Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Bay Area 2010 Clean Air Plan
Stationary Source Control Measure SSM-9

BAAQMD Regulation 9, Rule 13:

NITROGEN OXIDES, PARTICULATE MATTER, AND TOXIC AIR CONTAMINANTS FROM PORTLAND CEMENT MANUFACTURING

Staff Report

July 2012

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ACKNOWLEDGEMENTS

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1.0 Executive Summary

The Bay Area Air Quality Management District ("BAAQMD" or "District") is proposing adoption of Regulation 9, Rule 13: *Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing* ("Regulation 9-13" or "the rule"). This source category was identified for potential emissions reductions of nitrogen oxides (NOx) and particulate matter (PM) in the Bay Area 2010 Clean Air Plan, Stationary Source Control Measure SSM-9. The proposed rule sets emissions standards for NOx, PM, and toxic air contaminants (TACs). The rule also proposes modifications to the emissions stack of the kiln based on analysis of health risk effects to the surrounding community, and would impose fugitive dust control and mitigation measures at the facility to further reduce particulate emissions.

Portland cement manufacturing is a multi-billion dollar industry in the United States, with annual domestic consumption of over 500 pounds per person. One hundred plants across the country produce 85 to 90 percent of this total with imports accounting for the remaining portion. In August of 2010, the United States Environmental Protection Agency (EPA) issued final amendments to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for the Portland Cement Manufacturing Industry. The revised NESHAP significantly reduces emissions of TACs from new and existing Portland cement kilns, but it has been challenged in Federal Court, and the effective date of the emissions standards may be delayed or the standards reduced in stringency, pending the final version to be issued in December of this year. In order to ensure that emissions of TACs from the manufacture of Portland cement are significantly reduced in the Bay Area, the 2013 effective date of the 2010 amended NESHAP has been retained in the proposed Regulation 9-13.

The Lehigh Southwest Cement Plant (Lehigh) located in unincorporated Santa Clara County, west of Cupertino is the only Portland cement manufacturing facility located in the District. One of the few cement plants in the country located in an urbanized area, it has been in operation since 1939, and has undergone many changes as the surrounding community has developed around it. The cement kiln at Lehigh currently represents the largest single source of NOx emissions in the District without modern add-on controls, emitting an average of 1700 tons of NOx per year. Emissions of TACs and PM, along with others from the plant have generated significant concern from the surrounding community. The most recent renewal of the Title V permit for the facility included a public hearing and two separate public comment periods from which the District received oral comments from 30 individuals and 75 written comments from individuals and organizations.

Adoption of the proposed rule would reduce emissions of NOx, PM, and TACs, and ensure environmental health protections for the surrounding community. The costs associated with the controls and other equipment modifications necessary to meet the standards and other provisions of the rule are not insignificant, but analysis shows the standards of the rule to be cost-effective and feasible considering their synthesis with impending federal standards. An independent analysis found the proposed rule to pose no adverse environmental impacts and a California Environmental Quality Act (CEQA) Negative Declaration is proposed.

2.0 Background

Portland cement is combined with water, gravel, sand, or other aggregate to form concrete, which is used in road building and a variety of other construction projects. Portland cement manufacture is a $10 billion per year industry in the United States. In 2008, Americans consumed 104 million tons of cement nationally, or 675 pounds per person for the year. Between 85% and 90% of that is produced in the United States with the rest imported primarily from China, Canada, Colombia, Mexico and Korea.

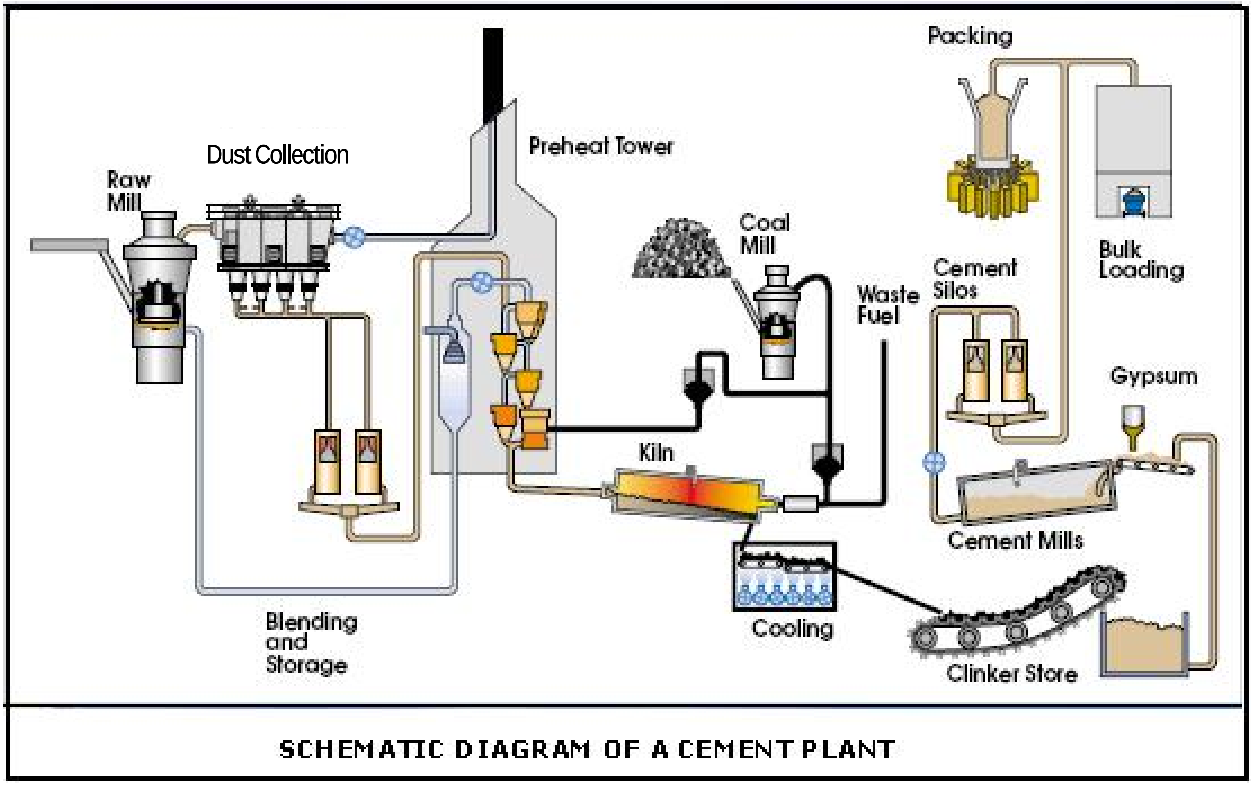
There are 108 Portland cement manufacturing plants operating in 36 states, with 11 in California, three in Northern California, and one in the Bay Area. Lehigh Southwest Cement Plant (Lehigh), located in unincorporated Santa Clara County, west of Cupertino, is the only cement manufacturing facility in the District. Consistent with national trends, Lehigh has reduced production annually since 2006. Their BAAQMD permit limits their production of clinker (a preliminary stage of cement) to 1.6 million tons per year, but in 2010 Lehigh produced 847 thousand tons of clinker, a little over half the permitted amount.

Portland cement manufacturing is the third largest industrial source of emissions of NOx and sulfur dioxide (SO_2) in the nation at 180 thousand tons per year. Lehigh is the Bay Area's largest source of NOx emissions without modern NOx controls such as ultra-low NOx burners or add-on controls such as catalytic reduction. This facility emitted 1,798 tons of NOx and 181 tons of SO_2 in 2008. The plant has been in operation since 1939, and is subject to a variety of District, State, and federal air quality rules and regulations. District staff has evaluated more stringent standards for NOx, PM, and SO_2. In addition, U.S. EPA has adopted amendments to federal rules affecting this facility, initially with compliance due in September of 2013; however, in June of this year, EPA proposed revisions to some of the emissions limits, monitoring methods, and compliance dates for the rules with final approval for these revisions set for December 20, 2012. Staff has evaluated the standards and compliance deadlines of these federal rules to ascertain their application to this facility and to determine what additional technologies and/or methodologies could be employed to reduce emissions of air pollutants in a cost effective manner.

Portland Cement Kiln Overview

Portland cement is a fundamental ingredient of concrete, consisting of calcium, silicon, aluminum, and iron. These materials are combined in a number of steps requiring careful control to ensure that the final product meets specific chemical and physical specifications required for building and construction needs. Figure 1 shows a schematic diagram of Portland cement manufacturing.

Figure 1 – Schematic of Cement Manufacturing Process



Manufacturing Steps

Portland cement manufacturing is a series of steps which take place at a large industrial facility usually located adjacent to a source of raw materials. Raw materials consist of limestone, shells or chalk, clay, sand, alumina and iron ore. The bulk of these are mined at a quarry, blended, and ground to a powder. This blended material is subjected to intense heat in a kiln to cause a series of chemical reactions, transforming the powdered raw materials into something called cement clinker. Cement clinker consists of grayish-black pellets the size of marbles or golf balls, which is cooled, ground and mixed with gypsum and other additives to form powdered Portland cement.

In the initial manufacturing step, limestone is mined from a quarry near the plant. At the quarry, the material is reduced to a manageable size (from chair or desk size to softball size) by a two-stage primary crusher before stockpiling and transport to the kiln. The limestone is crushed for a third time and then pre-blended to homogenize the quality of the limestone. It is then mixed with bauxite (a source of alumina) and iron ore before being ground inside a ball mill and further blended to create the required proportions necessary for the desired end product.

In older cement manufacturing plants water is added to the raw materials to form a slurry, and grinding and mixing operations are completed in a slurry form. This aids in conveying the material, but the dry method is ultimately more energy efficient. The Lehigh facility converted from wet to dry process in 1981. In order to produce clinker the material must be heated to at least 2400 degrees Fahrenheit and this is much easier when the raw materials are dry. At modern plants, the materials are preheated before entering the kiln and at many facilities the process of making cement is begun at this stage in a process called precalcining. A preheater/precalciner tower is utilized at the Lehigh facility to heat the material to approximately 1650 degrees F, and begin the cement manufacturing process prior to the material entering the rotary kiln.

At the heart of the manufacturing process is the cement kiln. The blended mixture of raw material is fed from the preheater/precalciner into the upper end of a tilted rotating cylindrical kiln where it will reach temperatures of 2400 to 3000 degrees F. This intense heat causes the material to fuse and undergo chemical reactions to create cement clinker. The clinker is discharged from the lower end of the kiln where it is cooled and then ground into a fine powder. Some of this heat is recovered at this stage and routed to the preheater. The ground clinker is mixed with gypsum and ground one final time to make the final product.

Emissions from Portland Cement Manufacturing

The manufacturing of cement requires the movement and processing of many tons of material as well as the combustion of large amounts of fuel in order to heat that material to extremely high temperatures. Emissions of pollutants are directly attributable to both the fuel combustion and materials processing. The formation of NOx during the manufacture of cement is due to the high temperature, oxidizing atmosphere necessary for clinker formation. Emissions of TACs arise from the presence of these compounds predominantly in the raw materials and to a lesser extent the fuel to fire the kiln. Predominant TACs emitted include mercury, hydrochloric acid (HCl), benzene, dioxins and furans, and dependent on the raw materials used, metals such as lead and hexavalent chrome. Particulate emissions arise from crushing, mixing and storage of raw materials, clinker production and cooling, finish grinding, packaging, and from vehicle traffic.

NOx is linked with a number of adverse effects on the respiratory system. It is a major precursor to the formation of ground level ozone and also a precursor to secondary fine particulate formation. Ozone can worsen the effects of bronchitis, emphysema, and asthma, and is the primary component of photochemical smog. Exposure to fine particulate matter is by far the leading public health risk in the Bay Area, accounting for more than 90% of premature mortality related to air pollution. Coarse particulate can exacerbate respiratory ailments in addition to nuisance complaints.

For the most part, emissions of metallic TACs are limited at Lehigh due to low levels in raw materials and fuel used at the plant, combined with the high level of control from fabric filtration systems in use at the plant. Mercury emissions are more significant than other metallic TACs due to relatively high mercury levels in the limestone quarried at the facility and because the metal is volatilized by the high temperatures of the kiln. Mercury can damage the central nervous system, kidneys, and liver. Short-term or acute exposure can cause skin rashes, diarrhea and respiratory distress. Chronic exposure can cause muscle tremors, irritability, personality changes, and nerve damage ranging from loss of sensitivity in hands and feet to difficulty in walking, slurred speech, and in severe cases paralysis and death. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methyl mercury has caused kidney tumors in male mice.

Other TACs emitted from the kiln include hydrochloric acid (HCL), dioxins, furans, and benzene. HCl may cause eye, nose and respiratory tract irritation and inflammation at acute exposures and chronic exposure at lower concentrations may lead to gastritis, chronic bronchitis, and skin problems. Exposure to dioxins and furans can cause skin disorders, liver problems, impairment of the immune system and effects on the developing nervous system. Long term exposure to benzene causes harmful effects on bone marrow, a decrease in red blood cells, and can impair reproductive organ function in some women. Dioxin, furans, and benzene are all recognized to cause carcinogenic effects from long term exposure.

Federal Regulations

Two federal rules address air emissions from the manufacture of Portland cement: New Source Performance Standards (NSPS) and National Emission Standard for Hazardous Air Pollutants (NESHAP). EPA generally promulgates NSPS for specific industrial operations to address emissions of criteria pollutants from new, modified, and reconstructed sources. NESHAP addresses emissions of TACs (also known as hazardous air pollutants) from both new and existing sources, and may have separate standards for each case.

The NSPS for Portland cement manufacture was originally promulgated in 1971, and has been amended many times. Clean Air Act amendments of 1977 require a quadrennial review of all NSPS and, if deemed appropriate, EPA revises the standard. The most recent amendments to the NSPS were proposed in June of 2008 and finalized in August of 2010. The previous standard remains in effect for all sources constructed after 1971. For facilities constructed, modified or reconstructed after June 6, 2008, emissions standards have been made more stringent, and the monitoring methodology has been modified. EPA is requiring continuous emission monitoring systems (CEMS) for each of the three pollutants covered under the NSPS (PM, NOx, and SO_2). Because the Lehigh facility has not been modified or reconstructed after June 6, 2008, it is not subject to the new emissions standard (modifications to the kiln in 1981 make them subject to the 1979 standard).

EPA initially issued the NESHAP for Portland cement manufacture in 1999 to limit emissions of PM as a surrogate for certain toxic metals contained in cement kiln and clinker cooler PM, to limit dioxin/furan emissions, and to set a hydrocarbon limit for new kilns. Several organizations filed petitions for judicial review of that rule. In 2000, the US Court of Appeals remanded parts of the 1999 standard and instructed EPA to consider standards for hydrochloric acid (HCL), mercury, total hydrocarbons, and metallic hazardous air pollutants. In December of 2006, EPA issued final amendments to the NESHAP to set limits for mercury and total hydrocarbons for kilns built after December 2, 2005 and to require that existing kilns meet “work practice” standards to reduce emissions of mercury and hydrocarbons. In a separate December 2006 action, EPA announced that it would reconsider the emission limits for mercury and total hydrocarbons for new cement kilns. Prior to that action, EPA had been sued by the cement industry, environmental groups, and state environmental agencies on the final amendments, and also received petitions to reconsider the existing source standards for mercury, hydrocarbons, and the decision not to regulate HCl. On April 21, 2009 EPA proposed to amend the NESHAP to reduce emissions of mercury, total hydrocarbons, HCl, and PM from both new and existing cement kilns.

On August 6, 2010, EPA issued final amendments to both rules. These were then appealed directly to EPA, and further challenged in Federal Court. On June 22, 2012, as part of a settlement agreement, EPA revised its proposed emissions limits for PM and Organic HAPs, and made changes to monitoring requirements and extended the compliance date to September 10, 2015. The revised NESHAP significantly reduces hazardous (toxic) emissions from new and existing Portland cement kilns, and the NSPS further limits criteria pollutant emissions from new and modified operations. Table 1 illustrates the standards in the federal NSPS for NOx, SO_2, and PM; and Table 2 shows the NESHAP limits.

Table 1 – 2012 New Source Performance Standards	
Pollutant	Emission Limit
Oxides of Nitrogen (NOx)	1.5 lb/ton of clinker, averaged over 30 days
Sulfur Dioxide (SO_2)	0.4 lb/ton of clinker, averaged over 30 days
Particulate Matter (PM)*	0.02 lb/ton of clinker, averaged over 30 days

Table 2 – 2012 National Emission Standards for Hazardous Air Pollutants		
Pollutant	Existing Facilities	New and Modified Facilities
Mercury	55 lbs/million tons of clinker, averaged over 30 days	21 lbs/million tons of clinker, averaged over 30 days
Dioxins/Furans*	0.2 nanograms/dry standard cubic meter (ng/dscm)(TEQ), averaged over 24 hours	0.2 ng/dscm (TEQ)*, averaged over 24 hours
Total Hydrocarbons	24 parts per million by volume (ppmv), averaged over 30 days	24 ppmv, averaged over 30 days
Total Organic HAP*	12 parts per million by volume (ppmv), averaged over 30 days	12 ppmv, averaged over 30 days
Particulate Matter (PM)*	0.07 lb/ton of clinker, averaged over 30 days	0.02 lb/ton of clinker, averaged over 30 days
Hydrochloric Acid (HCL)	3 ppmv, averaged over 30 days	3 ppmv, averaged over 30 days

**NOTES: The PM standards were raised from 0.01, and 0.04 to 0.02, and 0.07 in the June 2012 proposed revision. The Total Organic HAP standard was raised from 9 to 12 in the June 2012 proposed revision. The Total Organic HAP standard is an alternative to the Total Hydrocarbon Standard. The Dioxin/Furan standard is unchanged from the previous NESHAP standard. Toxic Equivalent (TEQ) weighs the toxicity of less toxic compounds as fractions of the most toxic compound of the group.*

The amended NESHAP will reduce emissions of mercury, total hydrocarbons, HCl, and PM from both new and existing kilns. EPA estimates that by that date the NESHAP will result in national emissions reductions from cement kilns of 92% for mercury, 83% for total hydrocarbons, and 97% for HCl. The federal regulation would reduce emissions at the Lehigh facility by approximately the following amounts: 93% for mercury; 91% for total hydrocarbons;

and 70% for HCl. The Lehigh facility is not "new or modified" and so only the amended NESHAP limits would apply and not the amended NSPS limits.

Legislation has been passed by the US House of Representatives and been introduced in the Senate to stay or rescind these federal regulations. As stated previously, the NESHAP was challenged in Federal Court, and a settlement agreement was reached in April of this year between EPA and the Portland Cement Association and several cement manufacturers. The agreement stayed the litigation and stipulated that EPA publish a notice of proposed rulemaking that addresses the concerns raised regarding the standards and will either propose a two year delay, or leave the NESHAP unchanged and solicit comments on potentially extending the compliance deadline to 2015.

On June 22, 2012, EPA proposed revisions to the emissions standards for PM and Organic HAPs, the methods of determining compliance for PM, and the compliance date. The PM standards were changed from 0.01 pounds per ton of clinker for new kilns, and 0.04 pounds per ton of clinker for existing kilns, to 0.02 pounds per ton of clinker, and 0.07 pounds per ton of clinker. In addition, these limits are no longer averaged over 30 days, but rather over three source test runs, since the revised rules do not rely on a PM CEMS. The standard for Organic HAPs was raised from 9 ppmv to 12 ppmv, but the averaging period remains the same. The date of Compliance was changed from September 9, 2013 to September 10, 2015, to allow facilities more time to install emissions controls in order to comply with the rule requirements.

California Regulations

All cement kilns operating in California are subject to permitting by the local air district. Major sources of air pollution like the Lehigh facility are required to obtain Title V operating permits which incorporate the applicable NESHAP, NSPS and District regulations. There are currently no State rules that specifically regulate cement manufacture, other than greenhouse gas emissions reporting requirements and those rules governing the use of scrap tires as fuel. Several air districts (Antelope Valley, Amador, Kern, Mojave, and Monterey Bay Unified) with cement kilns operating within their jurisdiction have adopted regulations to address emissions of NOx and/or PM from these sources. South Coast Air Quality Management District has adopted several cement manufacturing regulations addressing emissions of NOx, PM, and CO, as well as hexavalent chromium and fugitive dust. At least two of these regulations were adopted to address specific conditions at individual cement manufacturing facilities.

Applicable BAAQMD Regulations

While there is currently no BAAQMD rule which specifically addresses cement manufacturing operations, these operations are subject to a number of District regulations that govern permitting (e.g., Regulation 2-1, 2-2), emissions of toxic or hazardous compounds (Reg. 2-5), and some general or miscellaneous regulations for individual pollutants (Reg. 6-1 for PM, Reg. 8-2 for Volatile Organic Compounds (VOCs), Reg. 9-1 for SO_2, and Reg. 11-1 for lead). Requirements of these rules are incorporated into the Title V permit for Lehigh along with the applicable federal requirements of the NESHAP and NSPS.

3.0 Technical Review

Controlling Emissions from Cement Manufacturing

The manufacturing of cement requires the movement and processing of many tons of material as well as the combustion of large amounts of fuel in order to heat that material to extremely high temperatures. Emissions of pollutants are directly attributable to both the fuel combustion and materials processing. Any improvements to the efficiency of the material handling processes as well as the delivery of heat can result in a reduction in emissions to the atmosphere. Over many years of operation Lehigh has implemented efficiency related modifications to their process as the state-of-the-art of cement manufacturing has developed. The facility has switched from a wet to a dry process, introduced heat recovery methods, and installed a precalcining tower. The driving force behind these modifications has been financial, but the improved efficiency has also reduced emissions. There do not appear to be any obvious additional modifications of this type that might be undertaken at this time. Add-on emissions control or improvements to existing emissions control devices hold far greater potential to reduce emissions in a cost effective manner.

NOx Emissions Control

The formation of NOx during the manufacture of cement is due to the high temperature, oxidizing atmosphere necessary for clinker formation. NOx is primarily formed by two mechanisms: the oxidation of molecular nitrogen in the combustion air or "thermal NOx"; and the oxidation of nitrogen compounds in the fuel or "fuel NOx". Although the contribution of fuel NOx cannot be discounted, in the high temperature zone of cement kilns, thermal NOx is the dominant contributor to NOx formation. Additionally, some NOx may be formed by oxidation of nitrogen compounds from the raw materials or "feed NOx", and a small amount of NOx is formed instantaneously at the flame surface or "prompt NOx." The predominant nitrogen species in cement kiln exhaust gas is NO, at typically up to 90-95%, with NO_2 accounting for the remainder.

A number of post-combustion or add-on control techniques have proven successful at removing NOx in exhaust streams from a variety of industrial combustion sources. These include scrubbing technology utilizing various chemical additives, oxidation technology utilizing hydrogen peroxide, and selective reduction technology utilizing ammonia or urea injection either with or without a catalyst present. The applicability of these add-on NOx controls to the exhaust from cement kilns is somewhat limited by high temperature, high flow rate, and high level of particulate in the exhaust. The cost, availability, and handling requirements of the chemical additives can further restrict their usefulness in this application. The two post-combustion techniques that present the greatest likelihood of successful NOx reduction from cement kiln exhaust are selective non-catalytic reduction (SNCR) and selective catalytic reduction (SCR). Both SNCR and SCR utilize a nitrogen based reducing agent (usually ammonia or urea) to convert NOx into molecular nitrogen (N_2) and water vapor (H_2O).

Use of either SNCR or SCR would require substantial equipment upgrades as well as operational modifications to any cement manufacturing plant. Operational plans and equipment are required for the delivery, storage, and mixing of the ammonia-based reagent. The complexity of this depends on the form of the reagent used. The performance of these systems is highly dependent on temperature, residence time, and concentration of the applied reagent. Control systems to monitor these variables as well as CEMS for NOx and ammonia are required to determine the optimum conditions to maximize NOx control and minimize emissions of unreacted ammonia. Emissions to the atmosphere of unreacted ammonia resulting from the use of SNCR and SCR are referred to as "ammonia slip" and can result in odor concerns, stack plume visibility problems and secondary PM formation. Additional issues associated with poorly managed SNCR systems at cement plants include the potential for increased emissions of carbon monoxide (CO), and N_2O (more likely when using urea as a reagent).

SNCR has proven an effective means of NOx control at a number of cement kilns across Europe, Japan, and the United States. The first trial use of this technology in cement manufacturing occurred in Europe in 1979, with further trials carried out at cement plants in Europe and Japan throughout the 1980s. As of 2007, over 60 cement plants across Europe utilized SNCR for the control of NOx emissions achieving control efficiencies in excess of 50%. Higher NOx reduction efficiencies are possible when SNCR is paired with staged combustion or some other combustion modification. In the United States, the application of SNCR to cement kilns is more recent and initially only proved successful on preheater/precalciner kilns. However, there are currently several cement plants across the country utilizing SNCR including wet kilns, long kilns and those using waste derived fuels. Reported NOx control efficiencies for the US applications run from 12% to 65%. Higher efficiencies are generally associated with higher concentrations of ammonia added to the flue gas, and this often results in greater ammonia slip (emissions of unreacted ammonia).

SCR has proven an effective means of NOx control for a variety of combustion sources, from gas turbines at power plants to industrial boilers to diesel locomotives and even automobiles. The application of this technology to cement kilns is much more limited. Primarily, this is due to the high levels of dust in cement kiln gas at the temperature favorable for SCR use. In determining emissions levels for the NSPS, EPA considered lower NOx levels based on performance of SCR, but determined that SCR was not "sufficiently demonstrated technology for this industry."

PM Emissions Control

Particulate emissions arise from a variety of activities at cement manufacturing facilities, some of which are amenable to collection and control by add-on systems and some of which are fugitive in nature (i.e., not emitted from a stack) but which may be nevertheless reduced by mitigation methods. Dust sources amenable to collection and control include crushing, mixing and storage of raw materials, clinker production and cooling, finish grinding, and packaging. Of these sources, the largest single point of emissions are the stack emissions from the kiln including the feed system, fuel firing, and clinker cooling and handling systems. Fugitive emission come from quarrying and primary crushing of raw materials, storage and handling of raw materials, fuel, clinker, and finished product, and from vehicle traffic.

Fugitive dust emissions are best controlled by efficient site design and lay-out as well as proper maintenance and operation of equipment to reduce spillage and air leakage from collection systems. These can be addressed appropriately in a dust mitigation plan and operation and maintenance plan. Fugitive dust control and mitigation measures may include open pile wind protection, use of water spray or chemical dust suppressors, paving, road wetting, and housekeeping requirements, and humidification of stockpiles. Additional measures may include enclosing or encapsulating dusty operations such as grinding, screening and mixing, covering conveyors and elevators, vacuum systems to prevent formation of diffuse dust from spillage during maintenance operations, and flexible filling pipes for dispatch and loading processes. Particularly dusty operations may require ventilation and collection by a control device similar to that for stack emissions.

Various systems have been employed in the cement industry to control point source or stack emissions in the past, but the predominant means of add-on particulate control currently in use are either fabric filtration (bag houses), electrostatic precipitation (ESP) or a combination of the two (hybrid filters). Hybrid filters are often ESP systems that have been modified to include a bag house in order to extend the useful life of the control device. In some cases a cyclonic separator may be used to remove larger particulate matter upstream of these fine particulate control devices.

Fabric filters are very efficient at dust collection, with the basic principle of a fabric membrane that allows the gas to pass but retains particulate. The most common large scale systems use hanging bags arranged geometrically across the top of a box or chamber, hence the name "bag house." Dust is deposited both on the surface and within the fabric, and in time the dust itself becomes the dominant filtering medium. Periodic cleaning of the fabric membrane is required as dust builds up and resistance to gas flow increases. The most common cleaning methods are compressed air pulsing, reverse airflow, mechanical shaking or vibration. Usually baghouses have multiple chambers that can be isolated in case of bag failure, and to maintain efficiency during the cleaning cycle. Filter bags are available in a variety of woven and nonwoven fabrics with some synthetic fabrics that can operate effectively at temperatures above 500^{o}F. Monitoring systems such as bag leak detectors can ensure continuous efficient operation of the control equipment and often detect failures in advance of emissions excesses.

TACs Emissions Control

The TACs addressed in the proposed regulation as well as the federal NESHAP come in a variety of forms, so that control thereof is equally varied. The addition of adsorptive materials to the production process can be utilized to adsorb organic compounds, ammonia and ammonium compounds, HCl and mercury. The removal of toxic compounds that are emitted in solid form such as lead, beryllium and chrome is also increased slightly by the use of activated carbon. Acidic compounds can be removed through use of scrubbers which either spray caustic liquid into the kiln itself or into a separate reaction chamber downstream of the kiln. Alternatively, dry lime can be utilized in place of the caustic solution. Dioxins and furans are controlled by activated carbon or through operational controls such as maintaining a lower inlet temperature to the baghouse or other particulate abatement device.

Adsorption addition refers to adding lime or activated carbon to the cement manufacturing process in either a wet or dry form when raw materials are mixed prior to entering the kiln, or directly incorporated into the clinker formation process. The lime may be calcium oxide (CaO) or any of the various chemical and physical forms of quicklime, hydrated lime, or hydraulic lime. Dry scrubbing is another term for the addition of dry CaO and this has already been implemented to a degree at Lehigh. Two raw mills are situated immediately prior to final mixing of the raw materials and test results show a decrease in emissions when these are operating due to the increased addition of pulverized limestone into the flue gas. A suspension of hydrated lime in water may be sprayed into the cement kiln flue gas to reduce emissions and is called lime slurry injection (LSI). Lehigh obtained a permit from the District in 2010 to add LSI to their process (injection point at the last stage of the preheater/precalciner) and the system has been installed and used on a trial testing basis. The facility is awaiting county approval before beginning full scale operation.

Organic compounds, ammonia and ammonium compounds, HCl, mercury, SO_2, and to a lesser extent, residual dust can be removed by adsorption by activated carbon. As stated above, activated carbon can be injected into the cement manufacturing process (ACI), or alternatively the kiln gases can be routed to packed beds or filters. In both cases, the saturated carbon is then added to the fuel mix in the kiln. Lehigh applied for a permit from the District to install ACI primarily to reduce emissions of mercury. The installation was completed and ACI was fully operational beginning in May 2011.

4.0 Regulatory Proposal

Requirements

The District is considering adoption of Regulation 9, Rule 13 to achieve the maximum feasible, cost effective emissions reductions of NOx and PM in concert with efforts to bring the Lehigh facility into compliance with limits for TACs consistent with the federal NESHAP. As an existing facility, Lehigh is not subject to the criteria pollutant emissions standards of the amended NSPS. Significant modifications will be required to reduce TAC emissions, including additional controls such as LSI and ACI, as well as enhanced monitoring requirements. The emission limits proposed in Regulation 9, Rule 13 represent the maximum feasible NOx and PM controls as applied to an existing unmodified source. The equipment modifications necessary to meet the proposed NOx emission limit may result in some excess ammonia emissions. Ammonia is a TAC and a precursor to secondary particulate matter formation; for this reason an ammonia emission limit is included in the proposed rule. Additional requirements of the proposed rule address concerns over the present configuration of the emission point from the kiln, and the need for enforceable fugitive dust control and mitigation measures. The proposed effective date of September 9, 2013 corresponds with that of the 2010 amended NESHAP and NSPS.

Criteria Pollutant Emissions Limits

Pursuant to the authority granted by Health & Safety Code Section 40001 to adopt rules to achieve state and federal ambient air standards, the District proposes the following emission limits for Portland cement manufacturing kilns:

- 2.3 pounds NOx per ton of clinker produced averaged over 30 days
- 0.04 pounds PM per ton of clinker produced averaged over 3 source test runs
- 10 ppmv ammonia above baseline, dry at 7% oxygen averaged over 24 hours.

Where possible, limits and averaging times are expressed so as to maintain consistency with federal standards and represent the most stringent limits that Lehigh can achieve for these pollutants in a cost-effective manner. Staff has evaluated the controls required by the federal standards and has proposed these standards based on reasonably achievable emission rates for this facility. These emission limits will require the use of a continuous emission monitoring system (CEMS) or parametric monitors, as well as a means of monitoring and recording the production rates. CEMS, parametric monitors, and production monitoring requirements are detailed in the monitoring and records section of the rule. There is currently no commercially available CEMS for PM, and since the compliance date for the Federal rules has be delayed until 2015, there is no longer a reasonable expectation that this parametric monitoring equipment will become available by September 9, 2013. District staff has proposed a standard that relies on source testing to determine compliance for PM. In order to ensure the operational integrity of the PM control equipment, the rule specifies parametric monitoring that may take the form of PM CEMS when they become available, or bag leak detection systems in the interim. Lehigh has already installed a parametric monitor to measure ammonia and is currently calibrating and testing this equipment for quality assurance of the measurements. All CEMS and parametric monitors are required to comply with the provisions of the District Manual of Procedures, federal requirements, and to maintain records as provided in District Regulation 1. An initial demonstration of compliance with these emission limits must be performed within 90 operating days of the effective date of the rule and repeated annually thereafter.

TAC Emissions Limits

Pursuant to the authority granted by Health & Safety Code Section 39659 to regulate TACs, the following emission limits are proposed:

- 0.2 nanograms Dioxins/Furans (TEQ) per standard cubic meter, dry at 7% oxygen averaged over 24 hours

- 55 pounds Mercury per million tons of clinker produced averaged over 30 days

- 3 ppmv HCl, dry at 7% oxygen averaged over 30 days

- 24 ppmv Total Hydrocarbons (THC), dry at 7% oxygen averaged over 30 days, or alternatively, 12 ppmv Total Organic HAP, dry at 7% oxygen averaged over 30 days.

The proposed emissions limits are consistent with the revised 2012 NESHAP standards but with compliance deadlines consistent with that of the previous 2010 NESHAP, September 9, 2013. These proposed standards will provide protection to nearby communities should the federal rules be further delayed or overturned either through legislative efforts or pending litigation. Lehigh has already installed control equipment (LSI and ACI) and monitoring equipment (CEMS and parametric monitors) in order to meet the compliance date of the federal rules.

Opacity Standard and Dust Control

District staff proposes an opacity limit of 10 percent opacity lasting for no more than three minutes in any one hour period from any emission point or miscellaneous operation. Compliance with this standard will be facilitated through the following dust mitigation control measures:

- Mitigation measures to minimize fugitive dust emissions from disturbed soil, open areas and unpaved roads

- Surface stabilization methods for material storage piles and dust suppression methods for material transfer processes, material handling equipment, housekeeping, and material cleanup

- Track-out prevention and control provisions to minimize dust emissions from paved roads

- Vehicle traffic speed limits

- Provisions to minimize emissions from material transfer and blasting at rock quarries

- Personnel training procedures.

These fugitive dust mitigation measures were derived from the Fugitive Dust Control Plan (FDCP) that Lehigh developed in cooperation with the District, as part of Lehigh's recent Title V permit renewal. To provide clarity and improve enforceability, additional definitions and test methods were derived from the California Air Resources Board Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations.

Emission Point Requirements

District staff has proposed that emissions from the kiln be monitored continuously, and enter the atmosphere from a point, or points, that have been demonstrated to not cause an unacceptable health risk to the community surrounding the facility. Lehigh anticipates making several modifications to the facility necessary for compliance with NESHAP provisions. The proposed regulation will require anyone operating a Portland cement manufacturing facility to demonstrate that emissions from the kiln, when combined with other facility emissions and operating at maximum permitted throughput, will not trigger the notification requirements of the Air Toxics "Hot Spots" Information and Assessment Act as codified in California Health and Safety Code Section 44300 et.al.

As part of the Air Toxics Hot Spots (ATHS) program, the District required Lehigh to prepare a comprehensive Health Risk Assessment (HRA) based on recently updated California Office of Environmental Health Hazard Assessment (OEHHA) guidelines. After District staff noted several discrepancies and/or errors and requested revisions to the HRA submitted by Lehigh in September 2010, a revised HRA was submitted in March 2011. The HRA included several emissions scenarios covering operation before and after implementation of the sorbent (lime and activated carbon) injection systems, as well as a projected future 2013 scenario considering additional risk reduction measures necessary to comply with NESHAP requirements (e.g. a modified kiln dust collector with higher single exhaust stack, and more stringent emissions standards for toxic air contaminants) and based on maximum permitted capacity (1.6 million tons of clinker). The HRA indicated that health risk levels associated with operation of the facility are below the significance thresholds which would trigger public notification under provisions of the ATHS program. District staff found the HRA to be completed in accordance with ATHS program guidelines and OEHHA staff reviewed the HRA document and provided comments, but did not note any significant issues.

After initially proposing a single 300 foot stack for their kiln, Lehigh has requested greater flexibility to accommodate other potential stack locations, configurations, and number of emissions points. Structural constraints, dynamic back pressure on the plume, as well as aesthetics and compliance with local building codes place constraints on the actual height of the stack. The number of emissions points is constrained by the continuous monitoring requirement on all emission points, due to the costs associated with installing and operating monitoring equipment. The proposed regulation is written to accommodate these alternatives while ensuring that the reductions in health risk to the surrounding community is maintained.

Sulfur Dioxide

On June 2, 2010, EPA established a new one-hour SO_2 ambient air quality standard which became effective on August 23, 2010. The new national standard, 0.075 ppmv, is considerably more stringent than the existing California ambient air quality standard, 0.25 ppmv. District staff is examining whether existing sources of SO_2, including Lehigh, have emissions sufficient to result in SO_2 concentrations above the new ambient standard. Based on preliminary dispersion modeling according to EPA specified methodology, Lehigh's SO_2 emissions may result in modeled concentrations above the standard; however, monitoring data for several other facilities indicate that modeling may significantly over-estimate ambient concentrations. This is likely due to the complex terrain surrounding the Lehigh facility, which is not adequately accommodated by the AERMOD model. In such instances, the model greatly over-predicts the likely downwind concentration (between 5 and 10 times the monitored data for complex terrain versus twice the monitored data for flat terrain). District staff is evaluating the potential of other models to more closely correlate with existing monitoring and improve the accuracy of the modeled results. Currently Lehigh is limited by permit condition to SO_2 emissions of 481 pounds per hour.

As mentioned previously, the LSI and ACI systems recently installed at Lehigh will reduce SO_2 emissions and the elevated stack will greatly reduce ground level concentrations of this pollutant. No SO_2 emissions standard is being proposed in this rule at this time; however, should future modeling or monitoring results indicate the need for SO_2 reductions from the facility, an emissions standard will be proposed that ensures that Lehigh does not cause an exceedance of the new standard. The facility is required to operate a CEMS to continuously monitor emissions of SO_2 and provide monthly summary reports as part of its Title V permit. District staff will utilize this data in determining any future SO_2 emissions standard.

5.0 Emissions Reductions

Emissions to the atmosphere from the manufacture of cement primarily come from combustion of fuel to heat the kiln, with additional point source particulate emissions from the kiln, grinding and mixing operations, and fugitive particulate emissions from transport of materials. Choice of fuel can impact combustion emissions, whether it is natural gas, coal, petroleum coke, or tires. Currently no cement kiln in the US is fired by natural gas due to substantially higher cost and availability concerns. For other source categories, natural gas presents a cleaner burning fuel option; however, cement kilns have dramatically higher NOx emissions when fired by natural gas as opposed to coal or petroleum coke. Lehigh currently uses 100% petroleum coke, having switched from a mixture of coal and petroleum coke in 2007. Generally, emissions of concern from cement manufacture are the criteria pollutants (NOx, PM, SO_2, and precursor organic compounds) and toxic air contaminants (TACs) from combustion. TACs include benzene, hydrochloric acid, dioxins and furans, as well as trace metals such as mercury, cadmium, arsenic, nickel, chromium, and manganese. In addition, cement kilns generate large amounts of greenhouse gases, primarily carbon dioxide (CO_2).

Emissions Inventory

Table 3 shows the average daily emissions from the cement kiln at Lehigh according to BAAQMD records for 2010. These values are determined by emission factors assigned by District permit engineers, stack testing, mass balance estimates, and the annual throughput of fuel used and clinker produced as reported by the facility. Lehigh reported that they produced 847 thousand tons of clinker in 2010, a little over half the permitted amount of 1.6 million tons per year.

Table 3 – Lehigh Southwest Cement Company Kiln Emissions (2010)

Pollutant	Average emissions in pounds per day	Average emissions in pounds per ton of clinker
Particulate Matter (PM)	32.62	1.40E-02
Precursor Organics (POC)	59.2	2.55E-02
Oxides of Nitrogen (NOx)	9,290	4.00E+00
Sulfur Dioxide (SO_2)	2,665	1.15E+00
Carbon Monoxide (CO)	5,435	2.34E+00
Benzene	16.1	6.84E-03
Hydrochloric Acid (HCL)	179	7.63E-02
Mercury	0.72	3.05E-04
Total Equivalent CO_2	4.08E+06	1.76E+03*

**NOTE: Total equivalent CO2 value calculated based on 2008 inventory scaled by the ratio of reported clinker produced for 2010 and 2008.*

Emissions Reductions

The proposed rule would limit emissions of NOx to 2.3 pounds per ton of clinker produced. This translates to a reduction in NOx emissions from the kiln of 2 tons per day or a 42% reduction over current levels. Lehigh is subject to the NESHAP emission limits and has already taken steps to meet these limits through application of the LSI and ACI systems detailed in the Technical Review section of this report. Operation of this equipment will have a side-benefit of reducing emissions of SO_2 over previous levels, although it would be difficult to estimate the exact reduction in SO_2 emissions.

Reductions in particulate matter emissions are more difficult to quantify than the NOx reductions. The Lehigh kiln currently emits at a rate only slightly above the proposed standard for PM which is consistent with the 2010 NESHAP standard for existing sources. Compliance with the fugitive dust control and mitigation provisions of the rule will also help to ensure the continued minimization of fugitive dust emissions. The proposed limit for NOx will decrease the potential for secondary particulate formation, and the proposed standard for ammonia emissions will limit potential secondary particulate formed by increased ammonia emissions resulting from NOx control.

As part of the 2010 Clean Air Plan, District staff developed a multi-pollutant evaluation method (MPEM) to evaluate the benefits of the proposed control measures contained in the plan. The MPEM can be used to calculate the reductions in PM2.5 from its precursors, NOx, SO_2, and ammonia, based on air quality modeling. The emissions reduction of NOx combined with the proposed ammonia emission standard would be equivalent to a PM2.5 emission reduction of 8.7 tons per year. This number would be slightly increased by the side-benefit reduction in SO_2 emissions mentioned previously.

Emissions from the kiln and the expected reduction resulting from the proposed rule are provided in Table 4:

Table 4 – Lehigh Kiln Emissions and Emissions Reductions from proposed Reg. 9-13

Pollutant	Average emissions in pounds per day (2010)	Average emissions reduction in pounds per day
Oxides of Nitrogen (NOx)	9,290	3,900
Particulate Matter (PM)	32.62	3.3*
Precursor Organics (POC)	59.2	54
Benzene	16.1	14.5
Hydrochloric Acid (HCL)	179	125
Mercury	0.72	0.67

**NOTE: Does not include reductions of secondary PM or fugitive dust from miscellaneous sources.*

6.0 Economic Impacts

Cost of Controls

Lehigh is undergoing major modifications at their facility to meet the federally-imposed NESHAP requirements. Regulation 9, Rule 13 is being proposed at this time to integrate controls to reduce NOx into Lehigh's planning process, as well as provide a backstop in the event that amendments to the NESHAP are delayed or rescinded. Some of the cost impacts are a result of the EPA mandates and some are the result of the District proposal. Costs attributable to federal compliance include capital and operational costs for TAC control and monitoring equipment, as well as costs for maintenance and reporting of that equipment. Costs associated with the proposed District rule include capital and operational costs for NOx control equipment, stack modifications, and possibly operation and maintenance costs for TAC control and monitoring if the NESHAP compliance deadline is delayed two years. EPA evaluated the cost impacts of the final amendments to the NESHAP and NSPS in documents issued at the same time as those final rules. The costs are nationwide estimates, based on 140 existing and 16 new kilns, and actual costs may vary at individual facilities. Lehigh has provided estimates of costs anticipated for modifications necessary to comply with both the NESHAP and the proposed District rule. Staff verified these estimates through comparison to EPA studies and other sources of information on the Portland cement industry.

In order to meet the emission limits and monitoring provisions of the NESHAP, Lehigh will need to install control equipment as well as CEMS or parametric monitors for each emission point from the kiln and clinker cooler. The baghouses at Lehigh are compartmentalized and have multiple emission points, so Lehigh representatives have told District staff they plan to manifold these to reduce the number of individual monitoring points. This will allow consolidation of monitoring equipment that would be required at each emission point, saving the cost of multiple monitors. Capital costs for modifications to the kiln mill dust collector (KMDC) and clinker cooler dust collector are $28.5 million. In addition Lehigh anticipates it will need to modify the clinker withdraw building at a cost of $1 million. Lehigh has installed a hydrated lime injection system (LSI) as well as activated carbon injection (ACI) in order to meet the NESHAP emission limits; these cost $700 thousand and $735 thousand respectively. Continuous monitoring equipment for THC, HCl, mercury, and PM are estimated to cost $1.5 million to install. Total capital expenditure for equipment necessary to comply with the federal NESHAP is then $32.4 million.

There are costs associated with the operation of this equipment including power generation, delivery and handling of the activated carbon and hydrated lime, and operation, maintenance and reporting for monitoring equipment. Some of these costs are dependent on the cement production rate at the facility. ACI operation will cost $1.10 per ton of clinker produced or $1.2 million per year based on average production over the last 10 years of operation ($1.7 million at maximum permitted capacity). LSI operation will cost slightly higher per ton of clinker at $1.26 million per year based on the same 10 year average ($1.8 million at max capacity). Operation, maintenance and reporting costs for the CEMs are estimated at $360 thousand per year. Total operating costs for compliance with the NESHAP are then $2.84 million per year.

The total annualized costs for compliance with the NESHAP is found by annualizing the capital expenditures and adding them to the yearly operating costs. The equipment costs capitalized over a 20 year period using a levelized cash flow method come to $5.52 million per year. Adding this to the annual operating cost provided in the previous paragraphs yields total annual costs due to compliance with the NESHAP of $8.36 million.

Using the EPA estimates for a similarly sized and configured kiln as exists at Lehigh, NOx control utilizing SNCR would have a capital cost of $2.3 million, and an annual operating cost of $922 thousand. Similar to the adsorbent injection systems for control of TAC's, the SNCR operational costs are dependent on cement production levels. Lehigh has provided an estimated capital cost resulting from the District proposal that is consistent with this estimate. The emissions standard for NOx contained in the NSPS is based on control using SNCR combined with a well-designed preheater/precalciner utilizing staged combustion. The estimated costs of modifying Lehigh's facility to include staged combustion in the preheater/precalciner would be $15-20 million. SCR, while well-established as a means of NOx control for other source categories was not considered by EPA as it is relatively unproven as applied to cement kilns (see the Technical Review section of this report). CEM measurement of NOx emissions is already required by District permit conditions so monitoring costs are not attributed to the proposed rule.

Lehigh has provided estimates for the cost to construct a 300 foot stack based on the updated HRA 2013 emissions scenario as well as the draft rule proposed at workshop. The final configuration of the emissions stack may change but this estimated capital cost of $2.5 million remains a reasonable estimate of the costs associated with compliance with the emissions point provisions of the proposed rule. Lehigh will have to provide an HRA demonstration of the final configuration, which may entail some costs, but the impetus for the 300 foot stack came from the updated HRA and ATHS notification provisions. Whatever the final configuration of the emissions stack, an updated HRA would be required as part of the ATHS program.

The total annualized costs for compliance with the proposed District rule may be found by annualizing the capital expenditures and adding them to the yearly operating costs. The SNCR equipment costs capitalized over a 20 year period using a levelized cash flow method come to $392 thousand per year. The cost for the modified emissions point capitalized over 20 years by the same method comes to $426 thousand per year. Adding this to the annual operating cost for the SNCR provided above yields total annual costs due to compliance with the proposed rule of $1.74 million.

Costs for implementation of the Fugitive Dust Control Measures are considered to be minimal. These provisions are already in place as a condition of Lehigh's Title V permit. The inclusion of these measures as requirements of the proposed rule is meant to codify the FDCP and improve enforceability of the provisions contained therein.

Cost Effectiveness

The cost effectiveness of a rule is the sum of compliance costs divided by the expected emissions reduction. This analysis will be limited to NOx, since the TAC emissions reductions comprise several compounds of varying toxicity, and the costs are attributable to compliance with requirements of the federal NESHAP. The costs for modification of the emissions stack are included as these may largely be attributable to the proposed regulation, although, as previously mentioned, manifolding of stacks allows Lehigh to consolidate monitoring equipment that would be required at each emission point, saving the cost of multiple monitors. Total annualized costs for compliance with the rule amounts to $1.74 million. The average NOx emissions rate prior to implementation of controls was 4.0 pounds per ton of clinker produced, and the proposed emissions standard is 2.3 pounds per ton of clinker produced. Taking the difference and assuming the same 10 year average of production levels as for the cost analysis above, yields a cost effectiveness (C.E.) of:

C.E. = $1.74 million / {(4.0-2.3) * (pounds NOx/ton clinker) * (70%) * (1.6 million tons clinker)}.

Or:

C.E. = $0.91 / {pounds NOx reduced * (1 ton / 2,000 pounds)} = $1,828 per ton NOx reduced.

$1,828 per ton NOx reduced is among the most cost effective NOx rules considered by the District.

Incremental Cost Analysis

Section 40920.6 of the California Health and Safety Code requires an air district to perform an incremental cost analysis for any proposed Best Available Retrofit Control Technology rule or feasible measure. The air district must: (1) identify one or more control options achieving the emission reduction objectives for the proposed rule, (2) determine the cost effectiveness for each option, and (3) calculate the incremental cost effectiveness for each option. To determine incremental costs, the air district must "calculate the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option."

To evaluate the incremental cost effectiveness of compliance with a more stringent option, staff compared the NOx standard of the proposed rule (2.3 lbs NOx/ ton of clinker produced) with the NSPS standard (1.5 lbs NOx/ton of clinker produced). Compliance with the NSPS NOx standard would require redesign and construction of the preheater/precalciner. These costs were provided in the preceding Cost of Controls section ($15-20 million). The annualized capital costs using the same 20 year levelized cash flow method would come to $3.4 million (using the high estimate for reconstruction). Using this increment of increased compliance costs for the rule and inserting the difference between the proposed standard and that of the NSPS into the cost effectiveness equation above yields and incremental cost effectiveness (I.C.E) of:

I.C.E. = \$3.4 million / {(2.3-1.5) * (pounds NOx/ton clinker) * (70%) * (1.6 million tons clinker)}.

Or:

I.C.E. = \$3.8 / {pounds NOx reduced * (1 ton / 2,000 pounds)} = \$7,573 per ton NOx reduced.

Meeting the more stringent NSPS emissions level would come at a cost of more than four times the cost of meeting the proposed standard in terms of dollars per ton of additional NOx reduced.

The proposed rule appears to be extremely cost effective, as District rules to reduce NOx typically range between 7 to 20 thousand dollars per ton of NOx reduced; however, the socioeconomic analysis shows that the cost of District and NESHAP controls is a significant economic impact.

Socioeconomic Analysis

Section 40728.5 of the California Health and Safety Code requires an air district to assess the socioeconomic impacts of the adoption, amendment or repeal of a rule if the rule is one that "will significantly affect air quality or emissions limitations." BAE Urban Economics of Emeryville, California has prepared a socioeconomic analysis of the proposed rule and it is attached to this report as Appendix A.* The analysis concludes that the proposed regulation would have a significant economic impact to the affected industry. BAE Urban Economics found an average profit margin for the Portland cement manufacturing sector of 6.5% of total revenue. The annual profit for Lehigh was estimated to be \$6.6 million. Compliance with the rule would result in an 18% reduction in established profit, which is above the California ARB 10% threshold used to determine cost burden.

The cost burden for compliance with emissions standards in the federal rules is even higher. If the District were to impose the NSPS limit of 1.5 pounds NOx per ton of clinker, compliance would result in a 30% reduction in profit. As this is three times the ARB threshold, it is easier to see the infeasibility of such a requirement even given the seemingly low incremental cost-effectiveness of this more stringent standard. Compliance with the requirements of the NESHAP already imposes compliance costs representing 43% of Lehigh's annual profit.

The Portland cement manufacturing industry may be able to pass these compliance costs on to consumers. An industry's ability to pass through costs is more likely when a product is demand-

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** NOTE: The Socioeconomic Analysis conducted by BAE Urban Economics uses a straight line depreciation method for calculating costs. This divides total costs by time period considered. Capital costs are annualized over 20 years. For the purposes of calculating cost effectiveness and incremental cost effectiveness, staff used the levelized cash-flow method typical of District regulatory economic analyses. The levelized cash flow method incorporates an interest rate into the capital recovery factor for annualized costs, in this case 5%.*

inelastic, but in the case of this industry that ability is somewhat unknown. The United States imports about 20% of cement to meet construction needs, so the impact on one facility, or the nation's facilities in the case of the NESHAP, may not be able to be passed through to customers without increasing imports. For Lehigh to reduce the costs of compliance with the proposed District rule to the 10% threshold, the cost of cement would have to increase by 0.72% or 72 cents per ton. The NESHAP costs are 43% of Lehigh's annual profit, and to pass these costs onto consumers, the price of cement would need to increase by $3.18 per ton (3.18%). Combining the costs of compliance with the proposed rule and the NESHAP, Lehigh would need to increase the cost of cement by $4.48 per ton to completely offset the costs of both rules, and by $3.53 to reduce the cost impact to the 10% threshold.

As part of the analysis of their amendments to the NESHAP, EPA examined the economic impacts in the report, "Regulatory Impact Analysis: Amendments to the National Emissions Standards for Hazardous Air Pollutants and New Source Performance Standards (NSPS) for the Portland Cement Manufacturing Industry, Final Report" issued August 2010. EPA estimated that compliance with the NESHAP standards could raise the price of cement $4.50 to $5.00 per ton (2005 prices). They further estimated that cement imports could rise by 10% to offset reduction in domestic production and price increases.

On June 22, 2012, EPA proposed revisions to the NESHAP as a response to a settlement agreement signed by EPA and the cement manufacturing industry. Among the proposed revisions was that of the effective date from September 9, 2013 to September 10, 2015. As a result, if the federal proposal is finalized without change, the proposed District rule would result in two years costs of compliance and monitoring of the TACs addressed in the NESHAP. After which, all Portland cement facilities in the US would be subject to the same standards.

7.0 Environmental Impacts

California Environmental Quality Act

Pursuant to the California Environmental Quality Act, the District has had an initial study for the proposed rule prepared by Environmental Audit, Inc. of Placentia, California. The initial study concludes that there are no potential significant adverse environmental impacts associated with the proposed rule. A negative declaration is proposed for approval by the District Board of Directors. A copy of the negative declaration and initial study is attached to this report as Appendix B and has been made available for public comment.

Greenhouse Gas Emissions

In June, 2005, the District's Board of Directors adopted a resolution recognizing the link between global climate change and localized air pollution impacts. Climate change, or global warming, is the process whereby emissions of anthropogenic pollutants, together with other naturally-occurring gases, absorb infrared radiation in the atmosphere, leading to increases in the overall average global temperature.

While carbon dioxide (CO2) is the largest contributor to global climate change, methane, halogenated carbon compounds, nitrous oxide, and other species also contribute to climate change. Gases in the atmosphere can contribute to the greenhouse effect both directly and indirectly. Direct effects occur when the gas itself is a greenhouse gas (GHG). While there is relative agreement on how to account for these direct effects of GHG emissions, accounting for indirect effects is more problematic. Indirect effects occur when chemical transformations of the original compound produce other GHGs, when a gas influences the atmospheric lifetimes of methane, and/or when a gas affects atmospheric processes that alter the radiative balance of the earth (e.g., affect cloud formation).

Adoption of Regulation 9, Rule 13 will not result in any adverse impact on the emissions of GHGs. The regulation includes an emissions standard for total hydrocarbons that may result in a reduction of methane emissions, although consistent with the NESHAP, the rule contains an alternative standard for total Organic HAP emissions which would exclude methane emissions. Operation of the controls necessary to meet the other emissions standards may result in a minimal increase in energy demand, but is unlikely to increase emissions of GHGs from the kiln itself.

8.0 Regulatory Impacts

Section 40727.2 of the Health and Safety Code requires an air district, in adopting, amending, or repealing an air district regulation, to identify existing federal and district air pollution control requirements for the equipment or source type affected by the proposed change in air district rules. The air district must then note any difference between these existing requirements and the requirements imposed by the proposed change.

As stated in the Background section of this report, there are two federal rules which govern air emissions from the manufacture of Portland cement. The NSPS provides emissions standards for NOx, SO2, and PM from new or modified Portland cement kilns and the NESHAP provides emissions standards for TACs from all Portland cement kilns with one set of standards for existing kilns, and one for new or modified kilns. The kiln at Lehigh has not undergone sufficient modification to be deemed new or modified after the effective dates of either rule, so is subject to only the existing source emissions standards contained in the NESHAP. All of these standards for TACs are included in the District's proposed rule. The proposed rule has an effective date of September 9, 2013 which is consistent with the 2010 version of the NESHAP, but this date has been proposed to be delayed two years pending EPA's final decision due in December of 2012. In addition, the proposed federal PM standard has been raised to 0.07 pounds per ton of clinker. The District's proposed 0.04 pounds per ton of clinker standard for PM would be more stringent. The proposed rule contains a NOx standard that is less stringent than that contained in the NSPS, but since the Lehigh facility is not new or modified, this proposed standard is in effect more stringent than what is required by federal rules. Additionally, the proposed rule contains an emissions standard for ammonia, dust mitigation measures, and a HRA demonstration for emissions points. These are not addressed in the federal rules, so these elements may be considered more stringent than federal requirements.

There are currently no State rules that specifically regulate cement manufacture, other than greenhouse gas emissions cap and trade (AB 32), and those rules governing the use of scrap tires as fuel. Several air districts (Antelope Valley, Amador, Kern, Mojave, and Monterey Bay Unified) with cement kilns operating within their jurisdiction have adopted regulations to address emissions of NOx and/or PM from these sources. South Coast Air Quality Management District has adopted several cement manufacturing regulations addressing emissions of NOx, PM, CO, as well as hexavalent chromium and fugitive dust. At least two of these regulations were adopted to address specific conditions at individual cement manufacturing facilities. These regulations are different in format, and include provisions tailored to the facilities in their jurisdiction. Staff believes that the proposed rule is no less stringent than any of the regulations governing cement manufacture from other air district in California, and is more stringent in terms of actual emissions standards for NOx, and TACs.

9.0 Rule Development Process

The District has developed rule language and provided a basis for its provisions in this staff report. The proposal is based in part on proposed federal regulations and in consideration of existing regulations in other air districts in California, as well as those of other jurisdictions in the United States and Europe. Elements of the proposed rule have been tailored to meet considerations specific to the Lehigh facility. Staff has consulted with officials from Lehigh Southwest Cement Company, Portland cement industry experts, elected local government officials, concerned members of the public and environmental organizations, California Air Resources Board staff, and EPA staff during the preparation of this document.

A public workshop was held December 12th, 2011 in the City of Cupertino to provide pertinent background information and present elements of the draft rule provisions. Rule Development staff was supported by staff from Compliance & Enforcement, Communications & Outreach, and Technical Divisions, with exhibits on air monitoring and health risk assessment efforts in the local community. The workshop was attended by members of the public, Cupertino City Councilmembers, staff from Lehigh Southwest Cement Company, representatives of local environmental organizations, and the local press. Verbal comments and questions were addressed at the meeting, and the District received several written comments and continued to accept comments well after the initial comment period ending date. Written comments were provided by members of the public, Bay Area for Clean Environment, Citizens Against Pollution, QuarryNo, San Francisco Baykeeper, the Loma Prieta Chapter of the Sierra Club, West Valley Citizens Air Watch, and Lehigh Hansen, Inc., the parent company of Lehigh Southwest Cement Company, LLC. Issues raised and staff's proposed resolutions are discussed below.

Proposed Standards versus Federal Standards

Several comments requested that emissions standards in the rule be as stringent as those applied to "new or modified" sources under the NSPS and NESHAP regulations. Some proposed that Lehigh should be considered a "new or modified" facility due to facility modifications dating back decades (but after the initial promulgation of the NSPS in 1971), more recent changes in fuel use and emissions control methods installed in anticipation of the proposed NESHAP, or due to modifications of their Title V permit. Others suggested that Lehigh be subject to "new or modified" standards due to its proximity to a large, urbanized population. Additionally, some commenters requested inclusion of an SO2 emissions standard in the rule. Lehigh requested that the proposed rule mirror the EPA's final NESHAP rule, as they contended that any differences between the District and federal rules would pose a competitive disadvantage to the Lehigh Southwest Cement Company as compared with facilities operating outside of the District.

Since their initial adoption, the NSPS (1971) and NESHAP (1999) have undergone several amendments with standards generally becoming more stringent at each revision. Dates are provided with each amendment to indicate the applicable sets of standards for facilities modified or commencing operation before or after said date. The pertinent dates for the most recent amendments to the federal rules are June 16th, 2008 for the NSPS, and May 6th, 2009 for the NESHAP. In the code of federal regulations (40 C.F.R. Section 60.14(a)), "Modification" is defined as "any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies…Upon modification, an existing facility shall become an affected facility for each pollutant to which a standard applies and for which there is an increase in the emission rate to the atmosphere." The code goes on to exclude from consideration routine maintenance, repair, and replacement. Also excluded are increases in production rate or emissions increases that do not involve a capital expenditure in excess of 50% of the fixed capital costs required to construct an entirely new comparable facility. Furthermore, modifications to permit conditions that do not result in an increase in emissions do not trigger new or modified standards. Neither do modifications undertaken to bring a facility into compliance with newly adopted regulations.

The District does not have information establishing that Lehigh has undertaken any changes in operation or equipment after the effective dates that could be deemed as "modifications" per the definitions contained in the appropriate sections of the code of federal regulations. The standards contained in the proposed District regulation represent reasonably achievable cost-effective emission standards for the facility, and in fact represent more stringent standards than the applicable federal rules since as an existing facility Lehigh is not subject to the amended NSPS or NESHAP standards for "new or modified" facilities. Some commenters suggested that these federal standards have been proven to be feasible and cost effective by the EPA for all cement manufacturing facilities. However, if this were the case, the more stringent standards would be applied all kilns, including those at existing facilities, rather than only for those at "new or modified" facilities.

As stated earlier in this report, the issue of attainment of the recently revised national one-hour ambient air quality standard for SO2 is currently in flux and as yet undetermined. Should the District determine a need for SO2 reductions from the facility, staff may propose that the rule be amended to include a standard that ensures emissions from the Lehigh facility do not cause an exceedance of the new one-hour ambient air quality standard for SO2.

The District has authority under California law to adopt emission limits more stringent than those required under federal regulations; however, any emission standard adopted by the District must be evaluated for cost-effectiveness and socio-economic impact. These analyses are part of this report, and staff believes that the proposed rule balances costs with necessary emissions reductions. The proposed regulation contains emissions standards that are as stringent as or more stringent than the applicable standards contained in the federal rules.

Emissions Monitoring

Several members of the public expressed concerns over emissions monitoring equipment, methodology, and averaging methods, with some commenters requesting that emissions monitoring data be made more readily available to the public. Some suggested that emissions be posted on the internet in real time similar to that provided by weather monitoring stations (and

District ambient air measurements) and others felt that the community at large could provide a resource to analyze the raw data on the District's behalf. Some commenters questioned the use of rolling averages, the distinctions between parametric monitors and continuous emissions monitors, and whether all 32 stacks of the existing kiln dust collection system would be monitored.

The District is committed to accurate measurement of emissions from all regulated sources and to providing emissions monitoring data to the public to the extent feasible. Obtaining CEM data from an active cement kiln is far more complex than ambient monitoring, and measurements need to be verified for accuracy before they can be made available to the public. Furthermore, emissions standards are tied to the production rate, and averaged over a 30 day period, so providing emissions data at or near real time would do little to enable the public to determine compliance of the facility. Nevertheless, CEM data reported to the District is currently available for public review, through Public Records Requests by calling (415) 749-4761, or by visiting: http://www.baaqmd.gov/Divisions/Legal/Public-Records-Request.aspx. The District is working on developing increased accessibility to CEM data by posting these reports on-line for major facilities, but believes a District-wide approach to this effort to be more appropriate than one specific to a single facility. The District currently provides real time on-line access to data from its ambient air monitoring network including the station located in Monta Vista Park in Cupertino, one mile east of the Lehigh Facility (see: http://gate1.baaqmd.gov/aqmet/aq.aspx). Unlike CEM data, air monitoring data is a direct measurement of the quality of air typical of what the surrounding population breathes every day. Staff believes that this data is far more useful in making judgments about the health effects of the air in the Cupertino area.

The proposed regulation is worded to ensure consistency with federal standards where appropriate. Rolling averages are commonly used with data measured at uniform time intervals to smooth out short-term fluctuations and highlight longer-term trends or cycles. A longer averaging period allows for the standard to be a lower number as compared to a shorter compliance interval and 30-days was chosen by EPA to allow for variations in Portland cement production cycles.

District Manual of Procedures Volume V (Continuous Emission Monitoring Policy and Procedures) addresses the requirements which must be met by CEM installations for those persons subject to District Regulations. Volume V currently only addresses measurement of opacity, sulfur dioxide, nitrogen dioxide, oxygen, and carbon dioxide. For this reason, the proposed regulation differs from federal regulations in calling for "parametric monitoring" for continuous monitoring of ammonia, mercury, total hydrocarbons, and hydrochloric acid. Federal test methods and performance specifications are cited for these pollutants rather than District test methods, and in all intents, the parametric monitoring shall consist of a CEM. The CEM equipment for these latter pollutants has only recently become available, at least in their application to cement manufacture, and in the case of PM, is not yet commercially available. As the use of this equipment becomes more commonplace, the District may consider amendments to the Manual of Procedures for their inclusion in Volume V.

The proposed regulation requires emissions monitoring of each emission point from the kiln and clinker cooler. Lehigh has indicated that they will be modifying their dust control system to duct all the 32 stacks to either a single elevated stack, or possibly several stacks (though far less than 32). The multiple stacks from the clinker cooler are also expected to be combined together to eliminate the need for multiple banks of CEMS. Nevertheless, the regulation is worded so that continuous emissions monitoring is required on each emissions point regardless of the number. This presents a strong economic incentive to minimize the number of emission points due to the expense of duplicative emissions monitoring equipment.

Mercury Emissions

Of all the pollutants emitted from the kiln, mercury is of particular concern for many community members surrounding the Lehigh facility, along with local environmental organizations concerned with water quality. Comments pertaining to mercury emissions included requests for an annual cap rather than an emissions standard tied to production levels, and questions regarding the potential for increased mercury levels in nearby waterways, as well as increased mercury content in finished cement resulting from operations of the Kiln Mill Dust Collector (KMDC) recycling and ACI systems. Additionally, one commenter was concerned that increased mercury levels in finished cement could impact do-it-yourself consumers, and another commenter suggested that it could result in elevated mercury emissions from concrete recycling efforts at nearby Stevens Creek Quarry.

The health impacts from emissions of mercury from Lehigh have been addressed in a recently updated Health Risk Assessment. Lehigh's Title V air permit already contains limits on annual and hourly emissions of mercury for compliance with the Air Toxics Hot Spots Program. The emissions standards in the proposed rule are consistent with the federal NESHAP and ensure efficient operation because emissions levels are tied to the production rate. Compliance with this standard ensures that mercury emissions would be lower than the Title V cap should production be lower than the maximum permitted operating limit. Mercury contamination in San Francisco Bay and other water ways is being addressed by the California Regional Water Quality Control Board and is beyond the scope of this rule making effort.

Regarding the potential for increased mercury levels in finished concrete, EPA has authorized KMDC dust shuttle systems at several facilities as a method to reduce mercury emissions and meet pending NESHAP standards. The levels of mercury in the finished cement will be very low, and unlikely to cause a noticeable effect at concrete recycling facilities. Lehigh is responsible for complying with all relevant product warning requirements for the finished product.

Dispersion Modeling

Some commenters questioned the veracity of the updated HRA, given that the workshop report stated that for the purposes of determining compliance with the federal one-hour SO2 standard, the AERMOD model does not adequately accommodate the complex terrain surrounding the

Lehigh Facility. Others questioned the HRA in more general terms based on the emissions inventory, risk factors assigned to various compounds, and possible synergistic interactions for the various toxic compounds.

AERMOD is the most validated model that EPA has ever approved for use (17 field study validations); however, for short term concentrations, the model always over-predicts the measured concentration at a monitor. For flat terrain, this is usually within a factor of 2 and for complex terrain it can be 5 to 10 times higher than monitored values. The application of AERMOD to model 1-hour SO2 concentrations is very different from using it to assess the health impacts due to a lifetime exposure. Modeling short term impacts such as the 1-hour SO2 concentration is inherently difficult because of short term turbulent nature of the atmosphere. Comparisons to actual monitoring data are almost always better for long term averages. For an HRA, any over-prediction of actual concentrations actually serves to be health protective, since the calculated health risk is proportional to the modeled concentrations. That is why health risks are always reported as an upper bound on health impact such "no more than 1 case in a million."

The District believes that the ATHS program is a health protective risk management program. The HRA is required to be completed in accordance with OEHHA guidelines and these consider the effects of different compounds additively but not synergistically. For more information regarding the District's position on synergistic toxicity, please see the March 29, 2011 letter from Jack Broadbent to Supervisor Liz Kniss found in Appendix C at the end of this report.

Alternative Fuels

The use of natural gas to fire the cement kiln was suggested as a means of lowering emissions by some commenters, while others expressed their desire to be notified should Lehigh seek to fire the kiln by fuels other than those currently in use according to their permit. Some commenters drew comparisons to natural gas fired power plants in California that have reduced emissions as compared to coal fired power plants in the Eastern United States.

As applied to power generation, natural gas does result in more efficient burning and less greenhouse gas emissions; however it results in significantly higher NOx emissions when used to fire cement kilns. SCR is a proven technology for controlling NOx emissions from power generation, but is relatively unproven for cement manufacturing due to the dust entrained in the flue gasses. In order to adequately control the increased NOx emissions, Lehigh would need to use more ammonia in their SNCR system, and this would likely result in greater ammonia emissions which would offset any gains in reducing secondary particulate emissions. Natural gas is also generally much more expensive than either coal or petroleum coke (approximately 10 times the cost per BTU), the costs are much more variable, and delivery in the amounts necessary to fire the kiln would pose economic and logistical burdens inconsistent with any possible emissions reduction likely to be gained from its use. Should Lehigh seek to utilize a new fuel other than what is currently allowed by permit, it would require modification of their Title V operating permit, and this would entail the notification and comment provisions of that program.

Opacity Standard

Some commenters raised objections to the use of a Ringlemann smoke chart for determining opacity readings as insufficient, and others suggested utilizing a “high quality monitor” in place and use comparisons to the Ringlemann chart as an adjunct.

The opacity standard to be met by miscellaneous sources at the facility are stated in both Ringelmann number (for dark plumes) and percent opacity (for white plumes), but these are meant to indicate a set standard to be met, rather than the means of measurement. District staff is trained and certified to read opacity using the Ringelmann chart, and these readings are more appropriate for the many sources, such as mining operations, conveyor belts, and roads that do not lend themselves to in-stack monitors. All emission points from the kiln and clinker cooler are required by the proposed rule to be measured by periodic source testing. This is consistent with Federal rules that exempt kilns and clinker coolers from opacity standards since particulate matter is more accurately monitored by direct measurement. Both the kiln and clinker cooler are still subject to a 20% opacity limit as per District Regulation 6, Rule 1.

Compliance Dates and Penalties

Some commenters were concerned that the source testing provisions of the proposed rule allow for up to 30 operating days before an initial demonstration of compliance must be performed. Other commenters asked for interim deadlines for the installation of specific control equipment as a means of ensuring progress toward meeting the standards. Several others requested that the rule contain punitive measures for noncompliance along with other provisions of the proposed rule.

Compliance with the emissions standards begins on the effective date specified in the rule. This will be predominately determined by emissions monitors that measure emissions continuously. The source testing requirement is a duplicative verification of compliance. In either case, if the results show noncompliance with the standards, the violation begins on the date of effectiveness, not one month after. The standards are stated as a monthly average to be consistent with federal rules, so compliance with the standard cannot be made until 30 days have elapsed. EPA staff has indicated that this is consistent with their views regarding initial determination of compliance.

District staff believes that interim deadlines are unnecessary, and compliance with the standards on the effective date is required regardless of the means of control to meet those standards. The control equipment for toxic emissions has already been installed. Modifications to the stack, and installation of NOx control equipment has not yet begun, but Lehigh must comply with the proposed rule on the effective date or be subject to enforcement action. Noncompliance with any District rule is subject to enforcement procedures that may include punitive measures. There is no need to add provisions to the proposed rule for additional punitive measures. It is the view of District staff that adoption of this rule furthers enforcement powers.

Workshop Comment Process

Some commenters expressed concerns regarding the comment process itself with calls for an extension of the comment period deadline, and requests for point by point responses posted on-line. The timing of the workshop in early December may have contributed to these concerns, as some pointed to the holidays as a basis for requests to extend the comment period. Some commenters may have been frustrated due to the extended review period for comments related to Lehigh's Title V permit renewal.

The District has continued to accept comments well after the stated January 3, 2012 comment period deadline, and made this known to all parties requesting extensions. All comments have been considered and responses are provided in this document. Responses to Title V comments were posted on the District website February 16, 2012, along with all other documents provided to EPA for their review.

Miscellaneous Comments

The district received several comments related to issues beyond the scope of this rule making effort. Several commenters brought up the Spare the Air program; either requesting that the facility shut down on Spare the Air days or proposing that emissions from Lehigh were the cause of the increased number Spare the Air days of this last winter. Some commenters requested that truck traffic to and from the facility be included in the measures considered in the proposed rule. Additionally some requested an analysis of the use of urea versus aqueous ammonia for use in the NOx control system.

Cement manufacturing is not a process that can be run intermittently. The kiln in which reactions take place is 16 feet in diameter and 250 feet long, and it must be heated to temperatures in excess of 2,500 degrees Fahrenheit. Shutting down the kiln can take up to 24 hours, and start-up can take up to 36 hours to bring the kiln to operating temperatures. District Regulation 4, Air Pollution Episode Plans does require major facilities to prepare plans to curtail operations during advisories, alerts, warnings and emergencies as defined by the regulation; however, the air pollution concentrations at which a facility must follow its curtailment plan are much higher than those generally found in the District even on Spare the Air days.

The Spare the Air program was established by the District to educate people about air pollution and to encourage them to change their behavior to improve air quality. This voluntary outreach campaign has been operated for nearly two decades with alerts in summer when ground-level ozone or "smog" becomes a pollution problem and in winter when particulate matter concentrations are expected to be unhealthy. District meteorologists evaluate the air pollution levels and meteorological conditions in order to forecast which days may have unhealthy air quality. Winter Spare the Air alerts are generally called on cold still winter days with stagnant air. With the passage of the District's Wood Smoke rule (Regulation 6, Rule 3) in 2008, Winter Spare the Air includes a mandatory curtailment of wood burning on days forecast to exceed the 24-hour National Ambient Air Quality Standard for $PM_{2.5}$. At this time, the Spare the Air program provides a means of curtailing sources of particulate emissions that are otherwise not regulated or controlled through District permitting of prohibitory regulations.

Emissions from trucks do not fall within the category of stationary sources and are therefore outside the authority of the District. The California Air Resources Board regulates truck emissions. Truck traffic to and from the facility is beyond the scope of this regulation, but the fugitive dust control measures included in the proposed regulation will help control dust emissions from trucks through on-site speed limits, truck washing, and other track-out minimization provisions.

The proposed regulation provides emissions standards but does not specify the control equipment to meet those standards; however the proposed standards do include a limit on ammonia emissions to ensure that NOx control equipment does not result excess secondary particulate formations. Aqueous ammonia is a preferred agent for NOx reduction because urea is hazardous to transport and store. This is addressed in the CEQA analysis.

Comments Received at the May 21, 2012 Board Meeting

On May 21, 2012, the Board of Directors conducted an informational meeting at the Quinlan Community Center in Cupertino, CA followed by a visit to the periphery of the Lehigh facility. At the meeting, ten members of the public commented. Most comments echoed those previously made. One commenter, Gary Latshaw, Ph.D., provided a written comment, “Citizen’s Report on Cement Plant Regulation in the San Francisco Bay Area,” describing the health costs and benefits of alternative scenarios based on the District’s Multi-Pollutant Evaluation Method (MPEM) described in the 2010 Clean Air Plan. Dr. Latshaw’s report took the monetized value of various pollutants and calculated the “health costs” associated with various levels of emissions from Lehigh, including the proposal, the NSPS and a newly permitted plant in Florida. However, the MPEM is not meant to be used to calculate the monetized health effects of emissions from a single source. The monetized values in the MPEM are based on ambient concentrations which accrue from all sources, both natural and anthropogenic, and are applied across the entire region. Staff believe that the proposed limits will reduce emissions and benefit public health, and are the most stringent that are economically feasible.

10.0 Conclusion

Pursuant to Section 40727 of the California Health and Safety Code, the proposed rule amendments must meet findings of necessity, authority, clarity, consistency, non-duplication, and reference before the Board of Directors adopt, amend, or repeal a rule. The proposed Rule is:

- Necessary to protect public health by ensuring reduction in toxic air contaminants to nearby residents and by reducing ozone and PM precursors to meet the commitment of Control Measure SSM-9 of the Bay Area 2010 Clean Air Plan;
- Authorized by California Health and Safety Code Sections 40000, 40001, 40702, and 40725 through 40728;
- Clear, in that the rule specifically delineates the affected industry, compliance options, and administrative requirements for industry subject to this rule, so that its meaning can be easily understood by the persons directly affected by it;
- Consistent with other California air district rules, and not in conflict with state or federal law;
- Non-duplicative of other statutes, rules, or regulations; and,
- Implementing, interpreting and making specific and the provisions of the California Health and Safety sections 40000 and 40702.

A socioeconomic analysis prepared by Bay Area Economics has found that the proposed regulation could have a significant economic impact or cause regional job loss; however, staff believes that the costs are necessary to protect public health and make progress towards attainment of air quality standards and that the proposed rule is cost effective. A California Environmental Quality Act (CEQA) analysis prepared by Environmental Audit, Inc., concludes that the proposed amendments would not result in adverse environmental impacts. District staff have reviewed and accepted this analysis as well. The CEQA document will be available for public comments prior to the public hearing.

The proposed Rule has met all legal noticing requirements, has been discussed with the regulated community and other interested parties, and reflects the input and comments of many affected and interested parties. District staff recommends adoption of proposed Regulation 9, Rule 13: *Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing*; and adoption of the CEQA Negative Declaration.

11.0 References

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