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# Socio-Economic Impact Study of the Proposed Bay Area 2012 Clean Air Plan, Control Measure SSM-9, BAAQMD Regulation 9, Rule 13: Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing

Submitted to: Bay Area Air Quality Management District

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# Table of Contents

# EXECUTIVE SUMMARY

The Bay Area Air Quality Management District (BAAQMD) proposes to enact Regulation 9, Rule 13 (Rule 9-13) to limit nitrogen oxides (NOx), particulate matter (PM), and toxic air contaminants (TACs) from Portland cement manufacturing at the Lehigh Southwest Cement Plant (Lehigh) in Santa Clara County.[1] Until now, emissions from Portland cement plants have not been subject to District requirements specific to this industry. However, manufacturers have been subject to federal regulations under New Source Performance Standards (NSPS) and National Emission Standard for Hazardous Air Pollutants (NESHAP). In addition, California establishments that operate cement kilns, including Portland cement plants, have been subject to Title V operating permits.

The proposed BAAQMD rule would apply specifically to Portland cement plants and include NESHAP regulations as well as additional regulations on NOx emissions from kiln exhaust. If Congress or the Courts overturn the new NESHAP requirements, Bay Area Portland cement plants would still be responsible for compliance under the proposed Rule 9-13. The implementation of Rule 9-13 would potentially reduce NOx emissions by up to two tons per day, as well as reduce secondary fine particulate matter (PM2.5). The rule would take effect September 9, 2013.

## Socio-Economic Impacts

In order to estimate the economic impacts of enacting Rule 9-13 on the affected industries, this report compares the affected industry's annualized compliance costs[2] with its 10-year average profit ratio. The analysis uses data from the BAAQMD, US Census County Business Patterns, the US Annual Survey of Manufacturers (2000-2010), the IRS (2000 – 2010), and the 2007 US Economic Census.

### *Economic Profile of Affected Industry*

The BAAQMD identifies the affected industry as Portland Cement Manufacturers (NAICS 327310). According to BAAQMD records, there is one Portland cement manufacturing establishment, Lehigh Cement (Lehigh), in the Bay Area that would be subject to the proposed rule.

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[1] The Lehigh plant is the only Portland cement manufacturing plant in the BAAQMD.

[2] Based on its 10-year average production level

### *Economic Impacts to Affected Industry*

IRS data indicate that between 2000 and 2010, firms in the Portland cement manufacturing sector earned an average 6.5 percent profits on total revenue, resulting in total annual industry net profits of $6.6 million. According to BAAQMD data, the average annualized compliance costs to the Portland cement manufacturing establishment would be approximately $1.2 million for compliance with the District requirements, or $4.0 million for compliance with the District and federal (NESHAP) requirements. Dividing the NESHAP and District compliance costs ($4.0 million) by annual profits ($6.6 million) shows that the proposed Rule would result in a 61 percent reduction in establishment profit. Dividing the District compliance costs ($1.2 million) by annual profits ($6.6 million) shows that the proposed Rule would result in an 18 percent reduction in establishment profit, which is above the California Air Resources Board's (ARB's) 10 percent threshold used to determine a significant cost burden. The ability of Lehigh Cement to pass these costs through to customers is not known.

### *Regional Employment, Indirect, and Induced Impacts*

Since on average, the proposed Rule 9-13 would result in significant economic impacts to establishments within the affected industries, this report analyses the regional employment, indirect and induced impacts should the Lehigh facility choose to close as a response to the projected costs of this proposed rule. A loss of 150 Lehigh employees would generate an additional loss of 469 regional employees, resulting in total regional losses of 619 employees, $60.7 million labor income payments,[3] and $196.3 million in gross regional receipts.

## Impacts to Small Businesses

Using the California Government Code 14835's definition of a small business, Lehigh does not qualify as a small business. Thus, the proposed Rule would not adversely impact small businesses.

[3] Includes payments to employee compensation, proprietors' incomes, and payments to independent contractors' incomes.

## DESCRIPTION OF PROPOSED RULE

The Bay Area Air Quality Management District (BAAQMD) proposes to enact Regulation 9, Rule 13 (Rule 9-13) to limit nitrogen oxides (NOx), particulate matter (PM), and toxic air contaminants (TACs) from Portland cement manufacturing at the Lehigh Southwest Cement Plant (Lehigh) in Santa Clara County.[4] The rule would take effect September 9, 2013.

Until now, emissions from Portland cement plants have not been subject to District requirements specific to this industry. However, manufacturers have been subject to federal regulations under New Source Performance Standards (NSPS) and National Emission Standard for Hazardous Air Pollutants (NESHAP). In August 2010, the EPA amended both NSPS and NESHAP standards to further reduce criteria and TAC emissions from Portland cement manufacturing operations. New NSPS standards regulate NOx, SO2, and PM emissions from facilities constructed, modified, or reconstructed after June 2008 and requires continuous emission monitoring, while the new NESHAP standards limit PM, dioxin/furan emissions, total hydrocarbons, mercury, hydrochloric acid (HCl), and metallic hazardous air pollutants from new and existing kilns. Because Lehigh's facility has not been modified since 2008, it is not subject to new NSPS requirements, but is subject to the amended NESHAP requirements for existing kilns.

Currently, federal NESHAP amendments are under fire from two sources. Cement manufacturing companies and the national industry association have filed litigation challenging the legality of the new standards. The US House of Representatives and the US Senate have also introduced new legislation (HR 2681 and S 1610, Cement Sector Regulatory Relief Act of 2011) to provide a legislative stay of the new EPA emissions standards. A decision reached in the lawsuit (Portland Cement Association vs. Environmental Protection Agency and Lisa Perez Jackson) on December 11, 2011 remanded the NESHAP for reconsideration but did not stay the effect of the rule. On April 16, 2012, a settlement agreement was filed with the US Circuit Court of Appeals, and as per that settlement, on June 22, 2012, EPA proposed revisions to the rules including a two year delay in the compliance deadline, and slight changes to the emissions standards for PM and Organic HAPs.

At the state level, establishments that operate cement kilns, including Portland cement plants, have been subject to Title V operating permits. Title V of the federal Clean Air Act as amended in 1990 require major facility emitters to obtain operating permits from the State and/or local

[4] The Lehigh plant is the only Portland cement manufacturing plant in the BAAQMD.

air district in which it operates. California delegates this permitting process to the local air districts. Thus, Lehigh is subject to BAAQMD Regulation 2, Rule 6 (Rule 2-6): Permits, Major Facility Review, which incorporates the applicable NESHAP, NSPS, and District regulations. However, according to the BAAQMD Rule 9-13 Workshop Report, there are currently no state or district rules "that specifically regulate cement manufacturers, other than greenhouse gas emissions reporting requirements and those rules governing the use of scrap tires as fuel."[5]

Aside from Title V permitting under Rule 2-6, the BAAQMD regulates cement plants through general governing of permits (Rule 2-1 and Rule 2-2), emissions of toxic or hazardous compounds (Rule 2-5), and some general or miscellaneous regulations for individual pollutants (Rule 6-1, Rule 8-2, Rule 9-1, and Rule 11-1).[6] The proposed BAAQMD rule would apply specifically to Portland cement plants and include NESHAP regulations as well as additional regulations on NOx emissions from kiln exhaust. The implementation of Rule 9-13 would potentially reduce NOx emissions by up to two tons per day, as well as reduce secondary fine particulate matter (PM2.5). Table 1 shows the proposed emissions limits under Rule 9-13.

In addition to the emissions limits in Table 1, proposed Rule 9-13 would require the modification to the emissions point such that when operating at full permitted capacity, pollutants are dispersed to the extent that notification to residents under the District's AB2588 (Air Toxics Health Risk Information and Assessment Act) program would not be required. A Health Risk Assessment performed in conjunction with the design process would be required for confirmation as part of the rule requirements.

Finally, elements of Lehigh's Dust Management Plan that is part of their Title V permit have been incorporated into the proposed rule. This Dust Management Plan is already in effect at the facility.

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[5] BAAQMD. BAAQMD Regulation 9, Rule 13: Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing, Workshop Report. November 2011. Page 8.

[6] BAAQMD. BAAQMD Regulation 9, Rule 13: Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing, Workshop Report. November 2011. Page 8.

**Table 1: Proposed Emissions Limits, Regulation 9, Rule 13**

| Operation | Emissions Limits | |
|---|---|---|
| Portland Cement Manufacturing Kilns | | |
| NOx per ton of clinker produced | 2.3 | pounds, averaged over 30 days |
| PM per ton of clinker produced | 0.04 | pounds |
| Ammonia | 10 | ppmv above baseline, dry at 7% oxygen averaged over 24 hours. |
| Toxic Air Contaminants (TACs) | | |
| Dioxins/Furans (TEQ) | 0.2 | nanograms per standard cubic meter, dry at 7% oxygen averaged over 24 hours. |
| Mercury | 55 | pounds per million tons of clinker produced, averaged over 30 days |
| Total Organic HAP | 12 | ppmv, dry at 7% oxygen averaged over 30 days |
| HCl | 3 | ppmv, dry at 7% oxygen averaged over 30 days |
| Opacity Standard | 10% | lasting no more than three minutes in any one hour period |

Sources: BAAQMD; BAE, 2011.

# REGIONAL TRENDS

This section provides background information on the demographic and economic trends for the San Francisco Bay Area, which represents the BAAQMD's District. The San Francisco Bay Area includes Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties. Regional trends are compared to statewide demographic and economic patterns since 2000, in order to show the region's unique characteristics relative to the State.

## Regional Demographic Trends

Table 2 shows the population and household trends for the nine county Bay Area and California between 2000 and 2010. During this time, the Bay Area's population increased by 5.4 percent, compared to 10 percent in California. Likewise, the number of Bay Area households grew by 5.8 percent, compared to a 9.3 percent statewide increase.

**Table 2: Population and Household Trends, 2000-2010**

| Bay Area (a) | 2000 | 2010 | Total Change 2000-2010 | Percent Change 2000-2010 |
|---|---|---|---|---|
| **Population** | 6,784,348 | 7,150,739 | 366,391 | 5.4% |
| **Households** | 2,466,020 | 2,608,023 | 142,003 | 5.8% |
| **Average Household Size** | 2.7 | 2.7 | | |
| **California** | | | | |
| **Population** | 33,873,086 | 37,253,956 | 3,380,870 | 10.0% |
| **Households** | 11,502,871 | 12,577,498 | 1,074,627 | 9.3% |
| **Average Household Size** | 2.9 | 2.9 | | |

Notes:
(a) Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.

Sources: California, Department of Finance; US Census; BAE 2011.

The slower growth in the Bay Area is related to its relatively built out environment, compared to the state overall. While Central Valley locations, such as the Sacramento region, experienced large increases in the number of housing units, the Bay Area, which was relatively built out before the housing boom, only experienced moderate increases in housing units.

## Regional Economic Trends

In the five-year period, between 2005 and 2010, the Bay Area's economic base shrank by 4.4 percent, decreasing from 3.23 million jobs to 3.09 million jobs. This represents slightly slower job loss than the State, where the number of jobs shrank by nearly six percent.

Manufacturing, Retail Trade, Professional, Scientific, and Technical Services, and Healthcare and Social Assistance, the largest private (non-government) sectors in the Bay Area's economy, each constituted 10 percent of the region's total jobs in 2010. Over the five-year period the Manufacturing sector lost 13 percent of its jobs, while the Retail Trade sector lost nine percent of its jobs. However, during this period, the Professional, Scientific, and Technical Services sector grew by 10 percent, while the Healthcare and Social Assistance sector grew by nearly 14 percent. Statewide, the Manufacturing and Retail Trade sectors declined by 17 and nine percent, respectively. However, the Professional, Scientific, and Technical Services and Healthcare and Social Assistance sectors grew by five and 13 percent, respectively. Overall, the Bay Area's economic base reflects the state's base, sharing a similar distribution of employment across sectors. Table 3 shows the jobs by sector in 2005 and 2010.

The affected industry, Cement Manufacturing, falls into the Manufacturing sectors, which represents 9.9 percent of the region's job base. The manufacturing sector's employment not only contracted between 2005 and 2010, but also decreased its share of the region's jobs one percent. The decrease in jobs follows the more recent national trends of the Great Recession, while decreases in the share of local jobs follows long-term national trends in manufacturing's reduced presence in the economy.

**Table 3: Jobs by Sector, 2005-2010** (a)

| Industry Sector | Bay Area 2005 (b) Jobs | Bay Area 2005 (b) % Total | Bay Area 2010 (c) Jobs | Bay Area 2010 (c) % Total | Bay Area % Change 2005-2010 | California 2005 (b) Jobs | California 2005 (b) % Total | California 2010 (c) Jobs | California 2010 (c) % Total | California % Change 2005-2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| Agriculture | 20,400 | 0.6% | 19,000 | 0.6% | -6.9% | 378,200 | 2.5% | 381,600 | 2.7% | 0.9% |
| Mining and Logging | 800 | 0.0% | 500 | 0.0% | -37.5% | 23,600 | 0.2% | 26,800 | 0.2% | 13.6% |
| Construction | 74,800 | 2.3% | 50,100 | 1.6% | -33.0% | 905,300 | 6.0% | 559,800 | 3.9% | -38.2% |
| Manufacturing | 350,400 | 10.8% | 305,400 | 9.9% | -12.8% | 1,502,600 | 9.9% | 1,242,400 | 8.7% | -17.3% |
| Wholesale Trade | 123,000 | 3.8% | 113,200 | 3.7% | -8.0% | 675,800 | 4.5% | 643,200 | 4.5% | -4.8% |
| Retail Trade | 336,700 | 10.4% | 305,900 | 9.9% | -9.1% | 1,659,300 | 10.9% | 1,508,800 | 10.6% | -9.1% |
| Transportation, Warehousing, and Utilities | 100,300 | 3.1% | 90,200 | 2.9% | -10.1% | 487,100 | 3.2% | 464,900 | 3.3% | -4.6% |
| Information | 112,900 | 3.5% | 110,800 | 3.6% | -1.9% | 473,600 | 3.1% | 429,000 | 3.0% | -9.4% |
| Finance and Insurance | 151,000 | 4.7% | 118,200 | 3.8% | -21.7% | 636,600 | 4.2% | 511,900 | 3.6% | -19.6% |
| Real Estate and Rental and Leasing | 55,600 | 1.7% | 47,900 | 1.6% | -13.8% | 283,600 | 1.9% | 247,900 | 1.7% | -12.6% |
| Professional, Scientific, and Technical Services | 289,100 | 8.9% | 318,800 | 10.3% | 10.3% | 970,200 | 6.4% | 1,020,600 | 7.1% | 5.2% |
| Management of Companies and Enterprises | 52,500 | 1.6% | 54,200 | 1.8% | 3.2% | 222,100 | 1.5% | 190,500 | 1.3% | -14.2% |
| Administrative and Waste Services | 182,100 | 5.6% | 167,100 | 5.4% | -8.2% | 963,300 | 6.4% | 858,300 | 6.0% | -11.4% |
| Educational Services | 73,000 | 2.3% | 81,700 | 2.6% | 11.9% | 272,200 | 1.8% | 307,900 | 2.2% | 13.1% |
| Health Care and Social Assistance | 284,500 | 8.8% | 324,100 | 10.5% | 13.9% | 1,321,200 | 8.7% | 1,479,000 | 10.4% | 11.9% |
| Arts, Entertainment, and Recreation | 47,600 | 1.5% | 37,200 | 1.2% | -21.8% | 239,000 | 1.6% | 241,200 | 1.7% | 0.9% |
| Accommodation and Food Services | 261,300 | 8.1% | 209,600 | 6.8% | -19.8% | 1,236,200 | 8.1% | 1,252,500 | 8.8% | 1.3% |
| Other Services, except Public Administration | 108,800 | 3.4% | 108,800 | 3.5% | 0.0% | 505,500 | 3.3% | 484,700 | 3.4% | -4.1% |
| Government (d) | 446,300 | 13.8% | 430,200 | 13.9% | -3.6% | 2,420,200 | 15.9% | 2,427,100 | 17.0% | 0.3% |
| **Subtotal (e)** | **3,071,100** | **95.1%** | **2,892,900** | **93.7%** | **-5.8%** | **15,179,500** | **100.0%** | **14,278,000** | **100.0%** | **-5.9%** |
| Additional Suppressed/Confidential Employment (f) | 159,800 | 4.9% | 195,900 | 6.3% | 22.6% | n/a | n/a | n/a | n/a | |
| **Total, All Employment** | **3,230,900** | **100.0%** | **3,088,800** | **100.0%** | **-4.4%** | **15,179,500** | **100.0%** | **14,278,000** | **100.0%** | **-5.9%** |

Notes:
(a) Includes all wage and salary employment covered by unemployment insurance.
(b) Represents employment for calendar year, 2005.
(c) Represents employment for calendar year, 2010.
(d) Government employment includes workers in all local, state and Federal sectors, not just public administration. For example, all public school staff are in the Government category.
(e) Totals may not add due to independent rounding.
(f) County employment for some industries were suppressed by EDD due to the small number of firms reporting in the industry for a given county.

Sources: California Employment Development Department, BAE, 2011.

## Affected Industry

The proposed rule would affect Portland cement manufacturers, which are included in the Cement Manufacturing sector (NAICS Code 327310). According to the US Census, in 2009, the Bay Area had three cement manufacturing establishments that accounted for 234 jobs. Dividing the total jobs by the number of establishment shows that on average, each establishment employed 78 workers. However, BAAQMD staff indicated that there is only one Portland cement plant in the Bay Area, Lehigh. Since the NAICS sector has a broader definition of firms than the proposed rule, Census data includes additional cement manufacturing establishments that would not be subject to Rule 9-13. Lehigh is represented as the firm with over 100 employees. Table 4 shows the profile of the affected industry.

**Table 4: Profile of Affected Industry, 2009**

| Industry | Cement Manufacturing (a) |
|---|---|
| Employment (b) | 234 |
| Average Employment per Establishment | 78 |
| Number of Establishments (by workforce size) | |
| 1-4 | 1 |
| 5-9 | 0 |
| 10-19 | 0 |
| 20-49 | 1 |
| 50-99 | 0 |
| 100+ | 1 |
| Total | 3 (c) |

Notes:
(a) The Portland Cement Manufacturing industry is defined as NAICS 327310, Cement Manufacturing.
(b) In cases where the actual employment number is not disclosed for confidentiality purposes, the analysis uses the midpoint employment number for each size cohort.
(c) BAAQMD estimates that the Bay Area has one establishment in this sector will be affected by the proposed Rule.

Sources: U.S. Census County Business Patterns, 2009; BAE, 2011.

# SOCIO-ECONOMIC IMPACTS

This section discusses the analysis' methodology, as well as the economic profile of the affected industry, and annualized rule compliance costs associated with adopting Rule 9-13. It then determines whether the annualized compliance costs would significantly burden the affected industry, and estimates adoption of the rule's regional economic impacts.

## Methodology

In order to estimate the economic impacts of adopting Rule 9-13 on the Portland cement manufacturing industry, this report compares the affected industry's annualized compliance costs with its profit ratios. The analysis uses data from the BAAQMD, 2009 US Census County Business Patterns, the 2000-2010 Annual Survey of Manufacturers, 2000-2010 IRS corporate income returns data, and the 2007 US Economic Census.

The BAAQMD identifies the affected industry as Portland Cement Manufacturing (a subset of NAICS 327310). According to BAAQMD records, there is one Portland cement plant establishment (Lehigh) in the Bay Area that would be subject to the proposed rule. BAAQMD staff indicates that the Bay Area Lehigh plant employs 150 workers.

## Economic Profile of Affected Industries

As shown in Table 5, according to 2000-2010 US Annual Survey of Manufacturers data, the average California firm in the Cement Manufacturing sector has average annual sales per employee of approximately $697,787.[7] Multiplying the average statewide revenues per employee by the number of Lehigh employees (150 workers) shows that on average, Leigh's establishment has total annual revenues of $102 million. Table 5 shows the affected industry's annual employment and sales data.

[7] Reported in 2011 dollars using Producer Price Index for cement.

**Table 5: Cement Manufacturing Industry, Sales**

| Number of Employees | Number of Establishments (a) | Average # of Employees (b) | Average Annual Sales (c) | Total Sales | Total Employees |
|---|---|---|---|---|---|
| 1-4 | 0 | 0 | $0 | $0 | 0 |
| 5-9 | 0 | 0 | $0 | $0 | 0 |
| 10-19 | 0 | 0 | $0 | $0 | 0 |
| 20-49 | 0 | 0 | $0 | $0 | 0 |
| 50-99 | 0 | 0 | $0 | $0 | 0 |
| 100+ | 1 | 150 | $101,968,090 | $101,968,090 | 150 |
| **Total** | **1** | **150** | **$101,968,090** | **$101,968,090** | **150** |

Notes:
(a) The number and sizes of businesses affected for each industry comes from BAAQMD data.
(b) Per BAAQMD staff.
(c) Based on 2000-2010 Annual Survey of Manufacturers data for cement manufacturing businesses in the United States. 327310, Cement Manufacturing. Reported in 2011 dollars.
Average revenues per employee $679,787

Sources: Annual Survey of Manufacturers, 2000-2012; BAAQMD, 2012; BLS Producer Price Index, 2012; BAE, 2012.

The IRS provides data on total sales and net income for the Cement, Concrete, Lime, and Gypsum Product Manufacturing sector. According to IRS data, between 2000 and 2010 Portland cement manufacturing firms averaged a 6.5 percent rate of return on total sales. As Table 6 shows, during an average year the Lehigh plant would generate net profits of approximately $6.6 million.

**Table 6: Cement Manufacturing Industry Profits**

| Number of Employees | Number of Establishments | Average Annual Sales (a) | Average Return on Sales (b) | Average Profits | Total Profits |
|---|---|---|---|---|---|
| 1-4 | 0 | $0 | 6.5% | $0 | $0 |
| 5-9 | 0 | $0 | 6.5% | $0 | $0 |
| 10-19 | 0 | $0 | 6.5% | $0 | $0 |
| 20-49 | 0 | $0 | 6.5% | $0 | $0 |
| 50-99 | 0 | $0 | 6.5% | $0 | $0 |
| 100+ | 1 | $101,968,090 | 6.5% | $6,594,800 | $6,594,800 |
| **Total** | **1** | **$101,968,090** | 6.5% | **$6,594,800** | **$6,594,800** |

Notes:
(a) Based on 2007 Economic Census data for petroleum refinery businesses in California. 324110, Petroleum Refineries.
(b) Based on 2000-2010 IRS data for Corporation Income Tax Returns: Returns of Active Corporations, Table 1.

Sources: Annual Survey of Manufacturers, 2000-2012; BLS Producer Price Index, 2012; IRS, 2000-20120; BAE, 2012.

## Description of Compliance Costs

In order to meet the proposed rule's emissions reductions requirements, Lehigh will have to employ several control measures and equipment. Two of the equipment upgrades refer specifically to meeting NESHAP's TAC requirements, while the other two are necessary to meet BAAQMD's additional NOx and PM requirements. Because the Portland cement industry is cyclical, the analysis uses 10-year average sales and profits to determine the proposed Rule's economic impacts. As Table 7 shows, the annualized costs of complying with NESHAP and BAAQMD requirements would be

approximately $4 million. The annualized costs of compliance with the BAAQMD requirements only would be approximately $1.16 million.

**Table 7: Compliance Costs**

| | Total Costs | Annualized Costs |
|---|---|---|
| **NESHAP Requirements** | | |
| Capital Costs (a) | $0 | $0 |
| Annual Operating Costs (b) | | |
| Activated Carbon Injection (c) | $1,220,318 | $1,220,318 |
| Lime Slurry Injection (c) | $1,255,184 | $1,255,184 |
| CEMS O&M (c) | $362,609 | $362,609 |
| *SUBTOTAL: NESHAP Requirements* | *$2,838,111* | *$2,838,111* |
| District Requirements | | |
| SNCR | $2,300,000 | $115,000 (d) |
| Stack Requirement Modifications | $2,500,000 | $125,000 (d) |
| Annual Operating Costs (c), (e) | $922,082 | $922,082 |
| *SUBTOTAL: NOx Control* | *$5,722,082* | *$1,162,082* |
| **Total Costs** | **$8,560,194** | **$4,000,194** |

Notes:
(a) NESHAP requirement capital costs range from $27 million - $32 million but since Lehigh has already spent this money to be in compliance with NESHAP, no additional capital costs are anticipated.
(b) If Congress or the Courts negate NESHAP requirements, Lehigh would still be responsible for these costs under Rule 9-13.
(c) Based on Lehigh's estimates of annual costs for full operations scaled down to reflect that in the average year (between 2001 and 2010), Lehigh produced 70% of its total permitted clinker.
(d) Capitalized over 20 years using a straight line depreciation method.
(e) Estimated costs based on ten year average of 70% clinker production.

Sources: BAAQMD, 2011-2012; BAE, 2012.

### *NESHAP Compliance Costs (Federal)*

*Capital Costs*

Lehigh has already purchased and applied for operating permits for the equipment necessary to comply with NESHAP's new TAC standards. A hydrated Lime injection system (LIS) and activated carbon injection (ACI) will bring Lehigh into NESHAP compliance and reduce SO2 emissions. Including the continuous emissions monitoring system (CEMS) and parametric monitors, control equipment designed to bring Lehigh into NESHAP compliance would cost between $27 million and $32 million. Since Lehigh has already purchased and installed this equipment, there are no additional capital costs to comply with Rule 9-13.

*Annual Operating and Maintenance Costs*

As Table 7 shows, operating and maintaining the capital equipment will cost Lehigh approximately $2.8 million, annually. Lehigh projects that at capacity operating levels, activated carbon injection, lime slurry injection, and CEMS operations and maintenance would cost $4.1 million. Between

2000-2010, on average, Lehigh produced 70 percent of its permitted clinker limit, per year. Using average annual production levels, annual operations and maintenance would cost Lehigh 70 percent of maximum costs, or $2.8 million.

Currently, these costs are not specific to BAAQMD requirements. Since NESHAP applies to all Portland cement plants in the United States, the ongoing compliance costs would not change Lehigh's relative competitiveness. Normally, the analysis would not include costs that apply to all plants and would not change a firm's competitiveness. However, in the event that Congress or the courts overturn the new NESHAP requirements, Lehigh would still be required to meet its requirements under the proposed BAAQMD rule. Since plants outside of the District would not be subject to overturned NESHAP requirements, the ongoing costs could impact Lehigh's relative competitiveness. In order to fully examine the proposed rule's potential impacts, the analysis considers the economic impacts of ongoing NESHAP compliance costs.

### *NOx Control and Stack Height Compliance Costs (District)*

*Capital Costs*

In order to comply with the portions of Rule 9-13 that extend beyond NESHAP requirements, Lehigh would need to modify its stack so that emissions would not result in the need to notify residents under the District's Air Toxics Health Risk Information and Assessment Act program (AB2588) at full production capacity. In addition, Lehigh would need to purchase and install post-combustion selective non-catalytic reduction (SNCR) cement kiln exhaust NOx reduction equipment to comply with the NOx emission limits. Lehigh has not yet implemented either of these control measures.

The District's AB2588 program requires notification to nearby residents if the results of a health risk assessment indicate that airborne emissions increase the cancer risk by more than 10 in one million, or cause an acute hazard index of greater than 1. Lehigh had conducted a health risk assessment in 2011 and determined that a 300 foot stack would disperse pollutants sufficiently so that notification was not required. However, other stack configurations that reduce exposure to an equivalent level may be considered.

As Table 7 shows, equipment modifications and new equipment necessary to comply with the proposed rule would cost Lehigh approximately $4.8 million. Stack requirement modifications (assuming the 300 foot stack scenario) would cost approximately $2.3 million, and SNCR equipment would cost approximately $2.5 million. However, the construction of a single stack also saves the expense of multiple monitors. Both the NESHAP the District's NOx standards require the use of emission monitors to determine compliance with the limits. Monitors for the components of the NESHAP, specifically for mercury and particulate matter, are relatively new and expensive. The cost of installing and using four monitors to comply with the NESHAP standards (organics and hydrochloric acid in addition to the mercury and particulate) is estimated to be $1,475,000. Lehigh currently has a baghouse with 32 separate openings. Consolidating these into a single stack allows them to utilize one emissions monitor for each pollutant, instead of multiple monitors. Using a 20-

year[8] straight-line calculation to annualize capital costs over the life of the equipment shows that on an annual basis, a 300 foot stack would cost Lehigh approximately $240,000.

*Annual Operating and Maintenance Costs*
According to the BAAQMD workshop report, the rule would also result in annual SNCR operating costs. At 2011 production rates, the cost of operating the SNCR equipment would be $700,000 per year, or $0.83 per ton of clinker. In an average year Lehigh produces 70 percent of its permitted clinker. As Table 7 shows, on average, operating the SNCR equipment would cost Lehigh an additional $922,082 per year.

## Affected Industry's Economic Impacts Analysis

In order to determine the impacts Lehigh, this analysis compares its annualized compliance costs to annual profits. The analysis estimates compliance costs using a 20-year straight-line capital improvement depreciation methodology. Average revenue estimates come from the 2000 – 2010 U.S. Annual Surveys of Manufacturers' reported cement manufacturers' revenues, in conjunction with the IRS' average cement, concrete, lime, and gypsum product manufacturers' 10-year average profit ratio.

The analysis then calculates the compliance costs as a percentage of profits to determine the level of impact. The BAAQMD uses the ARB's 10 percent threshold as a proxy for burden. Annualized compliance costs resulting in profit losses of 10 percent or more indicate that the proposed Rule has the potential for significant adverse economic impacts. The analysis considers the impacts from NOx costs alone, as well as the joint NOx and NESHAP costs. Table 8 shows the annualized compliance costs as a share of total profits for the cement manufacturing industry.

[8] The analysis assumes that stack modifications and SNCR equipment would have a 20-year lifecycle.

## Table 8: Rule 9-13 Compliance Cost as Share of Profit

**Cost of NOx controls, without ongoing NESHAP costs**

| Number of Employees | Number of Establishments | Average Annual Sales | Average Return on Sales | Average Profits | Total Profits | Compliance Cost | Share of Annual Profit |
|---|---|---|---|---|---|---|---|
| 1-4 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 5-9 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 10-19 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 20-49 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 50-99 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 100+ | 1 | $101,968,090 | 6.5% | $6,594,800 | $6,594,800 | $1,162,082 | 18% |
| **Total** | 1 | **$101,968,090** | **6.5%** | **$6,594,800** | **$6,594,800** | **$1,162,082** | **18%** |

**Cost including NESHAP O&M Costs**

| Number of Employees | Number of Establishments | Average Annual Sales | Average Return on Sales | Average Profits | Total Profits | Compliance Cost | Share of Annual Profit |
|---|---|---|---|---|---|---|---|
| 1-4 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 5-9 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 10-19 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 20-49 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 50-99 | 0 | $0 | 6.5% | $0 | $0 | $0 | 0% |
| 100+ | 1 | $101,968,090 | 6.5% | $6,594,800 | $6,594,800 | $4,000,194 | 61% |
| **Total** | **1** | **$101,968,090** | **6.5%** | **$6,594,800** | **$6,594,800** | **$4,000,194** | **61%** |

Sources: Annual Survey of Manufacturers, 2000-2012; BLS Producer Price Index, 2012; IRS, 2000-20120; BAAQMD, 2011-2012; BAE, 2012.

As Table 8 shows, annualized compliance costs of just the BAAQMD requirements represent 18 percent of Lehigh's profits, while the District and NESHAP compliance costs together represent approximately 61 percent of Lehigh's profits. Thus, compliance costs are above the 10 percent threshold for both scenarios, suggesting that Rule 9-13 could provide a significant burden to Lehigh. However, since Lehigh was able to absorb the $27 million to $32 million construction costs of NESHAP compliance, complying with Rule 9-13 may not result in Lehigh's closure. In addition, to the extent that Lehigh can pass some or all of the additional costs onto consumers, the proposed rule may not adversely affect its operations.

## Ability to Pass Through Costs

An industry may be able to absorb compliance costs or they may be able to pass them through to customers. Costs are more likely to be able to be passed on when a product is demand-inelastic. In this case, the ability to pass costs of the rule through to customers is not known. 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. Table 8 shows that the NOx controls would cost $1,162,082 or 18% of Lehigh's annual profit. At a production rate of 847,000 tons of clinker (2011), if the entire compliance costs could be passed on, the cost of cement would have to increase by $1.30/ton (1.3% based on a March, 2012 cement price of about $100 per ton (Mineral Commodity Survey, USGS Survey, January, 2012)). (Clinker is about 95% of the cost of cement.) To reduce the costs to less than 10% of profits (the threshold for significance), the cost of cement would have to increase by $0.72/ton (0.72%).

The costs of compliance with the NESHAP standards are higher. Table 8 shows NESHAP compliance costs of $2,838,111. Should these EPA standards continue to be applicable in the face of ongoing litigation and potential legislative action, all Portland cement manufacturers nationwide would be subject to the same standards and incur some of the same costs, depending in part on what the constituents of the raw materials were at each facility. The NESHAP costs are 43% of Lehigh's annual profit. At the 2011 production rate of 847,000 tons of clinker the price of cement would need to increase by $3.18 per ton (3.18%). Combined with the costs to meet the NOx standards, Lehigh would have to increase the cost of cement by $4.48 per ton (4.48%) to completely offset the costs, and by $3.53 to reduce costs to the 10% threshold.

In August, 2010, EPA issued "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." In the report, EPA estimated that the NESHAP standards could raise the price of cement by $4.50 or 5% (2005 prices). They further estimated that cement imports could rise by 10% to offset reductions in domestic production and price increases. EPA estimates nationwide costs (direct engineering costs and indirect social costs) of $904 to $930 million nationwide and benefits of $7.4 to $18 billion, for net benefits of $6.5 to $17 billion annually.

## Affected Industry and Regional Employment Impacts

Although Lehigh may be able to absorb the Rule's compliance costs, annual compliance costs represent more than ten percent of annual revenues, suggesting that the proposed Rule has the potential to affect regional employment.[9] As Table 9 shows, the proposed rule would result in the direct loss of 150 jobs should the Lehigh facility close rather than comply with the proposed rule.

**Table 9: Potential Employment Loss**

| Number of Employees | Number of Establishments | Number of Establishments Imapcted | Average Employment Per Establishment | Total Employment Loss |
|---|---|---|---|---|
| 1-4 | 0 | 0 | 0 | 0 |
| 5-9 | 0 | 0 | 0 | 0 |
| 10-19 | 0 | 0 | 0 | 0 |
| 20-49 | 0 | 0 | 0 | 0 |
| 50-99 | 0 | 0 | 0 | 0 |
| 100+ | 1 | 1 | 150 | 150 |
| **Total** | **1** | **1** | | **150** |

Sources: US Census County Business Patterns, 2009; US Economic Census, 2007; BAAQMD, 2011; BAE, 2012.

## Regional Indirect and Induced Impacts

Indirect and induced impacts refer to regional multiplier effects of increasing or decreasing regional economic activity. If the proposed Rule amendments significantly impacted local businesses, any closures would result in direct regional economic losses. Firms would no longer buy goods from local suppliers, thereby resulting in reduced indirect impacts, or business-to-business expenditures. In addition, businesses would no longer employ regional residents, resulting in reduced induced impacts in the form of household spending. Because the proposed amendments could result in significant direct impacts to dry cleaning industry employment, the analysis uses the IMPLAN input-output model to estimate the indirect or induced impacts.

### *IMPLAN Input-Output Model*

Economists use regional and national input-output models as a tool to understand the complex interactions among the various parts of an economy. The economic model used in this analysis, IMPLAN ("IMpact analysis for PLANning"), is a PC-based computer software package that automates the process of developing input-output models for regions within the United States. The IMPLAN model is well respected as the industry standard for projecting economic impacts resulting from current or future economic activities, often called "events." In this study, the loss of Lehigh sales and employment makes up the economic "event" modeled.

[9] The region includes the following nine Bay Area counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma.

At the heart of the IMPLAN model is a county-level trade flow called the Social Accounting Matrix (SAM) constructed from the production functions of 440 industries, using data from a variety of sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and US Census. The SAM uses each county's observed economic relationships between government, industry, and household sectors, allowing IMPLAN to model payments between industries, between households and industries, between government and industries, and between government and households. Thus, for a specified region, the input-output table accounts for all of the dollar flows between the different sectors within the economy. IMPLAN then applies county-level price and wage data, as well as the availability of goods within the nine-county Bay Area to estimate the specific impacts.

Once the economic event has been entered into the model, IMPLAN reports the following types of impacts:

- Direct Impacts. Direct impacts refer to the set of producer or consumer expenditures applied to the predictive model for impact analysis.[10] It is the amount of spending that is no longer available to flow through the local economy. IMPLAN then displays how the local economy will then respond to these initial changes.

- Indirect Impacts. The indirect impacts refer to the impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to income and taxes.[11] For Lehigh, this would include payments for cement clinker inputs such as limestone, calcium, fuel, office supplies, and any other non-labor payments that a Portland cement manufacturing firm would purchase.

- Induced Impacts. The induced impacts refer to an economy's response to an initial change (direct impact) that occurs through re-spending of income according to household spending patterns.[12] When households earn income, they spend part of that income on goods and services, such as food and healthcare. IMPLAN models households' disposable income spending patterns and distributes them through the local economy.

### *Economic Impacts of Reduced Portland Cement Manufacturing Employment*

The reduced employment and operating expenditures flow through the nine-county Bay Area economy to generate ongoing annual economic losses. As Table 10 shows, the potential job losses could result in $196.3 million in annual regional economic losses and approximately 619 permanent job losses.

[10] IMPLAN Online Glossary, 2012.
[11] Ibid.
[12] Ibid.

**Table 10: Potential Regional Losses from Rule 9-13**

| Impact | Employment | Labor Income | Output |
|---|---|---|---|
| Direct | (150) | ($29,716,800) | ($107,899,600) |
| Indirect | (195) | ($15,440,100) | ($45,391,900) |
| Induced | (274) | ($15,584,600) | ($43,004,800) |
| **Total** | **(619)** | **($60,741,500)** | **($196,296,300)** |

Sources: IMPLAN, 2010; BAE, 2012.

Of the total losses, 150 jobs and $107.9 million would come directly from Lehigh's closure. IMPLAN data show that Lehigh employees would lose $29.7 million in labor income.[13] Supporting industries would lose 195 jobs, $15.4 million in labor income, and $45.4 million in sales. The Bay Area economy would lose an additional 274 jobs, $15.6 million in labor income, and $43 million from reduced household spending. Total losses would represent less than one-tenth of one percent of total 2010 Bay Area employment.

On April 16, 2012, a settlement agreement was filed in the US Circuit Court of Appeals regarding the lawsuit brought by cement manufacturing companies and the Portland Cement Association against EPA. As per that settlement, on June 22, 2012, EPA proposed revisions to the NESHAP including a two year delay in the compliance deadline, and slight changes to the emissions standards for PM and Organic HAPs. EPA has requested comments on their findings via the Federal Register, and will finalize the amendments in December of 2012. If the two year delay is finalized, the costs of NESHAP compliance under the proposed District rule will be in effect for two years, after which these standards will be consistent with cement manufacturing in the rest of the country.

[13] Labor income include payments to employees, proprietor's income, and corporate income.

## IMPACT ON SMALL BUSINESSES

According to California Government Code 14835, a small business is any business that meets the following requirements:

- Must be independently owned and operated;
- Cannot be dominant in its field of operation;
- Must have its principal office located in California;
- Must have its owners (or officers in the case of a corporation) domiciled in California; and
- Together with its affiliates, be either:
    - A business with 100 or fewer employees, and an average annual gross receipts of $10 million or less over the previous three tax years, or
    - A manufacturer with 100 or fewer employees.

Using these definitions, Lehigh does not qualify as a small business. Since the proposed rule would not affect any other businesses, it would not place a disproportionate burden on small businesses.