



## Response to Public Comments

for

The Draft Air Quality Permit

for

MXI Environmental Services, LLC in Washington County, Virginia  
DEQ Registration Number 11447

**August 2, 2012**

Introduction – Comments received during the public comment period and at the public hearing have been grouped into categories of similar content. The comments have been summarized and/or paraphrased below in bold text. The DEQ’s response follows in normal text.

**Odors from MXI have impacted many residents and employees of nearby facilities causing a multitude of negative health effects.**

DEQ began receiving a significant number of odor complaints related to MXI in early 2009. The Virginia Department of Emergency Management was also contacted regarding the odor. DEQ air compliance staff investigated each complaint by contacting the MXI facility and reviewing operations with plant staff. In several cases, DEQ air compliance staff obtained air canister samples of the ambient air near the location of the complainant, as well as samples of the process water evaporated from MXI’s cooling tower. Air canister samples were sent for laboratory analysis and results were reviewed by toxicologists at the Virginia Department of Health. Toxicologists determined that no compounds were present in concentrations which would approach corresponding health-based exposure limits. DEQ has not documented potential emission rates above the exemption rates given in Virginia toxic air pollutant regulations (9 VAC 5-60, Article 5). DEQ has also not documented ambient air concentrations of any pollutants in excess of that allowed by Virginia toxic air pollutant regulations (9 VAC 5-60, Article 5).

On one occasion of a complaint investigation, process water samples were obtained and analyzed by a laboratory to determine the volatile organic compound (VOC) content. Results of the analyses indicated that one sample contained higher VOC content than was allowed by the current permit. DEQ compliance staff issued a Notice of Violation to the company and the violation was subsequently resolved.

In response to the many odor complaints and community concerns, DEQ requested that MXI submit a top-down Best Available Control Technology (BACT) analysis for odorous emissions. The company submitted one such analysis on July 9, 2009, and it was evaluated as part of the evaluation for a permit issued by DEQ on October 8, 2009. In complying with the terms of that permit, the company installed an oil-water separator followed by an activated clay filter in attempts to reduce odorous emissions from the cooling tower. Immediately after these systems were put in place, odors were generally perceived to have diminished. However, odor complaints later resumed and DEQ requested another top-down BACT analysis for odorous emissions on October 29, 2010. The company submitted the BACT analysis on January 27, 2011. The company submitted a permit application on June 2, 2011, to propose odor-related process changes and to add applicable federal regulatory requirements to their permit. DEQ drafted a permit and analysis for public review, but the company subsequently withdrew the permit application. This event led DEQ to reopen the permit on its own authority. These previous analyses were considered when developing the current draft permit that was the subject of this public comment period.

The draft permit contains requirements for the company to discontinue the use of distillate process water in the cooling system, thus reducing potential odors from the cooling tower, as well as eliminating the majority of volatile organic compound (VOC) emissions from the facility. Also, the draft permit requires the company to limit odorous emissions by utilizing a vapor return line when loading and unloading feedstock and ethanol product to/from tanker trucks. The draft

permit includes applicable federal New Source Performance Standards (NSPS) requirements, which will also diminish potential emissions of VOC; some of which could contribute odors.

**Concerns about Long-term exposure:**

Virginia regulations related to toxic air pollutants establish exemption rates and concentration standards for individual hazardous air pollutants. These standards were developed to protect human health and the environment. Title 9 of VAC 5-60-330 of Virginia's State Toxics Rule indicates the Significant Ambient Air Concentration (SAAC) for each regulated toxic air pollutant is based on a fraction of the Threshold Limit Value (TLV) for that pollutant. The TLV® is defined as the maximum airborne concentration of a substance to which the American Conference of Governmental Industrial Hygienists expects that nearly all workers may be repeatedly exposed day after day without adverse effects. Virginia's State Toxics Rule includes both a short-term (hourly) and a long-term (annual) standard for each pollutant. Based on the analysis of multiple ambient air samples obtained by DEQ staff and others, no toxic air pollutant concentrations were determined to approach their corresponding SAAC. State toxicologists with the Virginia Department of Health evaluated all sampling results and concluded that the measured concentrations were below any threshold of concern. To-date, all toxic air pollutant emission rates measured or calculated based on measurements have been found to be below corresponding exempt emission levels. Also, the company has taken recent measures to comply with federal NSPS requirements for reducing emissions from equipment leaks (Subpart VVa).

**What evidence leads DEQ to accept that the cooling tower is the primary source of odor rather than the condenser vent or equipment leaks?**

The company was issued a permit to install a vapor recompression evaporator on April 16, 2007. At the time, the evaporator was the presumed point of emissions. However, the evaporator was essentially a closed-loop system, and the cooling tower became the apparent emission point for the process, since process water was being utilized as cooling media in the cooling tower circuit. DEQ documentation indicates the evaporator began operating in early 2009 and that the majority of odor complaints were received thereafter. Early odor complaints led DEQ compliance staff to investigate the sources of odor from MXI, with the most obvious being the cooling tower as the primary source of VOC and odorous emissions. Also, during investigation of the odor complaints, DEQ compliance staff noted water vapor from the cooling tower, and odor in the vicinity of the cooling tower. The cooling tower operates under induced-draft conditions, generating a significant volume of air flow producing potential emissions of VOC, process water mist, particulate matter, and odor. The exhaust from the cooling tower was also suspected as the primary source of odor due to the close proximity to neighboring properties from which some complaints originated. Additionally, the timing of the onset of the majority of the complaints generally corresponds to initiation of use of the vapor recompression evaporator and process water in the cooling tower.

There are other potential sources of odor at the facility, including loading/off-loading of tanker trucks, storage tanks, container shredding/bulking operations, transfer of liquids, distillation (and associated condenser vent), evaporator and oil-water separator, and waste storage and handling operations. While these activities present potential for VOC and odorous emissions, the current

and draft permit contains provisions for managing these sources of odor by the application of good work practices.

The condenser vent is not suspected of contributing significantly to odor emissions from the facility because it is of small diameter and the fact that it is not a forced or induced draft vent, indicating a relatively small volume of emissions. DEQ understands that the condenser vent is used as a way to balance pressure through the mostly-closed distillation system. An azeotropic mixture of ethanol and water is produced in the distillation column, condensed, and further processed in the molecular sieve to produce high-purity ethanol. No odors have been specifically noted from the ethanol-side processes in the past, and distilled ethanol does not usually produce strong odors. The draft permit includes an estimate of VOC emissions from the condenser vent using generalized EPA emission factors. These estimates were made in the absence of actual emissions data.

Based on operations at similar facilities, DEQ determined that potential VOC and odorous emissions resulting from the transfer of feedstock material and ethanol product to/from storage tanks can be minimized by the use of vapor balancing efforts. A vapor return line will prevent the instantaneous emission of saturated vapor from the headspace in storage tanks during loading. DEQ considers this to be an appropriate measure to reduce possible odors.

Equipment leaks from pumps, valves, and other fittings are possible sources of odor, especially in chemical manufacturing plants. However, the large volume of emissions from the cooling tower far exceeds the expected quantity of emissions from equipment leaks. MXI is in the process of complying with federal NSPS for the synthetic organic chemical manufacturing industry (SOCMI) to further minimize equipment leaks. 40 CFR 60, Subparts VV and VVa apply to operations at the facility, and the company has already begun replacing seals in pumps and valves to reduce the leakage of volatile organic compounds. While these rules are not specifically intended to reduce odorous emissions, it has the beneficial effect of doing so by reducing fugitive VOC emissions and fluid leaks. DEQ estimated organic compound emissions from equipment leaks using published emission factors, and found them to be of minor quantity. DEQ considers the NSPS requirements to represent adequate work practice measures for minimizing VOC and odorous emissions from affected units and equipment.

Many industrial activities produce odors as a by-product of operation. Virginia's odor rule does not prohibit odorous emissions from industrial activities. Rather, it requires that facilities be equipped to manage odorous emissions through the application of odorous emissions BACT. Measures to minimize odor that are common to the industry have been placed in the draft permit. If another source of odorous emissions presents itself, DEQ has the authority to evaluate it and determine if other measures are appropriate.

**Many individuals who made comments at the June 5, 2012 public hearing made connection between odor from MXI and the combustion of waste materials.**

DEQ has no evidence that MXI is burning waste material in the boiler or any other process. The company is permitted to burn natural gas fuel or used distillate oil in the boiler for purposes of generating heat. DEQ has no information to indicate that the odorous emissions from the facility

are generated from a combustion process. DEQ accepts that the predominant source of odor is the evaporation of distillate process water from the cooling tower.

**Several commenters made reference to the use of masking agents by MXI, and that the masking agents are sources of odorous emissions.**

DEQ understands that odor maskants have been used by MXI in the past in an effort to neutralize odors from the facility. The October 8, 2009 permit prohibited the company from the use of odor masking agents at the facility without prior approval from DEQ. The draft permit contains the same requirement.

**Why didn't the oil-water separator and activated clay filter reduce odors?**

These operations were required by the terms of the October 8, 2009 permit (as amended October 29, 2009). DEQ understood that the primary source of the odorous emissions was certain organic compounds found in essential oils. The oil-water separator is a process operation common to the synthetic organic chemical manufacturing industry, and is intended to remove oily compounds from water by relying upon differences in miscibility and/or specific gravity. Organic compounds that are highly miscible or even partially soluble in water, however, may be difficult to separate using this method. This process was proposed as an enhancement to odor removal.

The activated clay filter was proposed as a means to control odorous organic material contained in the evaporator distillate by attracting it and collecting it on the surface of the clay material; similar to adsorption by activated carbon. The company proposed this system as an accompaniment to the oil-water separator, expecting that water-miscible organic compounds would be sufficiently controlled. The company was required to periodically evaluate the clay filtration system, and maintain the clay bed as proscribed by the manufacturer.

After these devices were installed and used, MXI noted a decrease in odor from the cooling tower. DEQ staff also noticed that odors from the cooling tower seemed less pungent than before, the number and frequency of complaints diminished, and some of the subsequent odor complaints identified a noticeable moderation in the odor. However, odor complaints continued to be reported even after the units were installed. Odor is measured subjectively, and there presently is no universally accepted quantitative means of determining degree or extent of odor. Even though the number of odor complaints diminished for a time after installing these devices, the perception of a change in odor is largely based on the subjective judgment of the observer. Therefore, no level of reduction in odor can be quantitatively assessed.

**If distillate process water is no longer processed in the cooling system, what are MXI's options in managing it?**

DEQ staff accepts that the use of MXI's distillate process water as cooling water is the primary source of objectionable odors from the facility, and that this practice, as currently implemented at the facility, does not meet best practices or presumptive odorous emissions BACT for the ethanol recovery industry. DEQ staff considers the distillate process water to be of low quality

compared to clean water sources, and would likely require extensive treatment before it may be used as a clean water source. Wastewater treatment and disposal options extend beyond the scope of the draft air permit and the company's ability to dispose of or recycle materials is likewise outside the authority of the draft air permit, and could be regulated by other entities (Water Division or Land Protection & Revitalization Division) within DEQ. If the company chooses to follow a pretreatment option, DEQ air and water regulations could apply to the activity, and a new permit may be necessary. MXI is responsible to investigate and determine the most acceptable modes and routes of disposal and treatment and to ultimately comply with applicable regulatory and permit requirements.

**The draft permit should require direct monitoring of emissions from the condenser vent.**

In the absence of better data, DEQ estimated potential VOC emissions from the condenser vent using published emission factors, and established emission limits accordingly in the draft permit. These emission estimates are expected to be conservative, because the volume of exhaust from the condenser vent is expected to be low. MXI is in the process of complying with federal NSPS regulations for the synthetic organic chemical manufacturing industry (SOCMI), 40 CFR 60, Subparts VV, VVa, and NNN. Subpart NNN contains provisions related to distillation operations (including vents) at SOCMI facilities. In complying with this regulation, the company must determine the volumetric flow rate from the condenser vent and/or the total organic carbon concentration of exhausts from the condenser vent. When these measurements are taken, more accurate emission estimates may be made. The predominant source of odors from the facility appears to be from distillate process water, and such odors have not been reported to resemble that of ethanol. Ethanol in a concentrated form has a relatively mild odor. Typically, strong odors from ethanol/solvent recovery operations are associated with chemical components of materials other than the ethanol stream itself. This appears to be the case at MXI.

NSPS Subpart NNN establishes a baseline of requirements for minimizing emissions from distillation systems. DEQ assesses that potential VOC and odorous pollutant emissions from the condenser vent will be minimized by complying with the subpart. Depending upon the results of testing and the regulatory alternatives selected by the company, the company may have to install a control device and/or monitoring devices in order to comply with Subpart NNN. DEQ does not propose a continuous emissions monitoring device at this time, given the requirements of Subpart NNN.

**How will BACT measures and NSPS requirements reduce emissions from the facility, and how will compliance be monitored and enforced?**

DEQ considered a variety of options that have the potential for reducing odorous emissions from MXI. The options that DEQ determined to be most appropriate are those currently used by similar facilities in the ethanol recovery and ethanol production industries. These approaches were regarded by DEQ as presumptive odorous emissions BACT measures, because they have been successfully implemented within similar industrial settings. Despite ongoing efforts by industry to conserve resources and reuse by-products, DEQ was unable to identify any similar facility that reuses distillate process water in the cooling system.

The requirement to utilize a vapor balance system when loading /unloading raw materials and ethanol product to and from tanker trucks should likewise prevent emissions by rerouting the vapor through a return line. Depending upon the material, this could also prevent odorous emissions. This is a relatively common measure among organic liquids distribution industries.

Each NSPS regulation contains emission standards for affected equipment, as well as work practices, monitoring, recordkeeping, and reporting requirements to help document compliance. The regulations themselves, as well as the draft permit, will become an enforcement tool DEQ compliance staff will be able to utilize to assure compliance. The draft permit also contains provisions for the company to develop an operation and maintenance plan, an odor control plan, and maintain good work practices for the purpose of reducing odorous emissions. The company will maintain records documenting their compliance. The draft permit contains additional provisions for DEQ to revisit odor BACT should it be necessary.

### **Why has the permit process taken so long?**

At DEQ's request, MXI submitted a top-down BACT analysis on January 27, 2011, followed by a permit application on June 2, 2011. In the following months, DEQ staff reviewed the permit application and sought out other data supporting the analysis through extensive research. The company provided subsequent information supporting the permit application on a number of occasions. By mid-December, 2011, DEQ staff determined that the application was sufficiently complete, and began drafting a permit. By early February, 2012, the draft permit had been developed, reviewed internally, and sent to MXI for their review. The company subsequently requested an extension of the timeframe for review until March 15, 2012. This request was granted, and after meetings and discussions with the company, the company withdrew the permit application on March 14, 2012. On March 16, 2012, DEQ notified MXI of its intention to reopen the permit for cause, according to 9 VAC 5-80-1300 of Virginia regulations. After the required 30-day waiting period, DEQ reopened the permit on April 19, 2012. The draft permit was prepared and reviewed by DEQ staff, and a public comment period and public hearing date were advertised in the *Bristol Herald Courier* on May 3, 2012. A public briefing and hearing were held on June 5, 2012. The public comment period remained open until June 20, 2012.

### **MXI does not accept that it is appropriate to amend the permit. MXI has already responded to the odor issues by taking significant measures to reduce the odor. These measures are sufficient. The number of complaints has significantly decreased since MXI has installed control equipment and improved the evaporator.**

The October 8, 2009 permit (as amended October 29, 2009) issued to MXI contained provisions for the installation of an oil-water separator and an activated clay filtration system to reduce odorous emissions released in the cooling tower. DEQ was notified on October 20, 2010, that MXI was in the process of installing the new control equipment. Between the timeframe the 2009 permit was issued and control equipment installation began, DEQ received approximately 11 odor complaints. At that time, according to DEQ documentation, no distillate process water was directed to the cooling tower. After the installation of the control equipment, MXI began reusing distillate process water as cooling water. After the installation of control equipment, approximately 45 complaints were received. In the months immediately following the changes,

DEQ staff noted a decrease in odor. However, odor complaints have since increased in frequency and persist to the present time.

In consideration of the complaints, DEQ compliance staff continued to encourage the company to address odor issues through the development of a consent agreement between the company and DEQ. Additionally, DEQ requested that MXI provide a second “top-down” odorous emissions BACT analysis to determine how odor is managed by similar facilities. Subsequent to providing the odorous emissions BACT analysis, MXI submitted a permit application on June 2, 2011, in part to include the company’s recommendations for implementing alkaline hydrolysis to address odors. MXI later proposed utilizing chemical oxidation as an extra measure. DEQ reviewed the BACT analysis and permit proposal, and based on available data from similar facilities, determined that the most effective means of reducing odor from the cooling tower was to eliminate process water from the cooling circuit (see the evaluation for the withdrawn permit application for more details). The company withdrew its permit application leaving DEQ with no direct, practical, enforceable mechanism of addressing the odor issues except by consent agreement or through the permit reopening procedure. Given the time-sensitive nature of the odor issues and the lack of success in developing a consent agreement with the company, DEQ determined to follow the permit reopening procedure in 9 VAC 5-80, Article 6 of Virginia regulations.

**MXI has never been found to be in violation of an odor standard. Sampling revealed that some pollutants collected were not identified with MXI’s operations. DEQ does not have evidence that an odor problem exists; and if it exists, DEQ has no evidence it is generated by MXI**

Approximately 70 odor complaints have been received from members of the community. Each complaint was investigated by DEQ compliance personnel and no complaint was attributed to the operation of other facilities. DEQ has concluded the predominant source of odorous emissions is the cooling tower, but has also concluded that other aspects of MXI’s operations may contribute odors. Although the sampling revealed background concentrations of air pollutants that are not normally associated with MXI, DEQ accepts that the odor complaints are associated with odors from MXI, rather than with low-level concentrations of other regulated pollutants found in ambient samples. MXI officials have already publicly acknowledged problematic odors from the facility (“Controversial Ethanol Production Business Won’t Be Moving Into City-Owned Site,” *Bristol Herald Courier*, February 15, 2012), which corroborates DEQ’s own assessment.

**MXI states that DEQ failed to make the BACT evaluation available.**

All documents, including the evaluation document, related to the draft permit were made available at the DEQ Southwest Regional Office during the public comment period from May 3, 2012, through June 20, 2012. The documents were available for public review during the advertised comment period, and are now subject to freedom of information act request. DEQ’s evaluation for this permit reopening is very similar in scope and content to the previous evaluation for the withdrawn June 2, 2011 permit application.

**MXI states that a BACT standard for odor is unreasonable. It violates due process and is without legal authority. Odor is not a pollutant, and it is impossible to apply BACT.**

**BACT is unlawful.**

9 VAC 5-50-130 – 150 details Virginia requirements for odorous emissions. These requirements apply to each facility constructed after March 17, 1972, that emits odor. The notable requirement of the rule is that BACT must be applied. “Regulated air pollutant” is defined in 9 VAC 5-80-1110 C to include “any pollutant subject to a regulation adopted by the board,” which would include odorous emissions. These rules were adopted following the Virginia Administrative Process Act, and DEQ is responsible for enforcing them.

BACT is defined in 9 VAC 5-50-250 C, in part, as “a standard of performance (including a visible emission standard) based on the maximum degree of emission reduction for any pollutant which would be emitted from any proposed stationary source which the board, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such source through the application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.” The definition goes on to say, “In determining best available control technology for stationary sources subject to Article 6 (9VAC5-80-1100 et seq.) of Part II of 9VAC5 Chapter 80, consideration shall be given to the nature and amount of the new emissions, emission control efficiencies achieved in the industry for the source type, and the cost effectiveness of the incremental emission reduction achieved.” These aspects of the definition make clear that the agency has discretion in determining what establishes BACT, taking into consideration the control methods used within an industry. This was the approach used by DEQ.

The company provided top-down BACT analyses on two occasions, at DEQ’s request. The company presented its BACT proposals as the means of meeting state odorous emissions BACT requirements. The company followed each analysis with a permit application to implement its proposals as odorous emissions BACT. The company did not contest DEQ’s authority to implement odorous emissions BACT for previous permits, and has been seeking to establish an approach within the framework of BACT that is acceptable to the company.

It is clear that odor is a pollutant, and that BACT for odorous emissions is a regulatory requirement. The regulations anticipate that DEQ will make the best assessment possible using the specific information available in each individual case, giving consideration to similar sources in the industry. DEQ judges that this has been achieved in the proposed permit.

**MXI states that BACT requires a top-down analysis, and DEQ has failed to follow the steps in a Top-down BACT determination. Top-down BACT warrants a cost/benefit analysis.**

DEQ requested that MXI provide top-down odorous emissions BACT analyses on two occasions in order to obtain the clearest presentation of odor control techniques used in the ethanol recovery industry. Top-down BACT is a feature of the federal Prevention of Significant Deterioration (PSD) permit program for major sources of air pollution, but is not a requirement of 9 VAC 5-80, Article 6 permits for minor sources of air pollution to which MXI is subject.

The information provided by MXI did not contain the level of detail required to make a top-down BACT comparison. For odorous emissions BACT, it is generally understood and was conveyed to MXI that top-down BACT for odorous emissions includes an examination of BACT ranging from the top performing technologies to the lesser-performing technologies, while recognizing that quantification of odorous emissions in a manner that is associated with the more formal top-down BACT analysis for a PSD permit would be impossible. As MXI argued in their statement, there is no convenient means of assessing costs per unit of pollutant controlled since odor is not measured on a mass basis. Due to the difficulties in quantifying the impact of odorous emissions and verifying the effectiveness of the techniques and costs associated with their control, DEQ reviewed information on similar facilities to ascertain a minimum-level of control regarded as “presumptive BACT” for the source category, while examining technologies ranging from the top performing to the lesser-performing. DEQ judges that this minimum level of control that is specified in the draft permit is reflected throughout the ethanol recovery and production industries.

**MXI states that DEQ is redefining the source by prohibiting use of process water in the cooling system. This is contrary to previous court decisions.**

DEQ disagrees with this comment. The feedstock, product, processes, and the individual equipment units at the facility are unaffected by the draft permit, with the exception of the removal of the clay filtration system, which is an air pollution control device. The by-product of MXI’s ethanol recovery process is a waste stream consisting mostly of water with odorous emissions-producing compounds that are resultant from distillation of feedstock material. In the current arrangement, the by-product waste stream is ultimately evaporated directly to the ambient air. The by-product waste stream contains materials that cause and contribute to odorous emissions when evaporated from the cooling tower. It is legitimate for DEQ to take measures to control regulated air pollutants, including odorous emissions producing materials. The ability of the source to continue to use the cooling tower for purposes of providing cooling water for process operations is not prohibited by the draft permit. Further, DEQ is not requiring any changes to the process unit operations, but to the final disposition of the by-product waste stream. Since the draft permit does not seek to modify or restrict any process operations or the ability to use the cooling tower without by-product waste water, this source has not been redefined.

**MXI considers that disposal of process water to a publicly owned treatment facility is not technically feasible. Hauling the material to another treatment facility is not viable due to high costs.**

Generally, the facility’s choice of pre-treatment and treatment options for waste management extend beyond the scope of the company’s air permit and DEQ air regulations. Such choices are rightly determined by the company and other regulatory authorities, and must be weighed against the many variables that define the company’s interests. Consequently, the proposed permit does not stipulate the methods to be used to manage waste streams, but leaves all appropriate options open for the facility’s consideration.

Currently, the company is emitting the waste stream directly to the atmosphere through the cooling tower, creating odors objectionable to the community, thus escaping other waste management obligations, whether that be onsite pretreatment and disposal, comprehensive onsite treatment and re-use, or off-site disposal. DEQ's assessment is that the company should duplicate the good engineering and responsible environmental practices that are utilized by other known ethanol recovery operations by excluding recycled process water from the cooling system, unless it has been comprehensively treated to attain appropriate water quality levels.

**MXI considers evaporating process water through the cooling tower as a best practice for the chemical process industry.**

DEQ understands that the chemical process industry, and particularly the ethanol production industry, is continually seeking process enhancements to reduce costs and material consumption. The industry desires to reduce the clean water demand for producing ethanol, and often reuses process water in processes involving fermentation for production of ethanol. The goal of zero liquid discharge is reportedly being realized at some facilities. The MXI facility does not currently utilize fermentation to produce ethanol. DEQ has not identified any facility in the ethanol production or recovery industries that reuses distillate process water in the cooling systems. All facilities examined used a clean source of cooling water in processes that are exposed directly to the atmosphere. The use of noncontact cooling water is considered to be standard operating practice for the industry, and is regarded as presumptive BACT. A number of years ago, a similar facility in Virginia stopped reusing distillate process water in their cooling system, in part to reduce offensive odor impacts on the community. Several other similar facilities in Virginia likewise use only clean water sources for cooling water. DEQ projects that MXI's distillate process water would require extensive treatment and conditioning before the quality would compare favorably with that of a clean water source.

To illustrate the need for enhanced treatment, in the May, 2012 edition of *Chemical Engineering* magazine, an article entitled "Water-Saving Strategies for the CPI," authored by Y.A. Liu of Virginia Polytechnic Institute and State University, identifies possible water management approaches for reducing freshwater consumption and wastewater discharge within the chemical manufacturing industry. Included in this article were proposals for the use of additional treatment steps to condition process water that has already undergone primary wastewater treatment so that it may be re-used in cooling towers. The author noted the successful application of mild and deep treatment regimes that raise the water quality to near that of freshwater, a standard of quality that is necessary for re-used water (as cooling tower makeup water, boiler makeup water, steam, etc.) and is recognized as a good engineering practice. Additional treatments identified include secondary water treatment, biological treatment, oxidation, filtration, and stabilization that may be followed by ultrafiltration and reverse osmosis. A succession of these treatments has been demonstrated to be effective in elevating the quality of process water to levels that may be acceptable for use in cooling water systems. This combination of physical, biological, and chemical treatments exceeds measures proposed by MXI thus far. DEQ expects that, at minimum, a series of similar extensive treatment steps would be necessary to achieve such levels of quality in the distillate process water stream at MXI. An exhibit submitted by MXI into the public comment record, "Water Reuse and

Efficiency Improvement: Process Condensate for Cooling Water,” essentially confirms this conclusion.

**DEQ has not explained the rejection of MXI’s previous BACT proposals; DEQ’s BACT review is invalid since it does not include net present value determinations for the options presented.**

DEQ explained the rationale for preferring the elimination of process water from the cooling system to other BACT options in the draft permit evaluation for the draft permit currently under consideration, as well as in the evaluation for the previously withdrawn MXI permit application. As discussed previously, DEQ expects that due to the nature of MXI’s distillate process water, multiple technologies/treatments may be necessary to adequately remove odorous organic materials such that the distillate process water is suitable for use as atmospherically exposed cooling water.

When a top-down BACT analysis is provided, typically, costs of installation and operation of each technology versus the quantity of pollutant controlled is reported. In a previous BACT submittal, MXI provided rough estimates of the cost of distillate process water disposal, the cost of utilizing alkaline hydrolysis, and some costs associated with carbon adsorption, but did not provide detailed technology-specific cost information to DEQ for evaluation or comparison. Based on past comparison of various control options, DEQ expects that the cost of eliminating the distillate process water from the cooling tower would likely be more economical than the costs associated with top-tier control options such as incineration or carbon adsorption.

One difficulty in making cost comparisons for the different technologies reviewed was the pollutant basis for those costs. Typically, BACT comparisons are based on costs per mass-based quantity of pollutant controlled/removed. Odor is an air pollutant, but is not measured or evaluated on a mass basis, as other pollutants are. Also, amounts of odor removed by a prospective technology or treatment may not be reliably estimated since the effectiveness of some of the control options presented would vary depending upon: the feedstock being processed; the raw materials or reagents used; the prevailing process conditions; subjectivity of the observation method; and the nature of the specific compounds carried into the distillate process water. DEQ’s review recognizes that the practice which is predominant in the ethanol industry that is more likely to result in the direct elimination of odor, and which apparently is among the least costly control options, is elimination of process water from the cooling system. This approach requires no capital-intensive investment. Because this practice is uniformly followed by ethanol production and recovery facilities, associated costs are inherently accounted for, and the economy of the practice is already established as a baseline business cost. DEQ therefore considers the practice as economical, effective, and standard operating procedure within the industry, and therefore is properly regarded as presumptive BACT.

**MXI provided exhibits in their comments comparing estimated costs associated with managing the distillate process water.**

The company deemed the cost information as confidential or protected information. The company submitted a redacted form of the information for the public record. The redacted

version of the exhibits did not contain cost figures, and will therefore not be discussed. As MXI pointed out, odor is not quantifiable on a mass (pound or ton) basis, and therefore costs associated with odor removal are difficult to rank according to effectiveness. Also, there is no previously determined control/cost level that has been established as unacceptable or excessive for odorous emissions. Given the limitations to evaluating and comparing odor control techniques, DEQ opted to determine a minimal level of odor management that is observed by all other similar facilities that would constitute a presumptive BACT measure.

In their comment regarding this matter, the company referenced an article as being attached, but the article was not attached to their submittal. The article was entitled, "Beneficial Wastewater Reuse: An Idea Whose Time Has Come." DEQ will not address this article since it is not provided for the public record.

**Why doesn't DEQ accept alkaline hydrolysis and chemical oxidation as BACT? These are feasible options that are demonstrated in DEQ permit actions for Pilgrim's Pride and Potomac Landfill.**

MXI submitted an air permit application on June 2, 2011 to incorporate alkaline hydrolysis as odor BACT. DEQ reviewed the application and determined that alkaline hydrolysis presented a partially effective methodology to convert organic esters to alcohols, but DEQ was unable to identify any previous demonstration of the use of alkaline hydrolysis for reduction of odor. Conceptually, alkaline hydrolysis would only convert ester compounds, and not other odorous organic compounds. No facility in the ethanol production or recovery industries is known to utilize such methods. MXI proposed an in-situ application of alkaline hydrolysis in the distillate liquid transfer lines rather than a distinct process unit operation. The only instances of alkaline hydrolysis known to DEQ are in specific chemical production activities involving controlled reactors performing under rigid operating scenarios. MXI could provide no examples of the use of alkaline hydrolysis for odor control.

Also, in relation to their June 2011 application, MXI then proposed to combine chemical oxidation methodology with alkaline hydrolysis. Chemical oxidation has a more extensive history in the reduction of odorous organic compounds in wastewater pretreatment applications. Oxidation has the potential to remove organic material from MXI's distillate process water. The effectiveness of chemical oxidation varies according to the chemical species and many other factors related to design and the prevailing process conditions. DEQ has been able to verify that chemical oxidation, in combination with additional process treatments, has been demonstrated within the chemical process industry to reduce odors and condition recycled process water so that it may be utilized in cooling systems (as discussed previously). Although oxidation can be effective in pretreatment of industrial wastewater prior to discharge, the quality expectations for cooling water are higher, given that it directly contacts process equipment and is ultimately exposed to the atmosphere. DEQ sent a letter to MXI on November 15, 2011, stating that the proposal to utilize chemical oxidation could be an effective first step in removing odor from the process water, and asked the company to provide an assessment of subsequent treatment as a finishing step. MXI did not provide a response, and subsequently withdrew the permit application. DEQ concludes that chemical oxidation, in combination with subsequent mild and deep treatment operations, has the potential to condition the process water to the desired extent

for use in the cooling system. However, given the company's reluctance to pursue this type of approach, DEQ expects that elimination of the distillate process water as cooling water is the most practical, effective means of limiting odors from the operation.

It is difficult to compare the site activities of MXI with those of a landfill. Landfills typically involve multiple sources of fugitive emissions of odorous compounds resultant from biological decay, collected leachate water, etc. The Potomac Landfill facility has not been issued an air permit by DEQ. The leachate from the landfill is not evaporated or utilized as cooling water, and the oxidation control is specifically designed to capture hydrogen sulfide odors. Leachate from the landfill is discharged to a municipal treatment facility; therefore chemical oxidation is used as a means of pretreating the wastewater in preparation for off-site transfer. The wastewater does not appear to be reused by the facility, and it is not clear that the water quality would accommodate beneficial reuse/recycling. Although oxidation appears to have been an effective means of addressing some of the odor concerns of leachate water collected at the landfill, DEQ would have similar concerns regarding reusing the leachate as cooling water, unless it is treated to acceptable levels.

Likewise, Pilgrim's Pride is a rendering plant operation that is in marked contrast with operations at the MXI facility. The plant has developed a comprehensive odor control approach that incorporates many site-specific techniques to assess and address odors from the operation. These techniques include incineration, multiple oxidation scrubbers, process enclosures, collected/controlled ventilation, sealed structures, negative pressure, closed transport, deodorization procedures, and prohibitions on the discharge of odors. Oxidation is only one aspect of a complex odor management program. The processes and pollutants involved do not resemble those associated with MXI, and the treated liquids are apparently not being reused for cooling water. The company has more recently employed a targeted catalyzed oxidation system designed for the specific odorous chemicals produced. This catalyzed oxidation system may prove to be an effective addition to Pilgrim's Pride Corporation's odor control program.

**MXI has taken substantive expensive measures to reduce odor from the facility including equipment and process improvements.**

DEQ acknowledges that the company has installed, replaced and maintained process equipment in order to improve the efficiency of the processes, including the process water collection system. The company installed an oil-water separator and activated clay system in 2009, and has since replaced the distillation column condenser and the mist eliminator in the cooling tower. The company is also in the process of improving the liquids-handling systems to comply with NSPS Subpart VVa regarding equipment leaks, reportedly at considerable expense.

Despite maintaining existing operating equipment, making process improvements, and installing additional equipment, odorous emissions from the plant have persisted. DEQ concludes that eliminating the distillate process water from the cooling system represents the most effective odor management practice and presumptive BACT for the ethanol-recovery industry.

**Ambient air sampling conducted by MXI indicated that many of the pollutants identified did not originate from MXI; some of the complaints occurred when MXI was not in operation, indicating other potential sources of odor.**

MXI, DEQ, and others have collected canister samples of ambient air. The samples were analyzed by laboratories that attempted to identify the presence of as many as 65 or more pollutants. An 8-hour sample conducted by MXI on plant property in 2009 identified several pollutants in low concentrations that apparently have not been associated with MXI operations. The levels identified by laboratory analysis could represent background concentrations of pollutants from outside the area, from transportation sources, or from other sources within the area. A linkage between the presence of those compounds detected at background concentration levels to odors in the area has not been established.

MXI documented certain instances that odor complaints were received by DEQ when the plant, or portions of it, was not in operation. The company ascribes this to insincerity on the part of the complainant(s), or that another source of odor is present. DEQ responds to each odor complaint to determine that a facility/source of odor is complying with permit or other state requirements. Although complaints may have occurred when some aspects of the facility were not operating, dozens of complaints have been received when the facility was operating, identifying the characteristic odor that has been associated with MXI's operation. DEQ has identified no secondary source of odor that is associated with the complaints received.

**The vapor balance system is unreasonable. This arrangement could be unsafe for MXI to use due to flammability dangers. This requirement could conflict with OSHA requirements. If MXI were to use a system similar to those in the petroleum industry, it could cost \$5 million. KmX is not required to use such a system.**

DEQ proposes the use of a vapor return hose/line when loading/unloading tanker trucks, in an effort to comprehensively address the potential for odorous emissions from the facility associated with liquids transfer. The design and cost of such a system is to be determined by the permittee in accordance with their process constraints and applicable regulatory and safety standards. DEQ clarified in the draft permit that a simple vapor return line should be used, if appropriate, rather than a metered or vacuum assisted routing system, to direct vapor displaced from the storage tanks or tanker truck back to the vessel of origin. DEQ considers this requirement to be commonplace for facilities involved in the bulk transfer of petroleum and non-petroleum organic liquids, and is, for example, a requirement of a recent federal regulation (40 CFR 63, Subpart EEEE) for subject major hazardous air pollutant source facilities. Should the company in the future elect to transport distillate process water via tanker truck, the vapor return line could be instrumental in reducing potential odors from that operation. This type of requirement was included in a previously issued air permit for a similar ethanol recovery facility – the Virginia Ethanol Distilling Company, Inc. permit dated December 22, 1998, for the reduction of volatile organic compound emissions during loading. Therefore, this type of requirement is not new or extraordinary for the ethanol recovery industry, and is not intended to impose hardship or unreasonable costs to the company.

DEQ is unaware of any conflicting safety regulations related to vapor management. MXI should carefully evaluate how to safely incorporate a vapor return line into the tanker truck operations.

Although the current permit for KmX does not include requirements for vapor balancing, DEQ file information indicates the company has incorporated similar vapor management practices when transferring liquids throughout the facility.

**MXI identified several permit conditions that could warrant revision if DEQ continues to prohibit the use of distillate process water in the cooling system:**

- **The oil-water separator becomes unnecessary and should be removed from the permit.**

The only equipment DEQ removed from the proposed permit was the clay filtration system due to its function of serving as a control device in conditioning the recycled distillate process water and its close association with the cooling tower. All other equipment was retained in the permit because of the potential for the company to utilize it in some part of their process independent of the disposition of the cooling system water. If the company determines that equipment units will no longer be used when process water is no longer utilized in the cooling system, it may request a permit amendment to remove specific references in the permit.

- **Condition #5 should be removed.**

Condition #5 reads as follows:

*Emission Controls - Particulate matter and PM10 emissions from the operation of the cooling towers shall be controlled by appropriately designed, constructed, and operated baffles, packing, and/or mist eliminators. Solids content of cooling tower water shall be minimized by operating the processes at the facility in such a manner as to remove or mitigate dissolved and suspended solids from the water, to the extent practicable, consistent with best management practices of all process equipment. At minimum, semi-annual inspections of the oil/water separator and cooling towers shall be completed.  
(9 VAC 5-50-260)*

This condition establishes requirements related to limiting particulate matter emissions from the cooling tower. This condition relates to the potential to emit particulate matter emissions due to solids content in clean water, mineral buildup in the cooling tower, or failure of the mist eliminators. Although such emissions are normally quite small, the primary intent of the condition is to facilitate the proper maintenance and operation of the equipment. The emission estimates were determined using EPA AP-42 emission factors, which in fact anticipate the potential for particulate matter emissions from cooling towers, even when using “clean” sources of cooling water.

- **Conditions #3 & #4 should be removed; they do not appear in the permit for KmX, and since MXI is already constructed, if DEQ wants to require sampling or testing it should rewrite these conditions.**

Conditions #3 and #4 read as follows:

3. *Emission Controls - Volatile organic compounds from the ethanol recovery facility shall be controlled by proper operation and maintenance of all*

*process, storage, and transfer equipment. Such equipment includes, but is not limited to:*

- *storage tanks, containers, and retention devices*
- *feedstock and raw material recovery and concentration operations*
- *distillation columns*
- *molecular sieve separators*
- *heat exchangers*
- *pipng, pumps, valves, and transfer systems*
- *evaporators*
- *oil-water separators*
- *water treatment and filtration units*

*(9 VAC 5-50-260)*

4. ***VOC Emissions*** - *At all times, processing and disposal of volatile organic compounds shall be accomplished by taking measures consistent with air pollution control practices for minimizing emissions. Volatile organic compounds shall not be intentionally spilled, discarded in sewers, stored in open containers, or handled in any other manner that would result in evaporation beyond that consistent with air pollution practices for minimizing emissions.*

*(9 VAC 5-50-260)*

These conditions identify the process equipment to be maintained and operated and work practices the company should consider to minimize VOC emissions. These conditions were established on a case-by-case basis for MXI's operation and may not be included in KmX's permit. The conditions do not relate to sampling or testing.

- **Condition #6 cannot be complied with. The equipment is custom-made, and there are no manufacturer's operating practices to follow.**

Condition #6 reads as follows:

6. ***Emission Controls*** - *At a minimum, equipment manufacturers' operating and best management practice recommendations for minimizing emissions and optimizing performance shall be followed. This includes, but is not limited to:*

- *following process design specifications and recommendations for distillation operating temperature profiles and feedstock characteristics/composition;*
- *maintaining cooling tower packing, mist eliminators, and/or baffles to minimize entrained liquid and mist in cooling tower exhausts;*
- *maintaining/cleaning heat exchangers, vapor condensers, compressors and evaporators in accordance with manufacturer's specifications, or more frequently, as necessary to optimize performance and minimize emissions ; and*
- *retaining onsite copies of manufacturer's best management practice recommendations. This documentation shall be available for review upon request.*

This condition requires the company to follow good operating practices for process equipment as a means of limiting potential emissions and minimizing problems arising from operation. This condition is unchanged from the previous permit and was previously uncontested by the permittee. In the absence of manufacturer's recommended operating practices, the company may develop, in conjunction with DEQ, its own operating and maintenance procedures for the specified equipment.

- **The permit should not contain a complete transcription of the new source performance standards (NSPS) regulations related to equipment leaks and distillation. The permit should contain the work plan that MXI submitted for NSPS Subpart VVa rather than the text of the rule. MXI may be exempt from NSPS Subpart NNN.**

DEQ included NSPS Subparts VV, VVa, and NNN into the proposed permit in a comprehensive manner, which does enlarge the permit document. DEQ incorporated the entire NSPS rules into the proposed permit because it was unclear which standards were inapplicable to the facility and which optional alternatives the company may chose to comply with. Also, at the time of the proposed permit, the company had not yet demonstrated compliance with these regulations. Establishing the regulatory requirements in the permit in this manner ensures that no requirement has been ignored.

Given the indeterminate circumstance regarding which specific requirements apply, DEQ elected to include the regulations themselves within the permit. A work plan or compliance plan established apart from the permit gives the company and DEQ more flexibility in making adjustments to accommodate future developments and in making compliance decisions where flexibility is allowed.

Some of the requirements of NSPS Subpart NNN may not apply if/when the company demonstrates that it meets vent flow criteria. If such is the case, the company may request that DEQ amend the permit to remove inapplicable requirements. Until this is demonstrated, the company has the obligation to comply with all applicable aspects of the subpart.

- **Condition #78 is irrelevant since the evaporator is not an emissions or odor source.** Condition #78 reads as follows:

*78. Operations and Maintenance Plan - The permittee shall develop and implement an Operations and Maintenance (O&M) Plan for the oil/water separator and evaporator. The O&M Plan shall include an emergency action plan outlining procedures to mitigate and control odor episodes which might result from the oil/water separator and/or evaporator operation. The permittee shall review the O&M plan semi-annually and revise the plan, as necessary, to reflect any process changes impacting the oil/water separator and/or evaporator operations. The permittee shall keep a record of the dates of the O&M plan review and dates of maintenance of the oil/water separator and evaporator.*

(9 VAC 5-80-1180 and 9 VAC 5-50-140)

It may be correct to conclude that the evaporator and oil-water separator would no longer be sources of odor if their use to process the distillate bottoms stream was terminated. However, if these units are used in conditioning the process water (for pretreatment, or other company purposes) apart from the operation of the cooling tower, odorous emissions could result due to the open nature of the oil-water separator.

- **Condition #79 is irrelevant. The current odor control plan focuses on the cooling tower. MXI has no other point or fugitive emissions source. There are no manufacturer's operating recommendations for the equipment. DEQ should publish an odor guide. KmX has no odor plan.**

Condition #79 reads as follows:

79. *Odor Control Plan/Best Management Practices - The permittee shall develop and implement an Odor Control Plan to mitigate odor released from the facility. The permittee shall review the Odor Control Plan semi-annually and revise the plan, as necessary. Odorous emissions from the following operations and processes at the facility shall be controlled by equipment manufacturers' operating and best management practice recommendations for minimizing emissions and optimizing performance:*

- *storage tanks, containers, and retention devices;*
- *feedstock and raw material recovery and concentration operations;*
- *distillation columns;*
- *molecular sieve separators;*
- *heat exchangers;*
- *pipng, pumps, valves, and transfer systems;*
- *evaporators;*
- *oil-water separators; and*
- *water treatment and filtration units.*

(9 VAC 5-80-1180 and 9 VAC 5-50-140)

This condition was revised slightly in the proposed permit, but was largely carried over intact from the previous permit. The goal of Condition #79 was for the company to establish a plan/process by which it will prevent odorous emissions and respond to odors from any aspect of the facility. Any of the operations mentioned has some potential to produce odor. DEQ expects the company to manage its operations in such a manner as to reduce odor and minimize instances of odor upsets. A direct and often effective way of being proactive is to observe manufacturer's recommendations. In the absence of such recommendations, the company may establish an alternative plan, in conjunction with DEQ, detailing what steps should be taken to prevent odor or to respond to upsets such as in the case of spills, malfunctioning equipment, accidental releases, etc. DEQ acknowledges that owners and operators who have firsthand knowledge of, and experience with their processes and operations and are in the best position to assemble a guidance document covering proper operation and mitigation strategies for the specific processes at their facilities.

KmX's current permit does not require the development of an odor control plan for processes at the facility. However, the permit does include many monitoring, recordkeeping, testing, and reporting requirements aimed at reducing emissions and aiding DEQ in determining compliance with the permit and applicable regulations. DEQ compliance staff has worked with KmX to reduce odor, and the company has not had an odor complaint in over 10 years. In more recent years, odor control plans have become a more common requirement for those facilities that have a history of producing odorous emissions or whose operations inherently produce odors, including the Pilgrim's Pride Corporation facility cited by MXI in exhibit 2B of their public comment submittal.

- **Condition #80 should be removed or clarified. It duplicates Conditions #66 and #79. The condition is too vague and difficult to comply with. What does "crushing and shredding operations shall be designed to effectively mitigate odors around such operations" mean? KmX does not have this requirement in their permit. DEQ should publish a best management guidance document for odor.**

Condition #80 reads as follows:

*80. Odor Minimization/Best Management Practices - At all times, processing and disposal of odorous emission-producing materials shall be accomplished by taking measures, consistent with air pollution control practices, for minimizing emissions. Odorous emissions-producing materials shall not be intentionally spilled, discarded in sewers, stored in open containers, or handled in any other manner that would result in evaporation beyond that consistent with air pollution practices for minimizing emissions. All bottle crushing and shredding operations shall be conducted as quickly as possible. All crushed glass, shredded cans, or other discarded vessels shall be forwarded to a covered container and recycling/disposal facility as soon as possible. The container for crushed glass, shredded cans, and discarded vessels shall remain covered at all times, except when discarded materials are being actively added. All drums of alcohol products shall remain covered unless they are being actively pumped. All systems related to crushing and shredding operations shall be designed to effectively mitigate odors around such operations.  
(9 VAC 5-80-1180 and 9 VAC 5-50-140)*

This condition is a carryover requirement from the previous permit. The intent was for the company to use good operating judgment in carrying out the work practices at the facility and to take positive, proactive measures to reduce opportunities for discharging odorous emissions. The requirement is similar to the two conditions identified, but it is more specific to the operations related to collecting and managing feedstock that is removed from smaller containers and transferred within the plant. DEQ may be able to assist a company in developing case-by-case strategies for limiting odors, but DEQ is not able to develop a comprehensive odor/best management guidance document for Virginia facilities. DEQ acknowledges that owners and operators who have firsthand knowledge of and experience with their processes and operations are in the best position to know which practices would be most effective at their facilities.

KmX has some operations that are similar to MXI, as well as some diverse operations. Their permit contains many requirements related to managing these operations, including the development of plans detailing monitoring, testing, and recordkeeping procedures.

- **Condition #81 should be removed. It is an arbitrary and capricious requirement that other facilities do not have to comply with. This is unfair to MXI.**

Condition #81 reads as follows:

*81. Additional Odor BACT/Permit Reopening - Failure to reasonably control odorous emissions from the facility may necessitate emissions testing and additional Best Available Control Technology review by the permittee, upon the request of the Director, Southwest Regional Office. This permit may be reopened to include additional equipment and control measures, as appropriate.  
(9 VAC 5-80-1180, 9 VAC 5-80-1300 and 9 VAC 5-50-140)*

DEQ is obligated to enforce Virginia regulations, including the state odor regulation. The presence of this condition does not place requirements or limitations on MXI's operations, nor does it place limits on DEQ's authority. The condition makes clear what measures DEQ is prepared to take to enforce the regulation.

- **Condition #84 should be removed since MXI would not be able to emit methanol from a point source apart from the cooling tower. MXI should be able to process feedstock containing methanol.**

Condition #84 reads as follows:

*82. Feedstock Processing – The permittee shall not process in the ethanol recovery facility any consumer, industrial, or other product, that may contain, or be reasonably expected to contain methanol. Such products may include, but are not limited to fuel additives, fuel anti-freeze, windshield de-icers, etc.  
(9 VAC 5-170-160)*

This requirement is carried over from the previous permit. Methanol is considered a toxic air pollutant that may be subject to 9 VAC 5-60-300, et. seq. This requirement was placed in the permit because the processes at the facility have not been evaluated for processing methanol products. MXI has taken measures to monitor for the presence of methanol in the distillate process water so that emissions may be estimated, and emissions estimates have shown exempt quantities of methanol have been present. If MXI desires to process materials containing methanol or other pollutants that have not already been evaluated, the company should request this change in the permit through a permit amendment or modification application.

In consideration of all comments received during the public comment period, DEQ proposes issuance of the draft permit, and recommends no changes to conditions, terms, or requirements.