemaking action under Texas Government Code, §2007.043. The primary purpose of this rulemaking action is to extend the compliance date for the 10 ng/J NO_x emission limit relating to the manufacture, distribution, and sale of conventional water heaters with a maximum rated capacity of no more than 75,000 Btu/hr from January 1, 2005, to January 1, 2007. Another purpose of this rulemaking action is to exclude power-vent and direct-vent water heaters from the 10 ng/J emission limit. All water heaters must still meet the 40 ng/J emission limit in the existing rules.

The commission completed a takings impact assessment for the previously adopted water heater rules, and the adopted amendments will not cause an additional burden on private real property. The amendments will not affect private property in a manner that restricts or limits an owner's right to the property that would otherwise exist in the absence of a governmental action. Therefore, the adopted amendments do not constitute a taking under Texas Government Code, Chapter 2007.

CONSISTENCY WITH THE COASTAL MANAGEMENT PROGRAM

The commission reviewed this rulemaking action and determined that the action is identified in Coastal Coordination Act Implementation Rules, 31 TAC §505.11, or will affect an action/authorization identified in §505.11, and therefore requires that applicable goals and policies of the Texas Coastal Management Program (CMP) be considered.

The commission determined that under 31 TAC §505.22, this rulemaking action is consistent with the applicable CMP goals and policies. The CMP goal applicable to this rulemaking action is the goal to protect, preserve, and enhance the diversity, quality, quantity, functions, and values of coastal natural resource areas (31 TAC §501.12(l)). Ozone levels will ultimately be reduced as a result of the adopted rulemaking, although the reduction will be delayed by two years. The CMP policy applicable to this rulemaking action, in conjunction with the previously adopted rules to be amended through the current rulemaking action, is the policy that commission rules comply with regulations in 40 Code of Federal Regulations, to protect and enhance air quality in the coastal area (31 TAC §501.14(q)). This rulemaking action complies with 40 Code of Federal Regulations. Therefore, in compliance with 31 TAC §505.22(e), this rulemaking action is consistent with CMP goals and policies.

EFFECT ON SITES SUBJECT TO THE FEDERAL OPERATING PERMIT PROGRAM

Chapter 117 is an applicable requirement under 30 TAC Chapter 122, Federal Operating Permits Program; therefore, owners or operators subject to the federal operating permit program must, consistent with the revision process in Chapter 122, revise their operating permits to include the

amended Chapter 117 requirements for each emission unit affected by the amendments to Chapter 117 at their sites.

PUBLIC COMMENT

A public hearing for this rulemaking action was held on September 14, 2004, in Austin, and the comment period closed on September 14, 2004. The AGA; AGA and the American Public Gas Association (AGA/APGA); Atmos Energy Corporation (Atmos); the Austin EAC Task Force (Austin EAC); City Public Service of San Antonio (CPS); Environmental Defense; EPA; and GAMA provided written or oral comment regarding these amendments. The AGA written comments included an attachment written by GARD Analytics, Inc., on behalf of AGA/APGA. Atmos and CPS supported the comments of AGA and APGA. BakerBotts, L.L.P., also provided comments on behalf of AGA/APGA.

RESPONSE TO COMMENTS

Comments of general support or opposition

Austin EAC and GAMA expressed general support for the amendments as proposed. No commenter expressed general opposition; however, AGA, AGA/APGA, Atmos, Austin EAC, Environmental Defense, EPA, and GAMA expressed concerns with and/or suggested changes to the proposed amendments.

GAMA stated that the association members in the water heater division are the makers of basically all of the major water heaters in the country, and as a result, a number of them are impacted by this

particular rule. GAMA also stated that the water heater manufacturers are committed to reducing NO_x emissions from their products.

GAMA supported the proposal to delay the implementation of the 10 ng/J NO_x emission limit from January 1, 2005, to January 1, 2006, for conventional residential gas models with storage volumes of 50 gallons or less, and from January 1, 2005, to January 1, 2007, for models with storage volumes greater than 50 gallons. GAMA also supported the proposal to continue to require power-vent and direct-vent models to comply with the current 40 ng/J NO_x emission limit.

Consumer cost differences

GAMA stated that it could not provide any data to address the consumer cost issues, because of antitrust concerns. GAMA stated that as a matter of policy it does not collect information on product costs or the prices consumers pay for the products manufactured by members of GAMA. GAMA expressed a belief that the cost analysis in the comments submitted by AGA/APGA was well-researched and thorough.

The commission will continue to monitor water heater manufacturer developments and SCAQMD research in the coming year for costs associated with the low-NO_x technology.

AGA/APGA commented that compliant water heaters, if and when available, are expected to carry a substantial consumer cost premium. AGA/APGA, citing an SCAQMD staff report regarding the Alzeta technology (an atmospheric, natural draft, fully mixed burner), estimated a \$15 - \$50 incremental

manufacturing cost increase alone to bring currently available water heater designs into compliance with the 10 ng/J emission limit. When a typical industry standard 250% markup is added, the projected cost premium to the installation contractor increases to \$25 - \$85 over the cost of current atmospherically-vented models. AGA/APGA stated that the projected ultimate cost premium seen by the homeowner for the Alzeta technology could be as much as \$100 when standard contractor overhead and profit markups are added. AGA/APGA also stated that the only Alzeta low-NO_x burner suitable for installation on a residential gas-fired water heater is a forced draft unit, and that the manufacturing cost increase for this forced draft unit would exceed the \$25 - \$85 projection over the cost of current atmospherically vented models. AGA/APGA stated that at present, the equipment cost premium for a power-vent unit relative to an atmospheric-vent unit is about \$100. After adding the cost of a low-NO_x burner, and factoring in the additional material and labor costs of providing an electrical hook-up for the vent fan, a total install cost premium to the consumer would be about \$300.

The commission researched and affirmed the SCAQMD residential water heater reports and regulations. The commission obtained cost estimates for atmospherically-vented residential water heaters meeting the 10 ng/J emission specification from the November 1999 SCAQMD report to address consumer cost issues. The report states that “AQMD {*Air Quality Management District*} staff has received confirmation from Alzeta that the low-NO_x portion of their technology would be \$15 per water heater.” The report also states that the cost for the DOE safety standards for water heaters that are resistant to ignition of flammable vapors is \$35. The commission also obtained cost information from a burner vendor, BEKAERT, that indicates an \$8.00 increase in cost for a low-NO_x burner that meets the 10 ng/J emission specification. AGA combined the

Alzeta low-NO_x burner cost of \$15 and the DOE technology cost of \$35 and attributed the total of those costs to the commission's low-NO_x emission specification. In the 1999 proposal of the water heater emission specification, the commission stated that only \$15 of the cost was attributable to the low-NO_x technology and further contends for the purpose of these amendments that a price range of \$8.00 - \$15 is a more accurate cost estimate. In addition, the SCAQMD report indicated that the retail markup factor to the manufacturing cost would be up to 244%. If this assumption is used, the projected cost to the installation contractor increases the burner cost by \$19 - \$37. The AGA stated that a forced draft system would be required to meet the low-NO_x emission specifications, however, at the present time a comprehensive low-NO_x water heater design has not been fully developed. In addition, actual cost estimates are not yet available.

AGA/APGA stated that the residential water heater market typically consists of electric and gas-fired storage tank water heaters with a storage capacity of 30 - 50 gallons, and that although tankless (instantaneous) electric and gas water heaters as well as electric heat pump water heaters are commercially available, together they account for less than 2% of the total residential market.

AGA/APGA divided the residential water heater market into the following appliance configurations: 1) atmospheric vent, natural gas-fired storage water heater (40 ng/J); 2) power-vent, natural gas-fired storage water heater (40 ng/J); 3) atmospheric vent, natural gas-fired storage water heater (10 ng/J); 4) power-vent, natural gas-fired storage water heater (10 ng/J); and 5) electric resistance storage heater.

AGA/APGA stated that the factors affecting the ultimate cost differentials to the consumer among these five configurations include variations in equipment purchase costs, installation costs, and annual operating costs. In the replacement market, most consumers will replace an existing water heater with

the same configuration and fuel type unless there is a compelling reason to do otherwise, because historically, this has been the homeowner's lowest cost alternative. Therefore, AGA/APGA limited its comments to purchase and installation costs, which in its opinion, indicates the cost considerations that most affect unit selection.

AGA/APGA anticipated that the equipment cost for an atmospheric vent gas-fired water heater that would meet the 10 ng/J NO_x emission limit would be \$132 more than an equivalent electric water heater, while the installation cost for a gas-fired water heater would be \$72 less, for a total cost premium of \$60. AGA/APGA noted, however, that the only known burner suitable for installation on a residential natural gas-fired water heater that can meet the 10 ng/J emission limit is incompatible with atmospheric vent units. AGA/APGA anticipated that the equipment cost premium for a gas-fired water heater that meets the 10 ng/J emission limit over an equivalent electric water heater would be \$232 for a power-vent heater, while the installation costs would increase by \$58, for a total cost premium of \$290. AGA/APGA noted that the cost estimates do not include additional material and labor costs associated with more stringent water heater venting requirements, nor do they account for increased space requirements for appliances that may have a larger footprint.

As mentioned in the previous response, the commission's current estimates for the low-NO_x technology would increase the cost of a water heater by \$8.00 - \$15 (or \$19 - \$37 with the 244% markup). The commission obtained annual operating costs of water heaters from GAMA's *Consumers' Directory of Certified Efficiency Ratings for Heating and Water Heating Equipment* (May 2004). Based on the national average unit cost of fuel, an estimated annual cost of operation

for a gas-fired water heater would be \$163, compared to an estimated annual cost of operation for an electric water heater of \$420. This results in a higher annual operating cost of \$257 for electric water heaters. AGA stated that the installation cost of an electric water heater is \$72 more than a gas-fired water heater. The commission contends that the increase in cost of a low-NO_x compliant gas-fired water heater would be minimal compared to the increased annual operation cost of \$257 and installation cost of \$72 that would be realized by the operation of an equivalent electric water heater.

Consumer shift

GAMA stated that as a result of the residential storage water heater industry's inability to comply with the current January 1, 2005, effective date of the 10 ng/J NO_x emission limit, Texas consumers needing to replace their existing residential gas storage water heater with a like or similar model manufactured after that date will be unable to do so. Instead, GAMA stated that consumers would have to purchase and have installed some other type of water heater that is not subject to the 10 ng/J NO_x emission limit, and in most cases consumers would choose to replace their gas storage model with an electric storage model. GAMA commented that its concern with the 10 ng/J NO_x emission limit is not a matter of potential lost sales, because GAMA members manufacture and sell electric water heaters as well as gas water heaters, and that both types are of equal quality. GAMA expressed a belief that it is not in the financial or environmental interest of Texas citizens to make them replace gas water heaters with electric models because: 1) the consumers will incur the increased installation cost of adding the electric circuit needed to power the water heater; 2) the consumer's total monthly energy bill will

increase because heating water with electricity is typically three times more expensive than gas heating; and 3) emissions from power plants will increase because of the increased electricity demand.

The commission contends that increased installation costs and the added annual operating costs, which are three times more expensive than gas heating as described in the response to the previous comment, would prevent a market shift from gas-fired to electric water heaters.

GAMA stated that the potential for consumers to shift to power-vent or direct-vent water heaters is an unlikely consequence, because in a replacement situation, the change would require some alteration of the residential structure to accommodate the new vent system. GAMA further stated that a replacement may also require relocating the new water heater, and the cost of alterations in addition to the increased cost of a power-vent or direct-vent model will preclude any significant shift by consumers.

The commission agrees with the statement made by GAMA that the alteration of a residential structure to accommodate the new vent system, the possible relocation of the new water heater, and the increased cost of a power-vent or direct-vent model would preclude any significant shift by consumers.

AGA/APGA stated that the implicit assumption of the proposed rulemaking is that the entire new construction and replacement market for gas-fired water heaters will shift to gas-fired units that meet the new limit for NO_x emissions. AGA/APGA stated that the assumption is flawed because the market for residential water heaters is extremely competitive and substantial incremental costs are projected for

water heater manufacturers to incorporate low-NO_x technology into existing product lines.

AGA/APGA cited the results of an internet search that showed the price range for a 40-gallon atmospheric vented unit with a six-year warranty ranged from \$228 - \$270, and the price range for an equivalent electric resistance unit ranged from \$158 - \$190.

As mentioned in a previous response, the commission's current estimates for the low-NO_x technology would increase the cost of a water heater by \$8.00 - \$15 (or \$19 - \$37 with the 244% markup). The commission contends that this cost increase of a low-NO_x compliant gas-fired water heater would be minimal compared to the increased annual operation cost and installation cost that would be realized by the installation and operation of an equivalent electric water heater. Although the AGA stated that the price difference in its analysis shows that an electric water heater is currently \$70 - \$80 cheaper, the installation cost difference of \$72 and annual operating cost difference of \$257 would still show a financial benefit by purchasing a gas-fired water heater. Furthermore, the commission conducted an analysis of water heaters on the market and in order for a consumer to purchase an electric water heater to produce the same amount of hot water as a gas-fired water heater a consumer would have to purchase a larger unit. Specifically, a 40-gallon electric water heater produces an equivalent amount of hot water as a 30-gallon gas-fired water heater. Therefore, the cost differential between a gas-fired water heater and an electric water heater would be less than the amount mentioned by the AGA.

AGA/APGA commented that because the first cost is the primary consideration for homebuilders in selecting a water heater for the new construction market, any increase in the cost of natural gas water

heaters relative to electric units puts natural gas units at a significant competitive disadvantage.

AGA/APGA expressed an expectation that given a projected installed cost premium of almost \$300 and the price elasticity of demand for household appliances of -0.63, the market share for natural gas water heaters, if the 10 ng/J emission limit were to take effect, would decrease from a current 60% share to a 40% share of the market. AGA/APGA also commented that during the same period, the installed inventory of electric water heaters is expected to increase correspondingly. Finally, AGA/APGA stated that because the replacement and new construction markets are very sensitive to the assumed price elasticity of demand, if the market for gas residential water heaters is more elastic, there will be an even greater shift to electric water heaters.

As discussed in previous comments, the estimated cost of the new technology is minimal, and the commission will continue to monitor technology and testing advances and any associated costs.

Furthermore, commission research shows that 85% of all water heater purchases are replacements and that new construction only makes up 15% of the market. Because existing homeowners make up 85% of the market and because retrofit, unit relocation, remodeling, electrical outlet installation, and annual operating costs would exceed the incremental costs of a low-NO_x technology, the commission does not expect a market shift.

Effects on SIP emission reduction strategies

EPA stated that the initial statewide rule for water heaters was approved on October 26, 2000 (65 FR 64148), as part of the Texas SIP, and that the commission declared a NO_x SIP credit of 0.5 tpd. EPA commented that the proposal does not provide for where or how the 0.5 tpd NO_x credit will be

accounted or compensated. EPA further stated that commission adoption of a rule revision that fails to account for a previously-declared SIP emission reduction credit would be difficult for the commission or EPA to refute potential backsliding arguments. EPA suggested that the commission provide an explanation on how the loss of credit will be accounted for in the SIP control plan.

During the initial rulemaking of this control measure, the commission utilized emission reduction calculations from an Environ report which stated that the state would realize a decrease of 0.5 - 1.0 tpd of NO_x for the Dallas/Fort Worth one-hour ozone nonattainment area by 2007. Since then, the commission has recalculated emission reductions using SCAQMD methodologies and incorporating AGA and GAMA data. Current commission estimates show that a 1.60 tpd NO_x reduction would occur by the 2007 attainment demonstration date without the compliance date delay and a 0.53 tpd NO_x reduction will occur with the compliance date delay in effect. As the 2000 Texas SIP revision accounted for a 1.0 tpd NO_x reduction by the 2007 attainment date demonstration date and the delay will demonstrate a 0.53 tpd emission reduction, there will be a 0.47 tpd shortfall. The commission will use reductions from the Texas Emissions Reduction Program funding to substitute for the 0.47 tpd shortfall.

AGA/APGA expressed an expectation that absent a delay or exemption, the lack of technology to meet the 10 ng/J NO_x emission limit and the projected cost increases in the event such technology eventually were to become available will result in a market shift away from gas-fired water heaters to electric resistance units. AGA/APGA stated that this shift would be expected to increase rather than decrease NO_x emissions. AGA/APGA contended that a market shift from gas-fired to electric resistance water

heaters, whenever it were to occur, would lead to an overall increase in NO_x emissions, taking into account emissions at the electrical power generating plants. Given the current power generation mix in Texas, the NO_x emissions associated with operating a water heater in a typical dwelling are 4.93 pounds per year for a conventional gas-fired water heater versus 11.02 pounds per year for a comparable electric water heater. AGA/APGA maintained that there would be no loss of emission reductions in the event of a delay of the implementation timetable, but that an extension would only delay the inevitable NO_x increase resulting from a market shift to electric resistance water heaters unless residential gas-fired water heaters are exempted from the 10 ng/J emission limit.

As stated in previous comments, the commission does not agree with the cost estimates for the low-NO_x technology that AGA claims. Based on independent research conducted by the commission, the commission contends that the AGA costs are overestimated and as these costs are the basis for the market shift, it is unclear if a market shift would occur. Furthermore, federal, state, and local measures controlling electric utilities in Texas are projected to reduce NO_x by 50% statewide and by up to 80% in the Houston/Galveston/Brazoria area through various cap and trade programs by 2007. The emissions at Texas utilities are capped and owners or operators may not increase emissions above these caps unless emission credits are purchased. The Texas SIP includes all emission reduction credits that are currently in the bank and the commission's rules contain a usage restriction system so that the use of credits does not affect the integrity of the cap.

AGA/APGA stated that exempting gas-fired water heater units from the 10 ng/J emission limit will prevent an increase in NO_x emissions due to fuel switching. AGA/APGA projected that if the

implementation of the 10 ng/J emission limit causes a shift in the gas-fired water heater market share from the current 60% to 40% or less, overall future NO_x emissions attributable to residential water heaters will exceed current levels.

As previously stated, the costs associated with retrofit, unit relocation, remodeling, electrical outlet installation, and annual operation would exceed the incremental costs of a low-NO_x technology; therefore, the commission does not expect a market shift. Furthermore, the federal, state, and local NO_x cap system for electric utilities would decrease overall NO_x emissions.

GAMA stated that failure by the commission to amend §117.465 as proposed would cause significant financial harm to Texas consumers and worsen air quality conditions in Texas.

The commission is adopting a compliance date delay of two years. In addition, as previously stated, the federal, state, and local NO_x cap system for electric utilities would decrease overall NO_x emissions.

AGA/APGA stated that the application of the 10 ng/J emission limit to residential gas-fired water heaters would ultimately increase NO_x emissions due to fuel switching. AGA/APGA stated that as a result of a shift from gas-fired to electric resistance water heaters, the statewide impact of extending the compliance date from one to two years would be a significant decrease in statewide NO_x emissions for that period from those emissions that would be projected if the standard were to take effect.

As previously stated, the costs associated with retrofit, unit relocation, remodeling, electrical outlet installation, and annual operation would exceed the incremental costs of a low-NO_x technology; therefore, the commission does not expect a market shift. Furthermore, the federal, state, and local NO_x cap system for electric utilities would decrease overall NO_x emissions.

Impacts on the SIPs

Environmental Defense did not object to delaying the effective date of the 10 ng/J emission limit if it is true, as the commission claims, that a “design has not been developed that meets both the 10 ng/J NO_x limit and maintains the current level of safety, efficiency, and reliability as required in the ANSI, DOE, and EPA standards.” Environmental Defense stated that as a matter of policy, the commission should not reward noncompliant manufacturers if other manufacturers will succeed in developing and producing water heaters that would comply with the emission limit. Environmental Defense also stated that the proposal lacks any evidence to support the claim that no compliant products will be available on January 1, 2005, and that before delaying the effective date, the commission must clearly establish that no manufacturers will be able to market compliant water heaters by the existing date.

Commission staff investigated all possible designs from all water heater manufacturers and a design that meets both the 10 ng/J emission specification and the ANSI, DOE, and EPA standards has not yet been developed. Burner technology that achieves the 10 ng/J standard does exist, but a water heater using the technology in conjunction with the ANSI, DOE, and EPA requirements does not exist. Specifically, the most recent water heater designs using the low-NO_x burner have not been able to pass all testing requirements for the ANSI, DOE, and EPA standards. In

addition, SCAQMD is conducting investigations for possible designs and also adopted a compliance date delay on September 3, 2004. The commission will continue to monitor water heater technology and testing advances.

EPA stated that the proposal does not contain specific justification (technically and economically) in support of the proposal, and suggested that a more complete explanation of the compliance delay be included in the final rulemaking. EPA also requested that the commission provide justification or support for the stated conclusion in the proposal that “the proposed amendments would not impact the commission’s commitments to maintain the EPA reasonably available control measure requirements as specified in the Texas SIP.”

The commission recognizes that a “reasonable available control measure” analysis is a SIP requirement and will document SIP requirements in the accompanying one-hour attainment demonstration scheduled for commission consideration on December 1, 2004.

The commission contends that delaying the effective date of the 10 ng/J standard for conventional water heaters from January 1, 2005, to January 1, 2007, will not interfere with the attainment demonstration for the one-hour ozone standard in 2007. In addition, the delay provides more time to review alternative control strategies submitted by the counties and their respective largest cities that may achieve equivalent emissions reductions and be proven cost-effective and appropriate for implementation by the individual counties. Based upon all data presently before the commission, the commission contends that the technology necessary to comply with the 10 ng/J

standard by January 1, 2005, is not reasonably available. The delay does not significantly impact modeled ozone concentrations and will allow the commission additional opportunities to monitor the progress of the technology development. The commission made no changes to the rules in response to this comment.

Austin EAC and Environmental Defense expressed strong concerns with the proposed alternative of exempting all conventional water heater units from the 10 ng/J emission limit, and stated that future base case modeling for the Austin EAC area takes into account the 2001 low-NO_x water heater rule. Austin EAC and Environmental Defense stated that significant alterations to the 2001 rule will affect the future base case model and will necessitate model adjustments. Austin EAC and Environmental Defense also stated that if model adjustments are needed, there may not be enough time to adjust the model to meet the EAC SIP submittal deadline. Environmental Defense commented that by the commission's own estimates, an exemption of all conventional water heater units from the 10 ng/J emission limit will mean many lost tons of NO_x emissions that would occur as the water heater inventory turns over. Finally, Austin EAC requested that the commission consider the possible negative effects on EAC areas when considering exempting all conventional water heater units from the 10 ng/J emission limit, or when considering other rules that may affect local or transported ozone levels in the Austin/Round Rock metropolitan statistical area.

The future case modeling run for the Austin EAC area originally included the reductions associated with the water heater control measure. Since the proposal of these amendments, the future case for Austin EAC area has been remodeled to exclude the reductions associated with the

water heater control measure. The modeling results show that the area will be in attainment of the eight-hour ozone standard by 2007 as required by the EAC agreement. Actual emission reductions that occur as a result of the implementation of the water heater rule will be an additional margin of safety for the area.

Alternative measures to compensate for loss of credit

GAMA stated that the recent changes in federal minimum efficiency regulations for residential water heaters have raised the efficiency of gas water heaters on average by 10%, and that this increased efficiency directly correlates to an average 10% reduction in energy consumption. Therefore, NO_x emission rules aside, the installation of new water heaters will result in reduced NO_x emissions because these products are more efficient and consume less gas.

The commission agrees that the federal minimum efficiency regulations for residential water heaters will result in reduced NO_x emissions. However, these changes are federally mandated, and therefore, they cannot be used as SIP credits. Only measures that result in surplus emission reductions can be used as SIP credits. Surplus measures are any measures that are not relied upon to meet air quality requirements.

Environmental Defense stated that before the commission contemplates an exemption of all conventional water heaters from the 10 ng/J emission limit, the commission must propose replacement measures to backfill for the measures proposed for repeal.

As previously stated in this preamble, the commission does not currently contemplate the adoption of an exemption of all conventional water heaters from the 10 ng/J emission limit, but is adopting a two-year compliance delay. The commission will continue to monitor the progress of water heater technology and design.

Austin EAC commented that the Austin/Round Rock metropolitan statistical area would find it difficult to compensate for the loss of NO_x reduction credit if the conventional water heater units were exempted from the 10 ng/J emission limit. Austin EAC stated that after adjusting the future base case to account for the statewide loss of emission reductions, the area would either have to find additional measures or determine that a smaller safety margin is acceptable. Austin EAC also stated that the Austin area EAC SIP currently does not contain any contingency measures, and the initial response would be to resubmit the NO_x reduction measures that the commission previously declined to include in the SIP.

The future case modeling run for the Austin EAC area originally included the reductions associated with the water heater control measure. Since the proposal of these amendments, the future case for the Austin EAC area has been remodeled to exclude the reductions associated with the water heater control measure. The modeling results show that the area will be in attainment of the eight-hour ozone standard by 2007 as required by the EAC agreement. Actual emission reductions that may occur as a result of the implementation of the water heater rule will be an additional margin of safety for the area.

AGA/APGA stated that its member companies are prepared to participate in any additional rule proceedings or studies that the commission may initiate on the issue of NO_x reduction.

The commission will continue to solicit input and use knowledge on the future developments of compliant water heater designs.

Current compliance date of January 1, 2005

AGA/APGA stated that presently, there is no residential gas-fired water heater design available that would meet the 10 ng/J NO_x emission limit within acceptable safety, efficiency, and reliability standards. AGA/APGA also stated that a compliant design is not anticipated by the current compliance date or the proposed extension of the compliance date.

GAMA, on the other hand, expressed a belief that at the time the 10 ng/J emission limit was promulgated in 2000, the emission limit could be met. GAMA further stated that when the federal government subsequently came out with the new energy efficiency regulations and requirements, GAMA began to meet with the commission to pursue a delay regarding the 10 ng/J emission limit. GAMA expressed support of the proposed rule because the current implementation date cannot be met. GAMA stated that despite industry efforts to date, the revised federal efficiency standards (effective January 20, 2004) and the new safety standards requiring the flammable vapor ignition resistant technology (effective July 1, 2003) have prevented manufacturers from developing a burner component that meets the 10 ng/J NO_x emission limit while still satisfying applicable safety, performance, and reliability criteria. GAMA stated that the fundamental obstacle to overcome has been modifying the

burner without adversely affecting the entire water heating system. Therefore, GAMA particularly supported the proposal regarding the Type 0 water heaters because the technology is simply not yet available to the manufacturers. GAMA also commented that there is a tremendous healthy competition among the manufacturers to be the first to meet the emission limit, and expressed a belief that this competition is a positive development.

The commission notes that GAMA, which represents the water heater manufacturers, also presented the commission a schedule of goals in February of 2004 that indicated a completion of an EPA, ANSI, and commission compliant design by the end of 2005. Based on the comments received and uncertainties in the testing results for the ANSI, DOE, and EPA standards, the commission adopts language to allow a two-year delay for all conventional Type 0 units, giving manufacturers an additional year beyond what was originally proposed for units with storage volumes of 50 gallons or less and will continue to monitor water heater manufacturer developments in testing and technology.

GAMA stated that the additional year of delay to January 1, 2007, for models greater than 50 gallons is required because these models present additional technical challenges to meet the 10 ng/J NO_x emission limit. GAMA further stated that the burner, combustion chamber, air intake, exhaust, air distribution, and fuel flow control for the larger volume models differ from the 30 - 50 gallon models, and that all of these aspects affect how the burner components interact with the water heater as a system. Finally, GAMA stated that combustion systems designed for 30 - 50 gallon models will not operate with this

category of larger volume products, and will require a redesign to meet the needs of the larger volume water heaters.

GAMA agreed with the rule proposal that would allow power and direct-vent units to remain at the 40 ng/J NO_x emission limit. GAMA stated that combustion systems designed for conventional water heater models and ultra-low-NO_x technology will not work with power-vent and direct-vent models. GAMA also stated that because sales of power-vent and direct-vent units represents a fraction of 1% of total water heater sales in Texas, the research and development required to achieve the 10 ng/J NO_x emission limit would be economically infeasible, not only for the manufacturers, but also for the consumers. Finally, GAMA stated that even if these products were able to comply with the 10 ng/J NO_x emission limit in the future, the reductions in statewide NO_x would be negligible.

The commission is considering all aspects of manufacturer design difficulties and will continue to review the concerns stated regarding the development of a compliant water heater. The commission is incorporating a two-year delay and is also excluding power-vent and direct-vent units.

AGA/APGA urged the commission to provide an exemption, not just a delay in the compliance date, for all Type 0 water heaters covered by the rules. AGA/APGA expressed a belief that if the commission only granted a compliance date delay, as opposed to an actual exemption, the industry would be back in a few months because there is no technology on the horizon.

Based on comments received in response to this rulemaking and in prior discussions with GAMA low-NO_x technology vendors, the commission maintains that the water heater manufacturing industry is making good faith efforts to develop a water heater design that meets both the 10 ng/J NO_x emission limit and the ANSI and EPA standards and testing requirements by the new compliance date. As GAMA commented, there is “tremendously healthy” competition among the manufacturers to develop a water heater meeting this emission specification. The commission recognizes that manufacturers are concerned about disclosure of proprietary information regarding design changes and innovative advances in technology. Therefore, information regarding the advances being made by the manufacturers may not be readily available to the commenter. The commission will continue to monitor the development of water heaters to meet the 10 ng/J emission standard and the ANSI and EPA requirements during the compliance date extension provided by the adoption of this rule.

Section 117.460, Definitions

GAMA requested that the phrase “sealed combustion” be dropped from the definition of “Direct-vent unit” because the term is an inappropriate and unnecessary adjective that confuses the definition.

GAMA explained that in order to comply with the nationally recognized safety standards, all direct-vent gas appliances must comply with a test that verifies the air tightness of the direct-vent system that will be used with the specific appliance model. The applicable safety standard for residential gas storage water heaters, ANSI Z21.10.1, does not use the term “sealed combustion” and therefore, the commission’s proposed definition implies that a Texas direct-vent water heater is somehow different than a direct-vent water heater certified to the national standard.

The commission agrees and deleted the term “sealed combustion” from the proposed definition of “Direct-vent unit” to be consistent with national definitions. The definition will read, “A water heater with air intake and exhaust ducts that use a gravity system to collect air from outside a building for combustion and exhaust combustion byproducts to the outside of a building.”

GAMA stated that the proposed definition for “Power-vent unit” is technically inaccurate, and requested that the commission adopt the definition as follows: “Power-vent unit - A water heater that has a mechanically induced draft for venting of combustion products.” GAMA stated that the errors in the proposed definition are: 1) once the products of combustion exit the water heater, they are considered vent gases, not flue gases; and 2) while most power-vented water heaters are vented horizontally, they can be vented vertically. GAMA stated that its suggested definition uses the more appropriate general term “combustion products” and does not limit these products only to horizontal venting applications.

The commission agrees and revised the definition of “Power-vent unit” to more general terms. The definition will read, “A water heater with a blower installed to assist in the expulsion of exhaust gases.”

Section 117.463, Exemptions

AGA requested that all Type 0 water heaters be exempt from the 10 ng/J NO_x emission limit by deleting the language “used exclusively to heat swimming pools and hot tubs” from §117.463(3).

The commission declines to make changes to §117.463, because changes were not proposed for this section. The exemption for heating swimming pools and hot tubs was added to the rule in response to comments in the 2000 amendments.

Section 117.465, Emission Specifications

GAMA stated that the proposed amendments provide a potential for significant confusion, in that §117.465(a) has been changed to apply only to boilers or process heaters, yet those product types are not defined. GAMA expressed a concern that the lack of a definition will invite debate about whether some specific unit is a water heater, a boiler, or a process heater. GAMA stated that the sole issue of the proposed change is Type 0 water heaters, i.e., models with inputs of no more than 75,000 Btu/hr, and that to GAMA's knowledge, those are the only Type 0 products available in Texas. GAMA suggested that if there is no data showing that Type 0 boilers and process heaters are being sold in Texas, then §117.465 should be simplified to refer only to natural gas-fired Type 0 water heaters.

Boiler and process heater definitions are already contained in §117.10(6) and (40), respectively, and these are the applicable definitions for the terms as used in Chapter 117, Subchapter D, Division 1. Furthermore, the emissions specifications are based on unit type and date of manufacture. Restructuring of §117.465 is necessary because the extension of the compliance date is applicable to Type 0 water heaters, but not to Type 0 boilers or process heaters. The commission declines to make the suggested change because there are Type 0 boilers and process heaters being sold in Texas that will be subject to the 10 ng/J NO_x emission specification.

Additionally, the issues raised regarding the 10 ng/J emission specification have only been identified as being associated with water heaters, not boilers or process heaters.

SUBCHAPTER D: SMALL COMBUSTION SOURCES

DIVISION 1: WATER HEATERS, SMALL BOILERS, AND PROCESS HEATERS

§117.460, §117.465

STATUTORY AUTHORITY

The amendments are adopted under Texas Water Code, §5.102, concerning General Powers, §5.103, concerning Rules, and §5.105, concerning General Policy, that authorize the commission to adopt rules necessary to carry out its powers and duties under the Texas Water Code; and under Texas Health and Safety Code, §382.017, concerning Rules, that authorizes the commission to adopt rules consistent with the policy and purposes of the Texas Health and Safety Code, Chapter 382 (also known as the Texas Clean Air Act). The amendments are also adopted under Texas Health and Safety Code, §382.002, concerning Policy and Purpose, that establishes the commission's purpose to safeguard the state air resources, consistent with the protection of public health, general welfare, and physical property; §382.011, concerning General Powers and Duties, that authorizes the commission to control the quality of the state's air; and §382.012, concerning State Air Control Plan, that authorizes the commission to prepare and develop a general, comprehensive plan for the control of the state's air. The amendments are adopted under federal mandates contained in 42 United States Code, §7410, that require states to introduce pollution control measures in order to reach specific air quality standards in particular areas of the state.

§117.460. Definitions.

Unless specifically defined in Texas Health and Safety Code, Chapter 382 (also known as the Texas Clean Air Act) or in the rules of the commission, the terms used by the commission have the meanings commonly used in the field of air pollution control. In addition to the terms that are defined by Texas Health and Safety Code, Chapter 382, the following terms, when used in this division, have the following meanings, unless the context clearly indicates otherwise. Additional definitions for terms used in this division are found in §§3.2, 101.1, and 117.10 of this title (relating to Definitions).

(1) **Direct-vent unit** - A water heater with air intake and exhaust ducts that use a gravity system to collect air from outside a building for combustion and exhaust combustion byproducts to the outside of a building.

(2) **Heat output** - The product H_o obtained when a Type 0, 1, or 2 unit is tested according to Section 9.3 of the South Coast Air Quality Management District Protocol: *Nitrogen Oxides Emissions Compliance Testing for Natural Gas-Fired Water Heaters and Small Boilers* (January 1998).

(3) **Power-vent unit** - A water heater with a blower installed to assist in the expulsion of exhaust gases.

(4) **Type 0 unit** - Any water heater, boiler, or process heater with a maximum rated capacity of no more than 75,000 British thermal units per hour.

(5) **Type 1 unit** - Any water heater, boiler, or process heater with a maximum rated capacity greater than 75,000, but no more than 400,000 British thermal units per hour.

(6) **Type 2 unit** - Any water heater, boiler, or process heater with a maximum rated capacity greater than 400,000, but no more than 2.0 million British thermal units per hour.

(7) **Water heater** - A closed vessel in which water is heated by combustion of gaseous fuel and is withdrawn for use external to the vessel at pressures not exceeding 160 pounds per square inch gauge, including the apparatus by which the heat is generated and all controls and devices necessary to prevent water temperatures from exceeding 210 degrees Fahrenheit.

§117.465. Emission Specifications.

(a) Natural gas-fired boilers and process heaters sold, distributed, installed, or offered for sale within the State of Texas must meet the following limits for nitrogen oxides (NO_x).

(1) Type 0 units manufactured on or after July 1, 2002, but no later than December 31, 2004, must not exceed:

(A) 40 nanograms per joule (ng/J) of heat output; or

(B) 55 parts per million by volume (ppmv) at 3.0% oxygen (O₂), dry.

(2) Type 0 units manufactured on or after January 1, 2005, must not exceed:

(A) 10 ng/J of heat output; or

(B) 15 ppmv at 3.0% O₂, dry.

(3) Type 1 units manufactured on or after July 1, 2002, must not exceed:

(A) 40 ng/J of heat output; or

(B) 55 ppmv at 3.0% O₂, dry.

(4) Type 2 units manufactured on or after July 1, 2002, must not exceed:

(A) 30 ppmv at 3.0% O₂, dry; or

(B) 0.037 pound per million British thermal units (lb/MMBtu) of heat input.

(b) Natural gas-fired water heaters sold, distributed, installed, or offered for sale within the State of Texas must meet the following limits for NO_x.

(1) Type 0 units manufactured on or after July 1, 2002, but no later than December 31, 2006, must not exceed:

(A) 40 ng/J of heat output; or

(B) 55 ppmv at 3.0% O₂, dry.

(2) Type 0 units, except power-vent and direct-vent units, manufactured on or after January 1, 2007, must not exceed:

(A) 10 ng/J of heat output; or

(B) 15 ppmv at 3.0% O₂, dry.

(3) Type 0 power-vent and direct-vent units manufactured on or after January 1, 2007, must not exceed:

(A) 40 ng/J of heat output; or

(B) 55 ppmv at 3.0% O₂, dry.

(4) Type 1 units manufactured on or after July 1, 2002, must not exceed:

(A) 40 ng/J of heat output; or

(B) 55 ppmv at 3.0% O₂, dry.

(5) Type 2 units manufactured on or after July 1, 2002, must not exceed:

(A) 30 ppmv at 3.0% O₂, dry; or

(B) 0.037 lb/MMBtu of heat input.