Appendix B – Four-Factor Analyses and Control Determinations

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## Appendix B.1 - Apex Plant, Lhoist North America

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</tr>
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Appendix B.1.a - NDEP Reasonable Progress Determination for Apex Plant
Apex Plant Reasonable Progress Control Determination

Evaluation of existing and potential new control measures at Lhoist North America’s Apex Plant necessary to achieve reasonable progress for Nevada’s second Regional Haze SIP.

Bureau of Air Quality Planning, Nevada Division of Environmental Protection
June 2022
1 Introduction

This document serves as the official reasonable progress determination for the Apex Plant based on analyses submitted by the owner of the facility. The Long-Term Strategy of Nevada’s Regional Haze SIP revision for the second implementation period covering years 2018 through 2028 will rely on the reasonable progress findings of this document. Potential new control measures are evaluated considering the four statutory factors to determine which measures are necessary to achieve reasonable progress. The four statutory factors include: cost of compliance, time necessary for compliance, energy and non-air environmental impacts, and remaining useful life of the source.

This reasonable progress determination references data and analyses provided by Lhoist North America (LNA) in several documents that can be found in Appendix B.1. Table 1-1 below outlines the documents submitted by LNA that supplement this determination document. In some cases, the Nevada Division of Environmental Protection (NDEP) adjusted information submitted by LNA to ensure the analyses relied on to make reasonable progress determinations agree with Regional Haze Rule regulatory language, Regional Haze Rule Guidance for the second implementation period, and EPA Control Cost Manual. Throughout the document, it can be assumed that referenced data and information rely on the following documents submitted by LNA, unless explicitly indicated that NDEP made adjustments.

<table>
<thead>
<tr>
<th>Full Document Title</th>
<th>Shortened Document Title (used in this document)</th>
<th>Date</th>
<th>Appendix Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Haze Second Planning Period Four-Factor Analysis</td>
<td>LNA Analysis</td>
<td>March 24, 2021</td>
<td>B.1.b</td>
</tr>
<tr>
<td>RE: RHR Apex Plant Update</td>
<td>LNA Email</td>
<td>September 13, 2021</td>
<td>B.1.c</td>
</tr>
<tr>
<td>RE: Lhoist North America of Arizona, Inc. - Apex Plant Comments on Draft 2021 Regional Haze Four Factor Review and Initial Control Determination</td>
<td>LNA Comments</td>
<td>October 13, 2021</td>
<td>B.1.d</td>
</tr>
<tr>
<td>Class I Air Quality Operating Permit</td>
<td>Permit</td>
<td></td>
<td>A.1</td>
</tr>
</tbody>
</table>

2 Facility Characteristics

The Apex Plant is a lime production facility located in Clark County, NV just northeast of the Las Vegas metropolitan area and operates four horizontal rotary preheater lime kilns permitted to utilize coal, petroleum coke, and/or natural gas. As stated on page 3-1 of LNA Analysis:

“Kilns 1 through 3 are nearly identical in design and operations, although constructed at different times. Kilns 1 and 2 have a nominal production rate of 300 tons per day and Kiln 3 has a nominal production rate of 400 tons per day. Kiln 4 is a newer kiln and has a nominal lime production rate of 1,350 tons per day.

All kilns can utilize natural gas, coal, and petroleum coke as fuels for the lime production process. Typical annual fuel usage rates for all kilns combine are approximately 250,000 million british thermal units
(MMBTU) per year of natural gas (at 19,500 Btu/lb), 94,000 tons per year of coal (at 11,500 Btu/lb) and 20,000 tons per year of coke (at 13,800 Btu/lb).”

The Apex Plant is regulated by the Clark County Department of Environment and Sustainability (CCDES), but NDEP has coordinated LNA’s 4-Factor Analysis for the implementation of Nevada’s Regional Haze State Implementation Plan. Any adjustments to LNA Apex Plant’s permit due to Regional Haze will be coordinated through CCDES.

3 Emissions Profile

Annual emissions reported by the facility were pulled from the National Emission Inventory (NEI), along with emissions data submitted in the LNA Analysis that NDEP confirmed by cross checking the data using EPA’s Emission Inventory System (EIS) Gateway. These emissions data were used for the source selection process, which Nevada determined using the Q/d method, and for development of baseline emissions to be relied on in this Four-Factor Analysis.

3.1 Q/d Emissions Profile

NDEP relied on the Q/d method for source selection by quantifying total facility-wide NO\textsubscript{x}, SO\textsubscript{2}, and PM\textsubscript{10} emissions, represented as “Q”, reported in the 2014 NEIv2. The Q value was then divided by the distance, in kilometers, between the facility and the nearest Class I area (CIA), represented as “d”. The nearest CIA to the Apex Plant is Grand Canyon National Park at 88 kilometers away. NDEP elected to set a Q/d threshold of 5. As displayed in Table 3-1, using 2014 emissions, the Apex Plant yields a Q/d value of 18.84, effectively screening the facility into a four-factor analysis requirement for the second round of Regional Haze in Nevada.

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Nearest CIA</th>
<th>Total Q (tpy)</th>
<th>Distance to CIA (km)</th>
<th>Q/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apex Plant</td>
<td>Grand Canyon NP</td>
<td>1,662</td>
<td>88</td>
<td>18.84</td>
</tr>
</tbody>
</table>

3.2 Baseline Emissions Profile for Four-Factor Analysis

For the purpose of the following four-factor analyses, NDEP is relying on the baseline emissions profile provided in Section 4, Appendix B, and Appendix C of the LNA Analysis. Facility-wide baseline emissions are pulled from Section 4, unit-level SO\textsubscript{2} emissions are pulled from “Appendix B: SO\textsubscript{2} Control Cost Calculations,” and unit-level NO\textsubscript{x} emissions are pulled from “Appendix C: NO\textsubscript{X} Control Cost Calculations.” Emissions were calculated by taking the average of emissions over the three-year baseline period of 2016 through 2018. Table 3-2 summarizes the baseline emissions profile of each kiln for SO\textsubscript{2}, NO\textsubscript{x}, and PM\textsubscript{10} emissions.

<table>
<thead>
<tr>
<th>Process Level</th>
<th>SO\textsubscript{2} Emissions (tpy)</th>
<th>NO\textsubscript{x} Emissions (tpy)</th>
<th>PM\textsubscript{10} Emissions (tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 1</td>
<td>107.30</td>
<td>304</td>
<td>18.46</td>
</tr>
<tr>
<td>Kiln 2</td>
<td>5.32</td>
<td>19</td>
<td>1.12</td>
</tr>
<tr>
<td>Kiln 3</td>
<td>14.42</td>
<td>154</td>
<td>15.81</td>
</tr>
<tr>
<td>Kiln 4</td>
<td>8.21</td>
<td>687</td>
<td>23.04</td>
</tr>
</tbody>
</table>
NDEP has pulled annual emissions data reported by the facility from 2014 through 2019 to confirm that the use of average annual emissions between 2016 and 2018 indeed represent normal operations and are appropriate for use as the facility’s baseline emissions in this four-factor analysis. Annual emissions include total NO\textsubscript{x}, SO\textsubscript{2}, and PM\textsubscript{10} emissions. As seen in Table 3-3, total emissions in 2014 and 2015 are higher than emissions reported in 2016 through 2018. Emissions in 2019 were slightly less than the baseline years.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NO\textsubscript{x}</td>
<td>1361</td>
<td>1281</td>
<td>1,220</td>
<td>1,109</td>
<td>1,179</td>
<td>1,151</td>
</tr>
<tr>
<td>SO\textsubscript{2}</td>
<td>152</td>
<td>151</td>
<td>141</td>
<td>140</td>
<td>128</td>
<td>166</td>
</tr>
<tr>
<td>PM\textsubscript{10}</td>
<td>149</td>
<td>129</td>
<td>156</td>
<td>150</td>
<td>148</td>
<td>117</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,662</strong></td>
<td><strong>1,561</strong></td>
<td><strong>1,517</strong></td>
<td><strong>1,399</strong></td>
<td><strong>1,455</strong></td>
<td><strong>1,434</strong></td>
</tr>
</tbody>
</table>

In Figure 3-1, the baseline emissions used in the four-factor analysis, consisting of the average annual emissions from 2016 through 2018, is represented by the orange line (facility emissions of 1,457 tons per year). This shows a 200 tons per year difference between 2014 emissions and roughly 100 tons per year difference between 2015 emissions. In looking at more recent years (2016-2019) the assumed baseline stays within roughly 50 tons per year of actual reported emissions. NDEP considers this a small margin and supports the use of a 2016 through 2018 baseline to represent normal operations considering the most up-to-date emissions data available at the time LNA submitted the LNA Analysis.

**Figure 3-1: Historical Annual Emissions Compared to Baseline Emissions used for Analysis**
4  PM$_{10}$ Control Determination

NDEP is relying on the following statement found on page 1-2 of the *LNA Analysis* in screening out consideration of additional PM$_{10}$ controls for all kilns at the Apex Plant:

“The facility kilns are subject to New Source Performance Standards for Lime Manufacturing Plants listed in 40 CFR Part 60, Subpart HH and/or the National Emissions Standards for Hazardous Air Pollutants listed in 40 CFR Part 63, Subpart AAAAA. The current baghouses used for control of particulate matter emissions from Apex’s kilns meet the applicable emission limits of Subparts HH as well as AAAAA and therefore, the baghouses meet the definition of best available control technology (BACT) for Rotary Lime Kilns. As a result, reasonable progress compliant controls are already in place and therefore no additional PM$_{10}$ control technologies are considered as a part of this Analysis.”

To further bolster the determination that the consideration of additional PM$_{10}$ control measures be screened out, NDEP cites the total PM$_{10}$ emissions among all four kilns amounting to 59.03 tons per year, found on page 4-1 of the *LNA Analysis*. Considering the existing effective controls paired with low facility emissions for PM$_{10}$, NDEP concludes that consideration of additional PM$_{10}$ controls should be screened out.

5  SO$_2$ Control Determination

5.1  Existing Control Measures

For existing SO$_2$ control measures at the Apex Plant kilns, NDEP refers to the following statement found on page 5-2 of the *LNA Analysis*:

“An important detail to consider is that SO$_2$ is inherently scrubbed within a lime kiln system due to the presence of large volumes of alkaline materials in the system, including the final product located within the kiln, limestone in the preheater, and lime kiln dust (LKD) in the baghouse. All kiln exhaust gases pass through each process where SO$_2$ is removed from the gas stream. A typical preheater kiln system, similar to Kilns 1, 2 and 3, scrubs approximately 90% of SO$_2$ (originating from both fuel sulfur and raw material sulfur) that would otherwise leave the stack. Process engineering at the Facility identifies that Kiln 4 is able to scrub approximately 99% of SO$_2$ (originating from both fuel sulfur and raw material sulfur) that would otherwise leave the stack. This reduction efficiency is determined using a balance on the sulfur entering and exiting the kiln, and the value falls within the range provided in the Portland Cement Association’s ‘Formation and Techniques for control of Sulfur Dioxide and Other sulfur Compounds in Portland Cement Kiln Systems.’ Though kiln technology differs between the cement and lime industry, it is assumed that inherent scrubbing efficiencies are similar. This in-situ scrubbing mechanism is commonly determined as BACT for preheater rotary kilns being permitted today.”

The inherent scrubbing of SO$_2$ emissions within the system of each lime kiln is not considered a control measure necessary to achieve reasonable progress, however, additional SO$_2$ control measures are considered further in the following section.

5.2  Potential New Control Measures

Considering that inherent scrubbing already achieves 90% to 99% SO$_2$ removal in the lime kilns, SO$_2$ baseline emissions are already relatively low, however, it is still possible to consider a fuel switch to
natural gas use only as a potential control measure to reduce \( \text{SO}_2 \) emissions. NDEP is relying on Lhoist’s consideration of potential additional \( \text{SO}_2 \) control measures outlined in Section 5 of the \textit{LNA Analysis}.

\textbf{Table 5-1: 4-Factor Summary of Technically Feasible \( \text{SO}_2 \) Control Measures}

<table>
<thead>
<tr>
<th>Control</th>
<th>Unit</th>
<th>Cost of Compliance</th>
<th>Time Necessary for Compliance</th>
<th>Energy and Non-Air Quality Impacts</th>
<th>Remaining Useful Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Switch – Use of Natural Gas Only</td>
<td>Kiln 2</td>
<td>$8,666,204/ton</td>
<td>10 years</td>
<td>Decreased overall plant efficiency resulting in increased electrical usage.</td>
<td>No facility closure date. Does not affect the annualized cost of the measure.</td>
</tr>
<tr>
<td></td>
<td>Kiln 4</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textbf{5.2.1 Identification of Technically Feasible Controls}

NDEP is relying on LNA’s identification of technically feasible controls in reducing \( \text{SO}_2 \) emissions outlined in pages 5-1 through 5-8 in the \textit{LNA Analysis}. As shown in the referenced sections, the conversion to Natural Gas use only on kilns 2 and 4 as an alternative low sulfur fuel is considered technically feasible.

As stated on page 5-5 of the \textit{LNA Analysis}, Kilns 1 and 3 are intended to produce dolomitic lime, which cannot be produced using 100% natural gas, as it would result in plugging of the kilns, as well as compromise the quality of the desired lime product. Kilns 2 and 4 are intended to produce HiCal lime product, which can be produced using 100% natural gas, however, LNA estimates a 10% reduction in production. The cost associated with the reduction in production is included in cost of compliance calculations.

Also stated on page 5-5 of the \textit{LNA Analysis}, increased usage of natural gas as fuel does have the ability to reduce \( \text{SO}_2 \) emissions, however, it can also result in an increase in \( \text{NO}_x \) emissions. Since \( \text{NO}_x \) is another primary visibility impairing pollutant of concern, total reductions used in developing a cost-effectiveness value are represented by the sum of \( \text{SO}_2 \) reductions and \( \text{NO}_x \) increases. Generally, none of LNA’s cost calculations for a fuel switch to increased natural gas usage resulted in a substantial \( \text{SO}_2 \) reduction without a relatively similar increase in \( \text{NO}_x \) emissions. This hinders any achievable reduction that would produce a cost-effective cost of compliance.

\textbf{5.2.2 Cost of Compliance}

The following cost calculations outlined in Table 5-2 are pulled from “Appendix B: \( \text{SO}_2 \) Control Cost Calculations” of the \textit{LNA Analysis}. NDEP is relying on this cost information in determining the cost-effectiveness of potential \( \text{SO}_2 \) control measures. As shown, the implementation of switching fuel use to 100% natural gas at Kiln 2 is not considered cost-effective at $8,666,204/ton reduced, well above the cost-effectiveness threshold set by NDEP. This is due to high annual costs contributed by a reduction in production that occurs when 100% natural gas is used instead of the preferred fuel blend for each kiln. For both Kiln 2 and Kiln 4, a fuel blend of roughly 65-75% coal and 25-35% coke is preferred in producing quality HiCal lime (outlined in Table 5-2 of the \textit{LNA Analysis}).

\textbf{Table 5-2: Cost of Compliance Breakdown for Potential \( \text{SO}_2 \) Control Measures}
<table>
<thead>
<tr>
<th></th>
<th>Kiln 2</th>
<th>Kiln 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annualized Capital Cost ($/year)</td>
<td>$90,333</td>
<td>$90,333</td>
</tr>
<tr>
<td>Total Annual Costs ($/year)</td>
<td>$8,708,565</td>
<td>$1,589,821</td>
</tr>
<tr>
<td>Baseline SO(_2) Emissions (tpy)</td>
<td>3.42</td>
<td>14.30</td>
</tr>
<tr>
<td>Baseline NO(_x) Emissions (tpy)</td>
<td>19.11</td>
<td>686.68</td>
</tr>
<tr>
<td>Baseline PM(_{10}) Emissions (tpy)</td>
<td>1.13</td>
<td>23.48</td>
</tr>
<tr>
<td>Baseline Total Emissions (tpy)</td>
<td>23.66</td>
<td>724.46</td>
</tr>
<tr>
<td>100% Natural Gas SO(_2) Emissions (tpy)</td>
<td>0.0027</td>
<td>0.005</td>
</tr>
<tr>
<td>100% Natural Gas NO(_x) Emissions (tpy)</td>
<td>21.52</td>
<td>848.89</td>
</tr>
<tr>
<td>100% Natural Gas PM(_{10}) Emissions (tpy)</td>
<td>1.1267</td>
<td>23.48</td>
</tr>
<tr>
<td>100% Natural Gas Total Emissions (tpy)</td>
<td>22.65</td>
<td>872.38</td>
</tr>
<tr>
<td>Total Tons Reduced</td>
<td>1.02</td>
<td>-147.92</td>
</tr>
<tr>
<td>Cost-Effectiveness ($/ton)</td>
<td>$8,666,204/ton</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Total capital costs include the cost of upgrading the gas train and burners and modifying the piping to be better suitable for the burning of 100% natural gas. The annualized cost was developed using a capital recovery factor of 0.079, which is based on a 4.75% interest rate. Generally, NDEP instructed all sources conducting a four-factor analysis for the second implementation period to utilize the most recent bank prime interest rate of 3.25%, however, it is clear that adjusting the capital recovery factor to reflect this would not lead to a cost-effectiveness value below the $/ton threshold set by NDEP.

5.2.3 Time Necessary for Compliance
NDEP is relying Lhoist’s estimated time necessary for compliance outlined in Section 5.4.2 on page 5-10 of the LNA Analysis that states the use of alternative fuels can be implemented during the second long-term planning period.

5.2.4 Energy and Non-Air Quality Environmental Impacts
There are no energy or non-air quality environmental impacts assumed in the consideration of switching to 100% use of natural gas at Kilns 2 and 4.

5.2.5 Remaining Useful Life of the Source
Currently, there is no federally enforceable closure date for the Lhoist Apex Plant. Because of this, an estimated control life of 20 years is assumed for the consideration of switching the fuel blend to 100% natural gas. The 20-year life of the potential control was factored into the capital recovery factor of 0.079, assuming an interest rate of 4.25%.

5.2.6 Determination for Potential New Measures to Control SO\(_2\) Emissions
Based on a cost-effectiveness value of $8,666,204/ton for Kiln 2, and net increase of visibility impairing pollutants (negative cost-effectiveness value) for Kiln 4, NDEP does not consider the replacement of coke and coal blends as fuel with 100% natural gas as controls necessary to achieve reasonable progress during the second implementation period of the Regional Haze Rule for Nevada.

6 NO\(_x\) Control Determination

6.1 Existing Control Measures
Kiln 3 and Kiln 4 at the Apex Plant currently use Low-NO\(_x\) Burners to achieve a 10% reduction in NO\(_x\) emissions at both kilns. Low-NO\(_x\) Burners were installed on Kiln 3 in August 2019 and Kiln 4 in April 2021. Low-NO\(_x\) Burners were not yet installed on Kiln 4 at the time LNA submitted the LNA Analysis and were
considered as a potential control measure because of this. For the purpose of NDEP’s control determination, NDEP is partially relying on the NO\textsubscript{x} four-factor analysis provided in the *LNA Analysis*, with minor adjustments made by NDEP to ensure a more up-to-date analysis that assumes all existing measures are already in use, as well as, ensure the methods used in the analysis agree with EPA’s Control Cost Manual.

The existing Low-NO\textsubscript{x} Burners on Kilns 3 and 4 are not currently listed or required in the Apex Plant’s air quality operating permit. NDEP considers these existing control measures as necessary to achieve reasonable progress during the second implementation period of Nevada’s Regional Haze SIP. New NO\textsubscript{x} limits are developed in Section 7 of this document to reflect the 10% reduction in NO\textsubscript{x} emissions at both kilns.

### 6.2 Potential New Control Measures

The use of Low-NO\textsubscript{x} Burners is considered as a potential additional control to further reduce NO\textsubscript{x} emissions at Kilns 1 and 2 only, as Kilns 3 and 4 already operate Low-NO\textsubscript{x} Burners. A 10% reduction in NO\textsubscript{x} is assumed when implementing Low-NO\textsubscript{x} Burners at Kilns 1 and 2. Selective Non-Catalytic Reduction (SNCR) is considered as a potential additional control to further reduce NO\textsubscript{x} emissions at all four kilns. Due to differences in kiln configuration, outlined in Section 6.1.2.2 and 6.2.2.2 of the *LNA Analysis*, a 20% NO\textsubscript{x} reduction is assumed when implementing SNCR on Kilns 1, 2, and 3, and a 50% NO\textsubscript{x} reduction is assumed for Kiln 4. NDEP agrees with LNA’s determination of achievable NO\textsubscript{x} reduction at each kiln when implementing SNCR. NDEP is relying on information submitted by LNA to evaluate the potential control measures outlined in Table 6-1 below. Cost-effectiveness values to determine cost of compliance, energy and non-air quality impacts, and the remaining useful life are pulled from the *LNA Analysis*. For time necessary for compliance, NDEP is relying on information submitted by LNA in the *LNA Comments* document.

<table>
<thead>
<tr>
<th>Control</th>
<th>Unit</th>
<th>Cost of Compliance</th>
<th>Time Necessary for Compliance</th>
<th>Energy and Non-Air Quality Impacts</th>
<th>Remaining Useful Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-NO\textsubscript{x} Burners (LNB)</td>
<td>Kiln 1</td>
<td>$850/ton</td>
<td>2 years</td>
<td>None</td>
<td>20 years</td>
</tr>
<tr>
<td></td>
<td>Kiln 2</td>
<td>$13,494/ton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selective Non-Catalytic Reduction (SNCR)</td>
<td>Kiln 1</td>
<td>$2,702/ton</td>
<td>2 years</td>
<td>Increase in energy and water usage. Potential ammonia slip.</td>
<td>20 years</td>
</tr>
<tr>
<td></td>
<td>Kiln 2</td>
<td>$37,847/ton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kiln 3</td>
<td>$4,995/ton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kiln 4</td>
<td>$764/ton</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6.2.1 Identification of Technically Feasible Controls

For the identification of technically feasible add-on NO\textsubscript{x} controls, NDEP is relying on Sections 6.1, 6.2, and 6.3 of the *LNA Analysis* that identifies Low-NO\textsubscript{x} Burners and SNCR as technically feasible add-on controls that could reduce NO\textsubscript{x} emissions at the Apex Plant kilns.
6.2.2 Cost of Compliance

NDEP is relying on the cost analyses that evaluate Low-NOx Burners and SNCR implementation at the Apex kilns outlined in “Appendix C: NOx Control Cost Calculations” of the LNA Analysis. Installation of Low-NOx Burners on Kilns 1 and 2 is relatively inexpensive, with no additional annual operating costs and annualized capital cost based on a capital recovery factor of 0.069 (3.25% interest for 20 years). Assuming 10% NOx reduction, Low-NOx Burners are cost effective for Kiln 1, achieving roughly 30 tons per year in NOx reduction. Low-NOx Burners are not considered cost-effective for Kiln 2 at $13,494/ton, achieving only 2 tons per year in NOx reduction. Kiln 2 does not have significant NOx emissions, restricting the amount of achievable reductions, and inflating the cost-effectiveness value. Table 6-2 below outlines the major cost components of Low-NOx Burners on Kilns 1 and 2.

Table 6-2: Cost of Compliance Breakdown for Low-NOx Burners

<table>
<thead>
<tr>
<th></th>
<th>Kiln 1</th>
<th>Kiln 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annualized Capital Cost ($/year)</td>
<td>$25,792</td>
<td>$25,792</td>
</tr>
<tr>
<td>Baseline NOx Emissions (tpy)</td>
<td>304</td>
<td>19</td>
</tr>
<tr>
<td>Total Tons NOx Reduced (tpy)</td>
<td>30.35</td>
<td>1.91</td>
</tr>
<tr>
<td>Cost-Effectiveness ($/ton)</td>
<td>$850/ton</td>
<td>$13,494/ton</td>
</tr>
</tbody>
</table>

Major cost components of implementing SNCR on all four kilns at the Apex Plant is outlined in Table 6-3 below. Annual capital costs are based on a capital recovery factor of 0.069 (3.25% interest for 20 years) and previous vendor quotes from implementation of SNCR at LNA’s Nelson Lime Plant. Annual operating costs include urea costs, operating labor, power usage and cost, and maintenance materials, all accounted for using methods agreeable to EPA’s Control Cost Manual. Cost-effectiveness values for Kilns 1, 3, and 4 fall below the threshold set by NDEP and are considered necessary to achieve reasonable progress. Much like considering Low-NOx Burners on Kiln 2, low baseline NOx emissions restrict the amount of achievable NOx reductions, inflating the cost-effectiveness value. NDEP does not consider SNCR on Kiln 2 as necessary to achieve reasonable progress.

Table 6-3: Cost of Compliance Breakdown for SNCR

<table>
<thead>
<tr>
<th></th>
<th>Kiln 1</th>
<th>Kiln 2</th>
<th>Kiln 3</th>
<th>Kiln 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annualized Capital Cost ($/year)</td>
<td>$40,679</td>
<td>$40,679</td>
<td>$40,679</td>
<td>$40,679</td>
</tr>
<tr>
<td>Annual Operating Costs ($/year)</td>
<td>$123,715</td>
<td>$104,003</td>
<td>$113,365</td>
<td>$221,665</td>
</tr>
<tr>
<td>Total Annual Costs ($/year)</td>
<td>$164,394</td>
<td>$144,681</td>
<td>$154,044</td>
<td>$262,344</td>
</tr>
<tr>
<td>Baseline NOx Emissions (tpy)</td>
<td>304</td>
<td>19</td>
<td>154</td>
<td>687</td>
</tr>
<tr>
<td>Control Efficiency</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>Total Tons NOx Reduced (tpy)</td>
<td>60.70</td>
<td>3.82</td>
<td>30.84</td>
<td>343.34</td>
</tr>
<tr>
<td>Cost-Effectiveness ($/ton)</td>
<td>$2,708/ton</td>
<td>$37,847/ton</td>
<td>$4,995/ton</td>
<td>$764/ton</td>
</tr>
</tbody>
</table>
6.2.3 Time Necessary for Compliance

For time necessary for compliance, NDEP is relying on the timeline estimated in LNA Email and LNA Comments. Initially, LNA estimated that Low-NO, Burners and SNCR could be implemented “during the second planning period” in the LNA Analysis. Since then, LNA has provided a more detailed time necessary for compliance, stating the following in the LNA Email:

“In regard to the timing of implementation of controls, LNA has already installed Low-NO, Burners on Kilns 3 and 4. A Low-NO, Burner would still be required for Kiln 1 and SNCR would be required for Kilns 1, 3, and 4. LNA expects a minimum of two years would be needed to properly design, construct, and optimize additional controls from the time a permit condition requiring the additional controls became enforceable. Applicable emission rates would first be calculated 30-days and 12-months after, as applicable.”

Furthermore, LNA provided a compliance deadline date based on a two-year timeline in the LNA Comments, stating:

“LNA proposes a compliance deadline of August 1, 2024, or two years after the Regional Haze control requirements are included in a federally enforceable operating permit, whichever is later.”

NDEP agrees on the proposed timeline for compliance, however, will be changing the requirement to reflect two years after the approval of Nevada’s regional haze SIP instead of two years after the requirements are included in a federally enforceable operating permit. This allows the facility to ensure that the proposed controls and associated limits are required under an approved SIP before implementing such measures. NDEP is also removing the August 1, 2024 deadline as Nevada’s RH SIP will be submitted to USEPA in August 2022. This inherently assumes that two years after approval of Nevada’s regional haze SIP will occur later than August 1, 2024.

6.2.4 Energy and Non-Air Quality Impacts

NDEP is relying on the LNA Analysis in Section 6.4.4.3 that identifies energy and non-air quality impacts from the implementation of SNCR. An expected decrease in efficiency throughout the facility as significant energy and water use is increased to support the SNCR technology is represented as additional power costs in the evaluation of cost of compliance. An additional annual power cost of $16,272 per kiln is estimated based on LNA’s previous experience in implementing SNCR on Lhoist’s Nelson facility. It is also acknowledged that the use of SNCR, and urea as a reagent, may introduce ammonia slip to the kilns. This is not accounted for in the cost calculations.

No energy and non-air quality impacts were assumed for the implementation of Low-NO, Burners.

6.2.5 Remaining Useful Life of the Source

Currently, there is no federally enforceable closure date for the Lhoist Apex Plant. Because of this, an estimated control life of 20 years is assumed for the consideration of Low-NO, Burners and SNCR (EPA Control Cost Manual recommends a 20-year life for both controls). The 20-year life of the potential control was factored into the capital recovery factor of 0.069, assuming an interest rate of 3.25%.

6.2.6 Determination for Potential New Measures to Control NO, Emissions

As stated previously, NDEP considers the implementation of Low-NO, Burners on Kiln 1, and SNCR on Kilns 1, 3, and 4, as cost-effective and necessary to achieve reasonable progress during the second
implementation period of the Regional Haze Rule for Nevada. New NO\textsubscript{x} limits, and other associated requirements, are outlined in the following section of this document.

7 Reasonable Progress Requirements

NDEP considers the continued use of existing Low-NO\textsubscript{x} Burners on Kilns 3 and 4 as necessary to achieve reasonable progress. NDEP also considers the implementation of Low-NO\textsubscript{x} Burners on Kiln 1, and SCNR on Kilns 1, 3, and 4, as necessary to achieve reasonable progress. NDEP proposes the following emissions limitations, compliance schedules, and other measures necessary to make reasonable progress as conditions to be added to the Apex Plant’s air quality operating permit issued by Clark County Department of Environment and Sustainability.

7.1 Emission Limitation and Averaging Period Requirements

NDEP is partially relying on the proposed NO\textsubscript{x} emission limits submitted by LNA in LNA Email with adjustments made to reductions assumed for Kiln 3. In LNA’s proposal, a 30 ton per year reduction in NO\textsubscript{x} emissions is assumed for Kiln 3 to reflect a 20% reduction achieved through the use of SNCR. NDEP has adjusted this to incorporate the assumed 10% NO\textsubscript{x} reduction achieved through the use of a Low-NO\textsubscript{x} Burner installed on Kiln 3 in 2019. This is necessary as the baseline years used to calculate new NO\textsubscript{x} limits are the three-year average from 2016 through 2018. Table 7-1 outlines NDEP’s adjusted NO\textsubscript{x} reductions through the implementation of Low-NO\textsubscript{x} Burners and SNCR for Kilns 1, 3, and 4.

<table>
<thead>
<tr>
<th>Kiln</th>
<th>NO\textsubscript{x} Baseline (tpy)</th>
<th>LNB Control Efficiency</th>
<th>LNB NO\textsubscript{x} Reduction (tpy)</th>
<th>Reduced NO\textsubscript{x} (tpy)</th>
<th>SNCR Control Efficiency</th>
<th>SNCR NO\textsubscript{x} Reduction (tpy)</th>
<th>Total NO\textsubscript{x} Reduction (tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 1</td>
<td>304</td>
<td>10%</td>
<td>30.4</td>
<td>273.6</td>
<td>20%</td>
<td>54.72</td>
<td>85.12</td>
</tr>
<tr>
<td>Kiln 2</td>
<td>19</td>
<td></td>
<td></td>
<td>350</td>
<td></td>
<td>350</td>
<td>43.12</td>
</tr>
<tr>
<td>Kiln 3</td>
<td>154</td>
<td>10%</td>
<td>15.4</td>
<td>138.6</td>
<td>20%</td>
<td>27.72</td>
<td>43.12</td>
</tr>
<tr>
<td>Kiln 4</td>
<td>687</td>
<td>10%</td>
<td>68.7</td>
<td>618.3</td>
<td>50%</td>
<td>309.15</td>
<td>377.85</td>
</tr>
<tr>
<td>Total</td>
<td>1164</td>
<td></td>
<td>114.5</td>
<td>391.59</td>
<td></td>
<td>506.09</td>
<td></td>
</tr>
</tbody>
</table>

Assuming these proposed reductions in NO\textsubscript{x} emissions at the Apex Plant kilns, the following new NO\textsubscript{x} emission rates are calculated and shown in Table 7-2.

<table>
<thead>
<tr>
<th>Kiln</th>
<th>Production (tpy)</th>
<th>NO\textsubscript{x} (tpy)</th>
<th>NO\textsubscript{x} (lb/tlp)</th>
<th>NO\textsubscript{x} Reduction (tpy)</th>
<th>NO\textsubscript{x} (tpd)</th>
<th>NO\textsubscript{x} (lb/tlp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 1</td>
<td>109,500</td>
<td>343</td>
<td>6.27</td>
<td>85</td>
<td>258</td>
<td>0.71</td>
</tr>
<tr>
<td>Kiln 2</td>
<td>109,500</td>
<td>350</td>
<td>6.39</td>
<td>0</td>
<td>350</td>
<td>0.96</td>
</tr>
<tr>
<td>Kiln 3</td>
<td>146,000</td>
<td>478</td>
<td>6.55</td>
<td>43</td>
<td>435</td>
<td>1.19</td>
</tr>
</tbody>
</table>
Based on these emission rates, NDEP proposes the following emissions limitations and averaging periods to be put into the facility’s air quality operating permit:

1. **3.75 tons per kiln operating day** based on a 30-day rolling average. Total tons of NO\textsubscript{X} from all operating kilns would be totaled on a daily basis. Each day’s total would be averaged over 30 days and compared to the 3.75 TPD emission limit. If no kilns operated on a particular day, the day would be skipped when calculating the 30-day average.

2. **3.59 lb / ton of lime produced** based on a 12-month rolling average. Total tons of NO\textsubscript{X} from all operating kilns would be totaled for each calendar month and added to the total tons of NO\textsubscript{X} from the preceding 11 months. Total tons of NO\textsubscript{X} from all operating kilns during this 12-month period is then divided by total tons of lime produced during the same 12-month period. You will notice the 3.59 lb/tlp emission limit is higher than the calculated value shown in Table 7-2 (3.26 lb/tlp). A 10% margin is added to the calculated NO\textsubscript{X} limit of 3.26 lb/tlp, resulting in 3.59 lb/tlp across all kilns. This is to account for production variability and inefficiencies in circumstances where demand does not account for the full allowable production rate.

### 7.2 Monitoring, Recordkeeping, and Reporting Requirements

NDEP is proposing the following monitoring, recordkeeping, and reporting requirements.

**Monitoring:**

1. Effective no later than two years after the EPA’s approval of the controls determination associated with the SIP, to demonstrate continuous, direct, compliance with the Kilns 1-4 (EUs: K102, K202, K302, and K402) emissions limits for NO\textsubscript{X} as specified in Conditions 3.2.1 and 3.2.2, the permittee shall calibrate, maintain, operate, and certify the continuous emissions monitoring system (CEMS) for NO\textsubscript{X} diluent gas and stack exhaust gas.

2. Effective no later than two years after the EPA’s approval of the controls determination associated with the SIP, the permittee shall operate the CEMS at all times the Kilns 1-4 (EUs: K102, K202, K302, and K402) are in use, except during malfunctions, maintenance, calibration, and repairs of the CEMS and:
   a. Shall include an automated data acquisition and handling system.
   b. Subject to the provisions of 40 CFR 60 Subpart A, Appendix B and F, as applicable.

3. Effective no later than two years after the EPA’s approval of the controls determination associated with the SIP, the CEMS shall monitor and record at least the following data for each kiln (EUs: K102, K202, K302, and K402):
   a. Exhaust gas concentration of NO\textsubscript{X} and diluent O\textsubscript{2};
   b. Exhaust gas flow rate;
c. Hourly emissions of NO\textsubscript{X};

d. Hours of CEMS operation; and

e. Dates and hours of CEMS downtime.

4. The permittee shall conduct Relative Accuracy Test Audits (RATA) and other periodic checks of the NO\textsubscript{X} and O\textsubscript{2} CEMS at least annually, as required by 40 CFR 60.

5. Effective no later than two years after the EPA’s approval of the controls determination associated with the SIP, the permittee shall monitor each kiln (EUs: K102, K202, K302, and K402) to demonstrate compliance with the NO\textsubscript{X} emission limit of 3.75 tons per day. Each rolling kiln 30-operating-day average will be calculated per the following procedure:

   a. The permittee shall measure the NO\textsubscript{X} emissions using CEMS and sum the hourly pounds of NO\textsubscript{X} emitted from Kilns 1, 2, 3, and 4 for the current operating-day period and the preceding 29-operating-day period for each kiln to obtain the total pounds of NO\textsubscript{X} for the 30-operating-day period.

   b. The permittee shall divide the total pounds of NO\textsubscript{X} by 2000 to calculate the total tons of NO\textsubscript{X} emitted over the most recent kiln 30-operating-day period.

   c. The permittee shall divide the total tons of NO\textsubscript{X} by 30 to calculate the rolling 30-operating-day NO\textsubscript{X} emission rate from all kilns.

   d. The permittee shall estimate NO\textsubscript{X} emissions during periods of CEMS downtime using the existing data substitution plan.

6. Effective no later than two years after the EPA’s approval of the controls determination associated with the SIP, the permittee shall monitor each kiln to demonstrate compliance with the NO\textsubscript{X} emission limit of 3.59 lb/tp (EUs: K102, K202, K302, and K402). Each 12-month rolling NO\textsubscript{X} emission rate will be calculated within 30 days following the end of each calendar month per the following procedure:

   a. The permittee shall measure the NO\textsubscript{X} emissions using CEMS and sum the hourly pounds of NO\textsubscript{X} emitted from each kiln for the month just completed and the 11 months preceding to calculate the total pounds of NO\textsubscript{X} emitted over the most recent 12-month period.

   b. The permittee shall sum the total lime production, in tons, produced from Kilns 1, 2, 3, and 4 during the month just completed and the 11 months to calculate the total lime product produced over the most recent 12-month period. Total lime production is to consist of both saleable and any waste lime produced.

   c. The permittee shall divide the total pounds of NO\textsubscript{X} by the total tons of lime product to calculate the 12-month rolling NO\textsubscript{X} emission rate in lb/tp.

   d. The permittee shall estimate NO\textsubscript{X} emissions during periods of CEMS downtime using the existing data substitution plan.

7. Effective no later than two years after the EPA’s approval of the controls determination associated with the SIP, the permittee shall monitor the amount of the reagent used for the SNCR for each kiln hourly (EUs: K102, K302, and K402).
**Recordkeeping:**

1. The permittee shall maintain the following records on-site and include, at a minimum:
   
   a. CEMS data for each kiln (EUs: K102, K202, K302, and K402); and  
   
   b. Hourly records of the amount of reagent used for the SNCR for each kiln (EUs: K102, K302, and K402).

2. The permittee shall maintain the following records on-site that require semiannual reporting and include, at a minimum:
   
   a. Daily, consecutive 30-day average of total NO\textsubscript{X} in tpd from all kilns (EUs: K102, K202, K302, and K402);  
   
   b. Monthly, consecutive 12-month average of total NO\textsubscript{X} in lb/tp from all kilns (EUs: K102, K202, K302, and K402);  
   
   c. The magnitude and duration of excess emissions, notification, monitoring system performance, malfunctions, corrective actions taken, and other data required by 40 CFR Part 60 and the CEMS Quality Assurance Plan (reported as required by Section 4.4.4 of this permit); and  
   
   d. CEMS audit results or accuracy checks, as required by 40 CFR Part 60 and the CEMS Quality Assurance Plan.

**Reporting:**

1. The permittee shall submit semiannual monitoring reports to DAQ. \([AQRI2.4.3.4(a)(10)]\)

2. The following requirements apply to semiannual reports: \([AQRI2.4.3.4(a)(10)]\)
   
   a. The report shall include item listed in Section 3.5 for semiannual reporting.  
   
   b. The report shall be based on a calendar semiannual period, which includes partial reporting periods.  
   
   c. The report shall be received by DAQ within 30 calendar days after the semiannual period.

**7.3 Compliance Deadline**

As stated above, NDEP is relying on a compliance deadline of no later than 2 years after approval of the applicable controls determination associated with Nevada’s second state implementation plan for regional haze by the USEPA.
Confidentiality Review

Lhoist North America requested that some information used in Apex Plant’s 4-Factor Analysis be kept confidential for business purposes. NDEP has reviewed and confirmed that the request to keep this information confidential agrees with the NRS 445B.570(6), which defines “confidential information” as:

1. Relate to dollar amounts of production or sales;
2. Relate to processes or production unique to the owner or operator; or
3. If disclosed, would tend to affect adversely the competitive position of the owner or operator.

Lhoist North America identified 5 pieces of information as confidential. NDEP reviewed the information and confirmed that the information is reasonable for the 4-factor analysis and compares to other publicly available figures and indicated which definition (e.g. 1, 2, or 3) it pertains to. The below descriptions of the confidential information does not list actual confidential data.

<table>
<thead>
<tr>
<th>Confidential Information</th>
<th>Data/Figures Reasonable?</th>
<th>Definition it Pertains to</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNA Nelson Plant SNCR process flow diagram</td>
<td>Reasonable. Documentation supports LNA’s assumptions in implementing SNCR at Apex.</td>
<td>2</td>
</tr>
<tr>
<td>Urea Cost – Vendor Quote</td>
<td>Reasonable. Confirms the source’s specific urea cost. Price is within a reasonable range of national averages.</td>
<td>1</td>
</tr>
<tr>
<td>LNA Nelson Plant SNCR Vendor Quote</td>
<td>Reasonable. Documentation supports LNA’s assumptions in SCNR cost at Apex.</td>
<td>1</td>
</tr>
<tr>
<td>LNA Apex Plant Kiln-Specific Sulfur Balances</td>
<td>Reasonable. Confirms SO2 baseline emissions and inherent dry scrubbing.</td>
<td>2</td>
</tr>
<tr>
<td>LNA Apex Plant 2020 Fuel Budget</td>
<td>Reasonable. Documentation confirms source specific fuel costs and amount of fuel used. Prices are within reasonable ranges of national averages.</td>
<td>3</td>
</tr>
</tbody>
</table>
Appendix B.1.b - Lhoist North America Four-Factor Analysis for Apex Plant
REGIONAL HAZE SECOND PLANNING PERIOD
FOUR-FACTOR ANALYSIS
Lhoist North America > Apex Lime Plant > Source 00003

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(916) 444-6666

March 2020
(Revised June 2020)
(Revised November 2020)
(Revised March 2021)

Project 190506.0063

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1. EXECUTIVE SUMMARY

This report documents the results of a four-factor control analysis of the four lime kilns at the Lhoist North America of Arizona Inc. (Lhoist) Apex lime plant (The Facility). All kilns are rotary, preheater type kilns that can produce between 300 and 1,350 tons per day of lime, each. This report is provided in response to the Nevada Department of Environmental Protection (NDEP) request letter dated August 12, 2019 and subsequent clarification dated March 3, 2020, May 28, 2020, August 24, 2020, and January 28, 2021.

The Facility was evaluated during the first regional haze planning period and it was determined that the Facility did not significantly contribute to visibility impairment at nearby Class I areas and a was not a Best Available Retrofit Technology (BART) eligible source. According to Chapter 5 of the Nevada State Implementation Plan (SIP) for the first planning period, "A BART-eligible source that is responsible for a 1.0 deciview (dv) change or more is considered to "cause or contribute" to visibility impairment. Although the appropriate threshold may vary, the USEPA guidelines indicate that the cause or contribution threshold used for BART applicability should not exceed 0.5 dv. Thus, Nevada considers a BART-eligible source that is responsible for a 0.5 dv increase or more to cause or contribute to visibility impairment. Any BART-eligible source determined to cause or contribute to visibility impairment in any mandatory Class I area is subject to a BART determination." Table 5-3 of the SIP then goes on to show that the Facility, formerly Chemical Lime Company, is a BART exempt source because the 98th percentile delta deciview at the nearest Class I source (Grand Canyon) is only 0.05. A five-factor analysis was not conducted for the Facility at that time.

During the second planning period for Regional Haze, the U.S. EPA’s guidelines in 40 CFR Part 51.308 are used to evaluate control options for the lime kilns. In establishing a reasonable progress goal for any mandatory Class I Federal area within the State, the State must consider the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected sources, and include a demonstration showing how these four factors are taken into consideration in selecting the goal (40 CFR 51.308(d)(1)(i)(A)). The most recent guidance, released by the EPA on August 20, 2019, additionally states in reference to Step 5 of the SIP development that:

_Importantly, this section assumes that the state will consider visibility benefits as part of the analysis. Section 51.308(f)(2)(i) of the Regional Haze Rule requires consideration of the four factors listed in CAA section 169A(g)(1) and does not mention visibility benefits. However, neither the CAA nor the Rule suggest that only the listed factors may be considered. Because the goal of the regional haze program is to improve visibility, it is reasonable for a state to consider whether and by how much an emission control measure would help achieve that goal._

As such, all cost effectiveness figures presented in this document should be considered in the context of the original visibility modeling for the first planning period, which demonstrated that the Facility’s visibility impact was 1/10th of Nevada’s eligibility threshold at all surrounding Class I areas.

The purpose of this report is to provide information to NDEP regarding potential PM$_{10}$, SO$_2$ and NO$_x$ emission reduction options for the Facility’s four lime kilns with the knowledge that the Facility’s visibility impairing impacts are minimal. Based on the Regional Haze Rule, associated EPA guidance, and NDEP’s request, Lhoist understands that NDEP will only move forward with requiring emission reductions from the Lhoist Apex lime

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1 Kilns 1 and 2 are authorized for an annualized throughput limit of 300 tons per day. Kiln 3 is authorized for a throughput limit of 400 tons per day. Kiln 4 is authorized for a throughput limit of 1,350 tons per day.

kilns if the emission reductions can be demonstrated to contribute to reasonable progress and provide the most cost effective controls among all options available to NDEP. In other words, control options are only relevant for the Regional Haze Rule if they result in a reduction in the existing visibility impairment in a Class I area needed to meet reasonable progress goals.

The report identifies the following potential control technologies for the Facility's lime kilns:

**PM$_{10}$ Emission Reduction Options**

- The Facility kilns are subject to New Source Performance Standards for Lime Manufacturing Plants listed in 40 CFR Part 60, Subpart HH and/or the National Emissions Standards for Hazardous Air Pollutants listed in 40 CFR Part 63, Subpart AAAAA. The current baghouses used for control of particulate matter emissions from Apex's kilns meet the applicable emission limits of Subparts HH as well as AAAAA and therefore, the baghouses meet the definition of best available control technology (BACT) for Rotary Lime Kilns. As a result, reasonable progress compliant controls are already in place and therefore no additional PM$_{10}$ control technologies are considered as a part of this Analysis.

**SO$_2$ Emission Reduction Options**

- **Alternative Fuel Scenarios:** Alternative fuels are considered as a feasible possibility for reducing SO$_2$ emissions and were evaluated on a kiln by kiln basis. Currently the kilns each fire a unique ratio of coal, coke, and natural gas depending on the product being produced. Switching to all coal, all diesel, or all natural gas could potentially reduce SO$_2$ emissions but increase the emissions of NO,$_x$, another visibility impairing pollutant. However, firing diesel is not an available reduction option for the Facility. Lhoist is not aware of any kilns that have successfully fired 100% diesel fuel, and there are extraordinary technical barriers associated with implementing an unproven technology. Natural gas is available at this location; however based on the fuel blends required for the products being produced at each kiln, only Kilns 2 and 4 are capable of burning 100% natural gas without impacting product quality; however, there would be an impact to the production capability and a significant capital investment to accommodate this change. Replacing coke with a lower sulfur fuel such as coal or natural gas could also be considered as a potential option. However, there are several major roadblocks impeding the complete replacement of coke for SO$_2$ reductions: 1) due to operational restrictions at the Apex kilns, each kiln has a maximum coal usage which it cannot exceed without negatively impacting operations, as increased coal usage leads to potential plugging of the preheater and ash rings in the kiln, resulting in more frequent shut-downs, cleanings, and restarts of the kiln$^3$, 2) two types of lime are produced at Apex: hi-cal (HiCal) and dolomitic (dolo) lime, each having a specific fuel blend which results in the desired product quality. At this time, Kiln 3’s primary use is for the production of dolomitic lime and Kilns 1, 2, and 4 for hi-cal; however, should Kiln 3 go down, Kiln 1 would be switched to dolomitic production and thus the kilns need the flexibility to burn multiple fuel blends, and 3) coal and natural gas produce more NO,$_x$ than coke, which is also a visibility impairing precursor pollutant.

Given the operational limitations, the significant capital investment required, and associated negative impact on NO,$_x$ emissions, it is not possible to suggest the replacement of any given fuel with another and claim with any certainty that the replacement provides any benefits towards reasonable progress.

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$^3$ EPA August 20, 2019 "Guidance on Regional Haze State Implementation Plans for the Second Implementation Round", states that "States may also determine that it is unreasonable to consider some fuel-use changes because they would be too fundamental to the operation and design of a source."
> **Inherent Dry Scrubbing:** Dry scrubbing of SO₂ is inherent to the design of rotary lime kilns, as combustion gasses pass over calcined and partially calcined materials in the kiln, preheater, and baghouse. The various alkaline components contained in the processed raw materials reduce approximately 90% (for Kilns 1, 2 and 3) to 99% (for Kiln 4) of the SO₂ that would otherwise leave the stack.

> All other SO₂ reduction options are determined to be technically infeasible at this time.

**NOₓ Emission Reduction Options**

> **SNCR:** Selective non-catalytic reduction (SNCR) has not been widely implemented on lime kilns in the United States. Lhoist has conducted a trial study at another facility in order to determine whether SNCR technology can be used for the reduction of NOₓ at preheater lime kilns. The results of this study showed that SNCR was technically feasible at the facility's preheater lime kilns; however, this example of SNCR installation on a preheater rotary lime kiln does not necessarily transfer to other lime kilns. Effectiveness of SNCR is highly site and source dependent, with a variety of factors having the potential to heavily influence the quantities of NOₓ controlled. Based on this information, Lhoist determined SNCR to be technically feasible for the Facility's kilns, but will assume a conservatively low control efficiency for select sources when determining cost effectiveness to account for the variability of effectiveness between individual kilns. Cost calculations were conducted for the installation of SNCR on all the facility kilns on an individual and combined basis. SNCR has been demonstrated as an effective control technology for NOₓ at similar Lhoist facilities and has fairly low costs for Apex Kilns 1 and 4; however, as discussed further in Section 6 of this Analysis, there are significant barriers associated with the implementation of SNCR on these kilns. The installation of SNCR on Kiln 2 is not cost effective at a total cost of $42,014 per ton NOₓ removal. This cost is above the typical $5,000/ton removal cost threshold implemented during the first planning period.

> **Low-NOₓ Burners (LNB):** The main principle of the LNB is stepwise or staged combustion and localized exhaust gas recirculation (i.e., at the flame). LNBs are designed to reduce flame turbulence, delay fuel/air mixing, and establish fuel-rich zones for initial combustion. The longer, less intense flames resulting from the staged combustion lower flame temperatures and reduce thermal NOₓ formation. Kiln 3 currently operates a KFS burner which is classified as a low NOₓ burner, while Kilns 1, 2, and 4 do not operate LNBs. The cost of installing and operating LNBs on all kilns have been evaluated and are estimated at a combined $709 per ton NOₓ removal.

> All other NOₓ reduction options are determined to be technically infeasible at this time.

Also note that Kiln 4 was permitted under EPA's PSD program and was determined to meet BACT at the time the permit was issued in October, 1995. Because the original visibility modeling for the first planning period demonstrated that the Facility has minimal impacts at all surrounding Class I areas, Lhoist expects that installation of LNB will contribute enough NOₓ reductions to meet reasonable progress for the second round of regional haze.

This report outlines Lhoist's evaluation of possible options for reducing the emissions of PM₁₀, NOₓ and SO₂ at the Facility in North Las Vegas, Nevada. The installation of LNBs on Kilns 1, 2, and 4 has been identified as a technically feasible and cost effective reduction option for the Facility. There are currently no additional technically feasible and cost-effective reduction options available for the Facility that would achieve additional reasonable progress goals for visibility impacts. Therefore, the emissions provided for the 2028 on-the-books/on-the-way modeling baseline will assume the installation of the economically feasible control technologies and use the reduced emission rates as compared to those used in the "control scenario" for the Facility.
2. INTRODUCTION AND BACKGROUND

In the 1977 amendments to the Clean Air Act (CAA), Congress set a national goal to restore national parks and wilderness areas to natural conditions by preventing any future, and remedying any existing, man-made visibility impairment. On July 1, 1999, the U.S. EPA published the final Regional Haze Rule (RHR). The objective of the RHR is to restore visibility to natural conditions in 156 specific areas across with United States, known as Class I areas. The Clean Air Act defines Class I areas as certain national parks (over 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 acres), and international parks that were in existence on August 7, 1977.

The RHR requires States to set goals that provide for reasonable progress towards achieving natural visibility conditions for each Class I area in their state. In establishing a reasonable progress goal for a Class I area, the state must (40 CFR 51.308(d)(i)):

(A) consider the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected sources, and include a demonstration showing how these factors were taken into consideration in selecting the goal.

(B) Analyze and determine the rate of progress needed to attain natural visibility conditions by the year 2064. To calculate this rate of progress, the State must compare baseline visibility conditions to natural visibility conditions in the mandatory Federal Class I area and determine the uniform rate of visibility improvement (measured in deciviews) that would need to be maintained during each implementation period in order to attain natural visibility conditions by 2064. In establishing the reasonable progress goal, the State must consider the uniform rate of improvement in visibility and the emission reduction.

With the second planning period under way for regional haze efforts, there are a few key distinctions from the processes that took place during the first planning period. Most notably, the second planning period analysis will distinguish between “natural” and “anthropogenic” sources. Using a Photochemical Grid Model (PGM), the EPA will establish what are, in essence, background concentrations both episodic and routine in nature to compare manmade source contributions against.

The purpose of this report is to provide information to NDEP regarding potential PM$_{10}$, SO$_2$ and NO$_x$ emission reduction options for the Facility’s four lime kilns with the knowledge that the Facility’s visibility impairing impacts are minimal. Based on the Regional Haze Rule, associated EPA guidance, and NDEP’s request, Lhoist understands that NDEP will only move forward with requiring emission reductions from the Lhoist Apex lime kilns if the emission reductions can be demonstrated to contribute to reasonable progress and provide the most cost effective controls among all options available to NDEP. In other words, control options are only relevant for the Regional Haze Rule if they result in a reduction in the existing visibility impairment in a Class I area needed to meet reasonable progress goals.

The information presented in this report considers the following four factors for the emission reductions:

Factor 1. Costs of compliance
Factor 2. Time necessary for compliance
Factor 3. Energy and non-air quality environmental impacts of compliance
Factor 4. Remaining useful life of the kilns
Factors 1 and 3 of the four factors that are listed above are considered by conducting a step-wise review of emission reduction options in a top-down fashion similar to the top-down approach that is included in the EPA RHR guidelines for conducting a review of Best Available Retrofit Technology (BART) for a unit. These steps are as follows:

Step 1. Identify all available retrofit control technologies
Step 2. Eliminate technically infeasible control technologies
Step 3. Evaluate the control effectiveness of remaining control technologies
Step 4. Evaluate impacts and document the results

Factor 4 is also addressed in the step-wise review of the emission reduction options, primarily in the context of the costing of emission reduction options and whether any capitalization of expenses would be impacted by limited equipment life. Once the step-wise review of control options was completed, a review of the timing of the emission reductions is provided to satisfy Factor 2 of the four factors.

Additionally, as mentioned in Section 1, the visibility modeling that was conducted for the first planning period is taken into consideration as an additional factor as the analysis demonstrated the Facility was a BART exempt source.

A review of the four factors for SO2 and NOx can be found in Sections 5 and 6 of this report, respectively. PM10 has not been evaluated in depth as the Apex kiln baghouses meet BACT for rotary lime kilns and no further emission reduction technologies are considered feasible at this time. Section 4 of this report includes information on the Facility's kilns' existing/baseline emissions.

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4 The BART provisions were published as amendments to the EPA's RHR in 40 CFR Part 51, Section 308 on July 5, 2005.
5 References to BART and BART requirements in this Analysis should not be construed as an indication that BART is applicable to the Lhoist Apex facility.

Lhoist North America of Arizona Inc. | Apex Plant Four Factor Analysis
Trinity Consultants
3. SOURCE DESCRIPTION

The Lhoist's Apex Plant is located in Clark County, approximately 32 kilometers north of North Las Vegas, Nevada. The nearest Class I area to the plant is Grand Canyon National Park. At its closest point, it is approximately 89 kilometers east of the Facility.

The facility operates four horizontal rotary preheater lime kilns. Kilns 1 through 3 are nearly identical in design and operations, although constructed at different times. Kilns 1 and 2 have a nominal production rate of 300 tons per day and Kiln 3 has a nominal production rate of 400 tons per day. Kiln 4 is a newer kiln and has a nominal lime production rate of 1,350 tons per day.

All kilns can utilize natural gas, coal, and petroleum coke as fuels for the lime production process. Typical annual fuel usage rates for all kilns combined are approximately 250,000 million British thermal units (MMBTU) per year of natural gas (at 19,500 Btu/lb), 94,000 tons per year of coal (at 11,500 Btu/lb) and 20,000 tons per year of coke (at 13,800 Btu/lb).

Further details of the fuel throughputs and emission rates are provided in Section 4.
4. EXISTING EMISSIONS

This section summarizes emission rates that are used as baseline rates in the four factor analyses presented in Sections 5, 6, and 7 of this report.

Baseline annual emissions for PM$_{10}$, NO$_x$ and SO$_2$ are calculated by taking the average of emissions over the three year baseline period of 2016-2018. These same baseline rates are provided to NDEP for use in the on-the-books/on-the-way basis for modeling because kiln operations are expected to be similar between now and 2028. The baseline annual emission rates are summarized in Table 4-1.

Table 4-1. Annual Baseline Emission Rates

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Kilns 1-4, Combined (ton/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO$_x$</td>
<td>1,163.51</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>135.31</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>59.03</td>
</tr>
</tbody>
</table>
5. SO₂ FOUR FACTOR EVALUATION

The four-factor analysis is satisfied by conducting a stepwise review of emission reduction options in a top-down fashion. The steps are as follows:

1. Identify all available retrofit control technologies
2. Eliminate technically infeasible control technologies
3. Evaluate the control effectiveness of remaining control technologies
4. Evaluate impacts and document the results

Cost (Factor 1) and energy / non-air quality impacts (Factor 3) are key factors determined in Step 4 of the stepwise review. However, timing for compliance (Factor 2) and remaining useful life (Factor 4) are also discussed in Step 4 to fully address all four factors as part of the discussion of impacts. Factor 4 is primarily addressed in the context of the costing of emission reduction options and whether any capitalization of expenses would be impacted by a limited equipment life.

The baseline SO₂ emission rate that is used in the SO₂ four-factor analysis is summarized in Table 4-1. The basis of the emission rate is provided in Section 4 of this report. As limestone is converted to lime in the calcination process, the kilns have an inherent limestone/lime scrubbing process which reduce SO₂ emissions from the source. This inherent control is commonly determined as BACT for preheater rotary kilns being permitted today.⁶

5.1. STEP 1: IDENTIFICATION OF AVAILABLE RETROFIT SO₂ CONTROL TECHNOLOGIES

Sulfur dioxide, SO₂, is generated during fuel combustion in a lime kiln, as the sulfur in the fuel is oxidized by oxygen in the combustion air. Sulfur in the raw material (limestone) can also contribute to a kiln's SO₂ emissions, though the proportion of sulfur contained in the raw material is much less than that of the fuel.

Step 1 of the top-down control review is to identify available retrofit control options for SO₂. The available SO₂ retrofit control technologies for the Facility's kilns are summarized in Table 5-1. The retrofit controls include both add-on controls that eliminate SO₂ after it is formed and switching to lower sulfur fuels which reduces the amount of sulfur added to the process.

<table>
<thead>
<tr>
<th>SO₂ Control Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Sorbent Injection</td>
</tr>
<tr>
<td>Alternative Low Sulfur Fuels</td>
</tr>
<tr>
<td>Wet Scrubbing</td>
</tr>
<tr>
<td>Semi-Wet/Dry Scrubbing</td>
</tr>
</tbody>
</table>

⁶ See Mississippi Lime permit (IL) from December 2010.
An important detail to consider is that SO₂ is inherently scrubbed within a lime kiln system due to the presence of large volumes of alkaline materials in the system, including the final product located within the kiln, limestone in the preheater, and lime kiln dust (LKD) in the baghouse. All kiln exhaust gases pass through each process where SO₂ is removed from the gas stream. A typical preheater kiln system, similar to Kilns 1, 2 and 3, scrubs approximately 90% of SO₂ (originating from both fuel sulfur and raw material sulfur) that would otherwise leave the stack. Process engineering at the Facility identifies that Kiln 4 is able to scrub approximately 99% of SO₂ (originating from both fuel sulfur and raw material sulfur) that would otherwise leave the stack. This reduction efficiency is determined using a balance on the sulfur entering and exiting the kiln, and the value falls within the range provided in the Portland Cement Association’s “Formation and Techniques for control of Sulfur Dioxide and Other sulfur Compounds in Portland Cement Kiln Systems.” Though kiln technology differs between the cement and lime industry, it is assumed that inherent scrubbing efficiencies are similar. This in-situ scrubbing mechanism is commonly determined as BACT for preheater rotary kilns being permitted today.

5.1.1. Dry Sorbent Injection

Dry sorbent injection operates under a similar principle to inherent dry scrubbing, using the injection of lime particulate into the process stream to initiate the same reaction. Additional dry sorbent injection is not considered further as the reaction is already taking place inherently as part of the lime kiln process.

5.1.2. Alternative Low Sulfur Fuels

Fuels that can be considered for use in the lime kilns must have sufficient heat content, be dependable and readily available locally in significant quantities so as to not disrupt continuous production. Also, they must not adversely affect product quality.

Currently, the Facility’s kilns utilize a blend of natural gas, coal, and petroleum coke during normal operations. The allowable blends are dependent both on kiln technology, type of lime being produced, and market availability. One alternative lower-sulfur fuel that can be considered is diesel, as well as operating scenarios using all natural gas and using coal where petroleum coke was previously used. Low sulfur petroleum coke is another example of an alternative lower-sulfur fuel; however, its presence in the market cannot be relied upon and therefore is not considered further.

In the case of diesel, there are no known examples of preheater rotary kilns that fire 100% diesel fuel for lime production. Therefore, the use of diesel fuel is not a commercially established emission reduction method and is not considered an available, feasible option at this time. In the case of using coal where petroleum coke was previously used, each kiln at the Facility has a maximum coal usage rate where, if exceeded, operational issues occur. These operational issues include plugging of the preheater and ash rings.

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7 Consistent with lime kiln BACT determinations in EPA RACT/BACT/LAER Clearinghouse. For example, Chemical Lime Texas facility. ID TX-0726 has a description for SO₂ control of 92% based on dry scrubbing inherent in system. https://cfpub.epa.gov/rlc/index.cfm?Action=PermitDetail.PollutantInfo&Facility_ID=27871&Process_ID=109937&Pollutant_ID=189&Per_Cntl_Equipment_ID=156818

8 Per recent sulfur balance completed for Kiln 4, see Appendix D for more detail.


10 See BACT determinations at Chemical Lime, Ltd. in Comal, TX, Mississippi Lime Company in Randolph, IL, the Clifton Lime Plant in Bosque, TX, and Graymont’s facility in Bayfield, WI in the RBLC search in Appendix A.
in the kiln. This results in the need to shutdown, clean and restart the kiln, disrupting production and creating additional emissions.\textsuperscript{11}

Alternate scenarios that will be considered include all-natural gas and a combination of natural gas and coal where coal has been used to replace the usage of petroleum coke.

5.1.3. Wet Scrubbing

A wet scrubber is a tail pipe technology that may be installed downstream of the kilns. In a typical wet scrubber, the flue gas flows upward through a reactor vessel that has an alkaline reagent flowing down from the top. The scrubber mixes the flue gas and alkaline reagent using a series of spray nozzles to distribute the reagent across the scrubber vessel. The calcium (or other alkaline reagent) in the reagent reacts with the SO\textsubscript{2} in the flue gas to form calcium sulfite and/or calcium sulfate that is removed with the scrubber sludge and is disposed. Most wet scrubber systems used forced oxidation to assure that only calcium sulfate sludge is produced.

5.1.4. Semi-Wet/Dry Scrubbing

Semi-wet/dry scrubbing uses a scrubber tower installed prior to the baghouse. Atomized hydrated lime slurry is sprayed into the exhaust flue gas. The lime absorbs the SO\textsubscript{2} in the exhaust and turns it into a powdered calcium/sulfur compound. The particulate control device removes the solid reaction products from the gas stream.

5.2. STEP 2: ELIMINATE TECHNICALLY INFEASIBLE SO\textsubscript{2} CONTROL TECHNOLOGIES

Step 2 of the top-down control review is to eliminate technically infeasible SO\textsubscript{2} control technologies that were identified in Step 1.

5.2.1. Alternative Low Sulfur Fuels

The use of entirely natural gas and the use of a combination of natural gas and coal where the coal usage has been increased to replace coke usage are both technically feasible and are considered further; however, there are some limitations to this. As an example, The Facility is unable to utilize more than 50\% natural gas on a MMBTU basis and any amount of coal in the production of dolomitic lime. Adding fuel in excess of these rates creates both quality and production concerns.

Per EPA's Guidance on Regional Haze State Implementation Plans for the Second Implementation Period dated August 20, 2019, fuel mixes with inherently lower SO\textsubscript{2}, NO\textsubscript{x}, and/or PM emissions may be determined by the state as reasonable to evaluate so long as the fuel-use changes are not considered too fundamental to the operation and design of a source.\textsuperscript{12} Fuels that can be considered for use in the lime kilns must have sufficient heat content, be dependable and readily available locally in significant quantities so as to not disrupt continuous production. Also, they must not adversely affect product quality.

\textsuperscript{11} EPA August 20, 2019 "Guidance on Regional Haze State Implementation Plans for the Second Implementation Round", states that "States may also determine that it is unreasonable to consider some fuel-use changes because they would be too fundamental to the operation and design of a source."

Currently, the Facility's kilns utilize a blend of natural gas, coal, and petroleum coke during typical operations. In order to allow for fluctuations in availability of coal and coke and to not adversely affect the production of either dolomitic or HiCal lime, the kilns must have the flexibility to operate within the fuel blend ranges contained in Table 5-2.

**Table 5-2. Required Fuel Blend Ranges**

<table>
<thead>
<tr>
<th>Kiln</th>
<th>Fuels</th>
<th>Typical HiCal Fuel Range</th>
<th>Typical Dolo Fuel Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coal</td>
<td>65%-75%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Coke</td>
<td>25%-35%</td>
<td>50% - 80%</td>
</tr>
<tr>
<td></td>
<td>Natural Gas</td>
<td>0%</td>
<td>20% - 50%</td>
</tr>
<tr>
<td>2</td>
<td>Coal</td>
<td>65%-75%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Coke</td>
<td>25%-35%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Natural Gas</td>
<td>0%</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Coal</td>
<td>65%-75%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Coke</td>
<td>25%-35%</td>
<td>50% - 80%</td>
</tr>
<tr>
<td></td>
<td>Natural Gas</td>
<td>0%</td>
<td>20% - 50%</td>
</tr>
<tr>
<td>4</td>
<td>Coal</td>
<td>70%-85%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Coke</td>
<td>15%-30%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Natural Gas</td>
<td>0%</td>
<td>-</td>
</tr>
</tbody>
</table>

The fuel usage during the baseline period of 2016 to 2018 differs slightly from the ranges provided in Table 5-2 due to fuel availability and product demand at the time. Lhoist has little control over the cost and sulfur content of both coal and coke locally available and as such cannot commit to the use of low-sulfur coke\(^{13}\) or to the replacement of coke with coal. Additionally, in order to burn a higher percentage of natural gas, Kilns 2, 3, and 4 must have upgrades to their current gas trains in order to meet NFPA standards. All kilns would require additional upgrades to their equipment and piping in order to allow for the usage of 100% natural gas.

\(^{13}\) Low-sulfur coke is currently being provided by one petroleum refinery in California. Communications with this refinery have indicated that the refinery cannot guarantee a stable supply of low-sulfur coke or the coke's sulfur content due to variability in the refinery's feed streams, market demands and conditions, and other factors.
Kilns 1 and 3 are intended to be used for the production of both dolomitic and HiCal lime product. Dolomitic lime cannot be produced using 100% natural gas as this would result in plugging of the kiln as well as quality issues with the product. Kilns 2 and 4 are intended to be used for the production of only HiCal lime product. HiCal lime can be produced using 100% natural gas without significant plugging of the kiln or impacts on product quality; however a 10% reduction in production would be expected.

An analysis of the emissions associated with the "high" and "low" SO\textsubscript{2} emission ranges has been conducted for each possible operating scenario at each kiln. The intent of this analysis was to determine whether there were any operating scenarios which significantly reduce the emissions of SO\textsubscript{2} without increasing the emissions of NO\textsubscript{x}, which is also considered to be a visibility impairing pollutant. As demonstrated in Table 5-3, there are no potential scenarios within the required operating ranges which reduces SO\textsubscript{2} emissions without a subsequent increase in NO\textsubscript{x}.

Although there are no scenarios where the reduction of SO\textsubscript{2} does not result in an increase in NO\textsubscript{x}, the use of all natural gas will be considered as an alternative scenario for Kilns 2 and 4. There are no other feasible alternatives which will reduce the sulfur content of the fuels and are considered to be dependable and readily available locally in significant quantities so as to not disrupt continuous production and that will not adversely affect product quality.
Table 5-3. Summary of Emission Changes Using Alternative Fuels

<table>
<thead>
<tr>
<th>Kiln</th>
<th>Product</th>
<th>Fuel Blend Generating</th>
<th>Fuel Blend</th>
<th>SO2 Emissions</th>
<th>NOx Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total (ton/yr)</td>
<td>Reduction (+ve) vs Increase (-ve) (%)</td>
</tr>
<tr>
<td>1</td>
<td>Baseline</td>
<td>-</td>
<td>Coal 60% Coke 25% Natural Gas 0%</td>
<td>138</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>Lowest SO2 75%</td>
<td>Coal 60% Coke 25%</td>
<td>73</td>
<td>47%</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>Highest SO2 65%</td>
<td>Coal 60% Coke 25%</td>
<td>94</td>
<td>32%</td>
</tr>
<tr>
<td></td>
<td>Dolo</td>
<td>Lowest SO2 0%</td>
<td>Coal 60% Coke 25%</td>
<td>115</td>
<td>17%</td>
</tr>
<tr>
<td></td>
<td>Dolo</td>
<td>Highest SO2 0%</td>
<td>Coal 60% Coke 25%</td>
<td>184</td>
<td>-33%</td>
</tr>
<tr>
<td>2</td>
<td>Baseline</td>
<td>98%</td>
<td>Coal 60% Coke 25%</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>Lowest SO2 75%</td>
<td>Coal 60% Coke 25%</td>
<td>12</td>
<td>-258%</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>Highest SO2 65%</td>
<td>Coal 60% Coke 25%</td>
<td>16</td>
<td>-360%</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>NG Only</td>
<td>Coal 60% Coke 25%</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>Baseline</td>
<td>95%</td>
<td>Coal 60% Coke 25%</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>Lowest SO2 75%</td>
<td>Coal 60% Coke 25%</td>
<td>44</td>
<td>-159%</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>Highest SO2 65%</td>
<td>Coal 60% Coke 25%</td>
<td>57</td>
<td>-234%</td>
</tr>
<tr>
<td></td>
<td>Dolo</td>
<td>Lowest SO2 0%</td>
<td>Coal 60% Coke 25%</td>
<td>69</td>
<td>-308%</td>
</tr>
<tr>
<td></td>
<td>Dolo</td>
<td>Highest SO2 0%</td>
<td>Coal 60% Coke 25%</td>
<td>111</td>
<td>-552%</td>
</tr>
<tr>
<td>4</td>
<td>Baseline</td>
<td>89%</td>
<td>Coal 60% Coke 25%</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>Lowest SO2 85%</td>
<td>Coal 60% Coke 25%</td>
<td>18</td>
<td>-24%</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>Highest SO2 70%</td>
<td>Coal 60% Coke 25%</td>
<td>28</td>
<td>-99%</td>
</tr>
<tr>
<td></td>
<td>HiCal</td>
<td>NG Only</td>
<td>Coal 60% Coke 25%</td>
<td>0</td>
<td>100%</td>
</tr>
</tbody>
</table>

* Various fuel blends were evaluated. The fuel blends are those that generate the lowest SO₂ emissions, the highest SO₂ emissions, as well as the combustion of natural gas only as a fuel. For each blend, the corresponding SO₂ and NOx emissions are presented as well as the change relative to the baseline emissions of these pollutants.
5.2.2. Semi-Wet/Dry Scrubbing

A semi-dry scrubbing system consists of a scrubber tower followed by a particulate matter control device. Flue gas enters the scrubber tower and is sprayed with an atomized hydrated lime slurry. The lime absorbs the SO₂ in the exhaust and turns the SO₂ into solid calcium/sulfur compounds. The particulate matter control device removes the solids from the exhaust stream.

Water is required to make the hydrated lime slurry needed for semi-dry scrubbing. Lhoist previously contacted a supplier of SO₂ scrubbing systems to understand the water requirements associated with a semi-dry system capable of achieving a 90% reduction in SO₂ emissions at another Lhoist facility with similar kilns to those operated at the Facility. The supplier estimated that an average of 58 gpm of water per kiln for a total of 232 gpm. Further details on this supplier estimate are provided in Appendix D.

The Facility is permitted to use approximately 81,580,000 gallons of water per year in total under State of Nevada Division of Water Resources permit 63261 and 64880, or approximately 155 gpm. Historically, the Apex plant has used at minimum 50% of their water allotment for current operation, often using up to 100% of the allotment. Documentation of the historical water usage at the Apex plant is provided in Appendix D. This usage would leave at most 78 gpm to be used for semi-dry scrubbing operations. Additionally, the Apex water basin is overpermitted for the recharge rate and the state has stopped issuing water permits within the basin. Based on the water demands that Lhoist has been provided for a semi-dry scrubbing (232 gpm), Lhoist concludes that the water demand for this type of system is not feasible to achieve.

Since the water necessary for a semi-dry scrubbing system at the Apex Plant is currently unavailable and ability to reasonably access additional water is not available, this technology will not be considered further in this review for SO₂.

5.2.3. Wet Scrubbing

In a typical wet scrubber, the flue gas flows upward through a reactor vessel that has an alkaline reagent flowing down from the top. The scrubber mixes the flue gas and alkaline reagent using a series of spray nozzles to distribute the reagent across the scrubber vessel. The calcium (typically) in the reagent reacts with the SO₂ in the flue gas to form calcium sulfite and/or calcium sulfate that is removed with the scrubber sludge and is disposed. Most wet scrubber systems use forced oxidation to assure that only calcium sulfate sludge is produced.

Lhoist does not have specific information on the water requirements for wet scrubbers for the kilns but such scrubbers require more water than semi-dry scrubbing systems. Since there is not enough water available for semi-dry scrubbing systems for the kilns, there is also not enough water available for wet scrubbing. Since sufficient water is not available for a wet scrubbing system, wet scrubbing technology will not be considered further.

5.3. STEP 3: RANK OF TECHNICALLY FEASIBLE SO₂ CONTROL OPTIONS BY EFFECTIVENESS

Step 3 of the top-down control review is to rank the technically feasible options by effectiveness. Table 5-4 presents potential SO₂ control technologies for the kilns and their associated control efficiencies. Each kiln fires a unique combination of natural gas, coal, and petroleum coke. As a result, the control efficiency of each alternative fuel scenario varies by kiln.
Table 5-4. Ranking of SO₂ Control Technologies by Effectiveness

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Control Technology</th>
<th>Potential Control Efficiency a (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 2</td>
<td>Alternative Low Sulfur Fuel – All Natural Gas</td>
<td>99.92</td>
</tr>
<tr>
<td>Kiln 4</td>
<td>Alternative Low Sulfur Fuel – All Natural Gas</td>
<td>99.62</td>
</tr>
</tbody>
</table>

a The alternative fuel scenario reduction efficiency is calculated using a material balance on the fuel sulfur. Fuel sulfur emissions reductions are assumed to be independent of feed sulfur emissions.

The alternative fuel scenarios have a calculated control efficiency that takes into account two key assumptions:

- Changing the primary fuel will fully reduce sulfur of each fuel type equally, affecting only the emissions directly resulting from sulfur contained in the fuel. SO₂ emitted from sulfur contained in the raw material that is processed in the kilns is assumed unaffected.
- The control efficiencies assume the same level of in-situ scrubbing reduction takes place under all fuel scenarios. These alternative fuel efficiency values are the incremental control efficiencies that take place as a result of the fuel switching beyond the inherent control.

Given the complexity of the inherent scrubbing's impact on SO₂ resulting from fuel sulfur vs. raw material sulfur, assuming the fuel switching fully reduces sulfur by the difference in sulfur levels between the fuel types is particularly conservative. Inherent SO₂ reduction (on a percent basis) would likely be reduced when the SO₂ concentration in the exhaust stream is also reduced.

5.4. STEP 4: EVALUATION OF IMPACTS FOR FEASIBLE SO₂ CONTROLS

Step 4 of the top-down control review is the impact analysis. The impact analysis considers the:

- Cost of compliance
- Energy impacts
- Non-air quality impacts; and
- The remaining useful life of the source

5.4.1. Cost of Compliance

The alternative fuel scenario calculations are determined using the fuel costs associated with plant operations during baseline emission years and the expected costs of upgrading the gas trains and equipment needed to burn 100% natural gas.

5.4.1.1. Control Costs

The cost of the fuel switching used in the cost effectiveness calculations is determined by calculating the current annual cost of using a natural gas, coal and coke blend and determining the increased cost of switching to replacing coke with coal and natural gas. Details are provided in Appendix B.

Switching fuel will require changes to the burners and the fuel storage, processing, and delivery system. These factors are significant and have been included in this evaluation. The control cost for each option is summarized in Table 5-5.
5.4.1.2. Annual Tons Reduced

 Though switching to lower sulfur fuels has the potential to reduce the SO$_2$ emissions associated with the kilns, it also has the potential to increase other visibility impairing pollutant emissions. The direct and precursor pollutants that can impair visibility include SO$_2$, NO$_x$, and PM.$^{14}$ The annual tons reduced that are used in the cost effectiveness calculations are determined by subtracting the estimated reduction in annual emission rates for all visibility impairing pollutants from the baseline annual emission rates. The baseline annual emissions are calculated using the baseline fuel usage calculated as an average of the fuel usage at each kiln during the years 2016 to 2018.

 The SO$_2$ emissions are calculated using a fuel sulfur balance. This methodology differs slightly from what is reported in the historic emissions inventories which are used for the overall baseline determination; however the methodology does not differ so significantly that these emissions should not be considered representative. For alternative fuel scenarios, the controlled annual emission rates are estimated by conducting a mass balance on the sulfur in the various fuels relative to the current baseline. The coal and coke sulfur content is obtained from recent analyses (0.42% and 5.51%, respectively). For natural gas, it is assumed that supplies would contain less than 0.2 grains sulfur per 100 standard cubic feet.

 The NO$_x$ emissions are calculated using fuel-specific emission factors and are scaled up to reflect the actual baseline emissions as reported in the emissions inventories from 2016 to 2018.$^{15}$

 An estimate of the amount of SO$_2$ that may be reduced annually for each of the proposed options is summarized in Table 5-5 and detailed calculations are provided in Appendix B.

5.4.1.3. Cost Effectiveness

 The cost effectiveness is determined by dividing the annual control cost by the annual tons reduced. Table 5-5 summarizes the results.

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$^{15}$ Total baseline NO$_x$ emissions are calculated as the average of the NO$_x$ emissions reported in Lhoist’s emissions inventories for years 2016 to 2018. The emissions inventory uses an overall lb/ton limit emission factor which is not fuel dependent. For this analysis, fuel-specific NO$_x$ emission factors have been used to determine the NO$_x$ contribution to the baseline from each fuel. The fuel-based emissions calculated are then scaled up by the ratio of the total NO$_x$ emissions calculated on a fuels basis for the baseline period to the total NO$_x$ emissions calculated from the emissions inventories.
Table 5-5. Cost of Compliance Based on Visibility Impairing Pollutant Emissions Reduction

<table>
<thead>
<tr>
<th>Unit</th>
<th>Control Cost ($/yr)(^1)</th>
<th>Baseline Visibility Impairing Emission Level (tons)</th>
<th>Emission Change (tons) Reduction (+ve) vs Increase (-ve)</th>
<th>Cost Effectiveness ($/ton removed)(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 2</td>
<td>$8,708,565</td>
<td>23.66</td>
<td>1.02</td>
<td>$8,666,204</td>
</tr>
<tr>
<td>Kiln 4</td>
<td>$1,589,821</td>
<td>724.46</td>
<td>-147.92</td>
<td>-</td>
</tr>
<tr>
<td>Kilns 2 and 4 Combined</td>
<td>$10,298,386</td>
<td>748.13</td>
<td>-146.90</td>
<td>-</td>
</tr>
</tbody>
</table>

\(^1\) Control costs were determined using information available on fuel train upgrade costs from Apex Kilns 1 and 3 and fuel prices and annual consumption for Kilns 2 and 4 from Apex’s 2020 fuel budget. See Appendix B for detailed calculations.

\(^2\) Note that no cost effectiveness evaluation is completed for Kilns 4 and “Kilns 2 and 4 Combined” because the switch to natural gas increases the emissions of the visibility impairing pollutants relative to the baseline.

5.4.2. Timing for Compliance

Lhoist believes that reasonable progress compliant controls are already in place as is apparent by the existing Title V Permit solid fuel sulfur input limits for Kilns 1, 2, and 3. There are no technically feasible reduction options available for SO\(_2\). However, if NDEP determines that one of the SO\(_2\) control options analyzed in this report is necessary to achieve reasonable progress, it is anticipated that the use of alternative fuels can be implemented during the period of the second long-term planning period for regional haze (approximately ten years following EPA’s reasonable progress determination).

5.4.3. Energy Impacts

The cost of energy required to operate the control devices has been included in the cost analyses found in Appendix B. To operate any of the add-on control devices, there would be decreased overall plant efficiency due to the operation of these add-on controls. At a minimum, this would require increased electrical usage by the plant with an associated increase in indirect (secondary) emissions from nearby power stations.

5.4.4. Environmental Impacts

Most of the alternative SO\(_2\) control options that have been discussed in this analysis also have additional non-air quality impacts associated with them. Specifically, while the replacement of coke with other fuels reduces SO\(_2\) emissions, coal and natural gas have higher NO\(_x\) emission factors compared to coke, which means that replacement of coke with coal and natural gas would increase NO\(_x\) emissions from the kilns, as summarized in Table 5-3. NO\(_x\) itself is a precursor pollutant affecting visibility, as such the reduction of SO\(_2\) with an associated increase in NO\(_x\) implies that there is no optimal configuration for the reduction of visibility impairing compounds, and the most favorable configuration is the one that represents maximum production efficiency for the facility. This has been accounted for in the cost evaluation in Table 5-5.

5.4.5. Remaining Useful Life

The remaining useful life of the kilns does not impact the annualized cost for the various fuel scenarios that are evaluated.
5.5. SO$_2$ Conclusion

The lime production process inherently removes the majority of SO$_2$ that is created from the process. This inherent control measure was BACT for Kiln 4 when it was originally constructed\(^{16}\) and is still commonly BACT for rotary kilns recently permitted under the PSD program.

In this analysis, no available reduction options for SO$_2$ emissions are identified that are cost effective and technically feasible for the Facility.

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\(^{16}\) Authority to Construct issued October 27, 1995.
The four-factor analysis is satisfied by conducting a stepwise review of emission reduction options in a top-down fashion. The steps are as follows:

- **Step 1.** Identify all available retrofit control technologies
- **Step 2.** Eliminate technically infeasible control technologies
- **Step 3.** Evaluate the control effectiveness of remaining control technologies
- **Step 4.** Evaluate impacts and document the results

Cost (Factor 1) and energy / non-air quality impacts (Factor 3) are key factors determined in Step 4 of the stepwise review. However, timing for compliance (Factor 2) and remaining useful life (Factor 4) are also discussed in Step 4 to fully address all four factors as part of the discussion of impacts. Factor 4 is primarily addressed in the context of the costing of emission reduction options and whether any capitalization of expenses would be impacted by a limited equipment life.

The baseline NO\textsubscript{x} emission rates that are used in the NO\textsubscript{x} four-factor analysis are summarized in Table 4-1. The basis of the emission rates is provided in Section 4 of this report. Kiln 3 currently utilizes a low NO\textsubscript{x} burner (LNB), as described in Section 6.1.1.2, below.

### 6.1. STEP 1: IDENTIFICATION OF AVAILABLE RETROFIT NO\textsubscript{x} CONTROL TECHNOLOGIES

NO\textsubscript{x} is produced during fuel combustion when nitrogen contained in the fuel and combustion air is exposed to high temperatures. The origin of the nitrogen (i.e. fuel vs. combustion air) has led to the use of the terms "thermal" NO\textsubscript{x} and "fuel" NO\textsubscript{x} when describing NO\textsubscript{x} emissions from the combustion of fuel. Thermal NO\textsubscript{x} emissions are produced when elemental nitrogen in the combustion air is oxidized in a high temperature zone. Fuel NO\textsubscript{x} emissions are created during the rapid oxidation of nitrogen compounds contained in the fuel.

Most of the NO\textsubscript{x} formed within a rotary lime kiln is classified as thermal NO\textsubscript{x}. Virtually all the thermal NO\textsubscript{x} is formed in the region of the flame at the highest temperatures, approximately 3,000 to 3,600 degrees Fahrenheit. A small portion of NO\textsubscript{x} is formed from nitrogen in the fuel that is liberated and reacts with the oxygen in the combustion air.

Step 1 of the top-down control review is to identify available retrofit control options for NO\textsubscript{x}. The available NO\textsubscript{x} retrofit control technologies for the Facility's kilns are summarized in Table 6-1.

<table>
<thead>
<tr>
<th>NO\textsubscript{x} Control Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Controls</td>
</tr>
<tr>
<td>Reduce Peak Flame Zone Temperature</td>
</tr>
<tr>
<td>Low NO\textsubscript{x} Burners (LNB)</td>
</tr>
<tr>
<td>Proper Kiln Operation</td>
</tr>
<tr>
<td>Preheater Kiln Design</td>
</tr>
<tr>
<td>Post-Combustion Controls</td>
</tr>
<tr>
<td>Selective Catalytic Reduction (SCR)</td>
</tr>
<tr>
<td>Selective Non-Catalytic Reduction (SNCR)</td>
</tr>
</tbody>
</table>

---

**Table 6-1. Available NO\textsubscript{x} Control Technologies for Apex Kilns**

Lhoist North America of Arizona Inc. | Apex Plant Four Factor Analysis
Trinity Consultants
NO\textsubscript{X} emissions controls, as listed in Table 6-1, can be categorized as combustion or post-combustion controls. Combustion controls reduce the peak flame temperature and excess air in the kiln burner, which minimizes NO\textsubscript{X} formation. Post-combustion controls, such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) convert NO\textsubscript{X} in the flue gas to molecular nitrogen and water.

6.1.1. Combustion Controls

6.1.1.1. Reduce Peak Flame Zone Temperature

These are methods of reducing the temperature of combustion products in order to inhibit the formation of thermal NO\textsubscript{X}. They include (1) using fuel rich mixtures to limit the amount of oxygen available; (2) using fuel lean mixtures to limit amount of energy input; (3) injecting cooled, oxygen depleted flue gas into the combustion air; and (4) injecting water or steam.

6.1.1.2. Low NO\textsubscript{X} Burners

LNBs reduce the amount of NO\textsubscript{X} initially formed in the flame. The principle of all LNBs is the same: stepwise or staged combustion and localized exhaust gas recirculation (i.e., at the flame). LNBs are designed to reduce flame turbulence, delay fuel/air mixing, and establish fuel-rich zones for initial combustion. The longer, less intense flames reduce thermal NO\textsubscript{X} formation by lowering flame temperatures. Control of air turbulence and speed is often controlled via mixing air fans. Some of the burner designs produce a low-pressure zone at the burner center by injecting fuel at high velocities along the burner edges. Such a low-pressure zone tends to recirculate hot combustion gas which is retrieved through an internal reverse flow zone around the extension of the burner centerline. The recirculated combustion gas is deficient in oxygen, thus producing the effect of flue gas recirculation. Reducing the oxygen content of the primary air creates a fuel-rich combustion zone that then generates a reducing atmosphere for combustion. Due to fuel-rich conditions and lack of available oxygen, formation of thermal NO\textsubscript{X} and fuel NO\textsubscript{X} are minimized\textsuperscript{17}.

6.1.1.3. Preheater Kiln Design/ Proper Combustion Practices

The use of staged kiln combustion and preheating alone can lead to effective reduction of NO\textsubscript{X} emissions. By allowing for initial combustion in a fuel-rich, oxygen-depleted zone, necessary temperatures can be achieved without concern for the oxidation of nitrogen. This initial combustion is then followed by a secondary combustion zone that burns at a lower temperature, allowing for the addition of additional combustion air without significant formation of NO\textsubscript{X}\textsuperscript{18}.

6.1.2. Post Combustion Controls

6.1.2.1. Selective Catalytic Reduction

Selective catalytic reduction (SCR) is an exhaust gas treatment process in which ammonia (NH\textsubscript{3}) is injected into the exhaust gas upstream of a catalyst bed. On the catalyst surface, NH\textsubscript{3} and nitric oxide (NO) or nitrogen dioxide (NO\textsubscript{2}) react to form diatomic nitrogen and water. The overall chemical reactions can be expressed as follows:

\begin{align*}
\text{NH}_3 + \text{NO} &\rightarrow \text{N}_2 + \text{H}_2\text{O} \\
\text{NH}_3 + \text{NO}_2 &\rightarrow \text{N}_2 + 3\text{H}_2\text{O}
\end{align*}

\textsuperscript{17} USEPA, Office of Air Quality Planning and Standards. Alternative Control Technologies Document – NO\textsubscript{X} Emissions from Cement Manufacturing. EPA-453/R-94-004, Page 5-5 to 5-8.

\textsuperscript{18} Ibid, Page 58.
4NO + 4NH₃+O₂→4N₂ + 6H₂O

2NO₂+4NH₃+O₂→3N₂+6H₂O

When operated within the optimum temperature range of 480°F to 800°F, the reaction can result in removal efficiencies between 70 and 90 percent. The rate of NOₓ removal increases with temperature up to a maximum removal rate at a temperature between 700°F and 750°F. As the temperature increases above the optimum temperature, the NOₓ removal efficiency begins to decrease. As of this report, there are no known instances of SCR systems installed on lime kilns.

### 6.1.2.2. Selective Non-Catalytic Reduction

In SNCR systems, a reagent is injected into the flue gas within an appropriate temperature window. The NOₓ and reagent (ammonia or urea) react to form nitrogen and water. A typical SNCR system consists of reagent storage, multi-level reagent-injection equipment, and associated control instrumentation. The SNCR reagent storage and handling systems are similar to those for SCR systems. However, both ammonia and urea SNCR processes require three to four times as much reagent as SCR systems to achieve similar NOₓ reductions.

Like SCR, SNCR uses ammonia or a solution of urea to reduce NOₓ through a similar chemical reaction.

\[2NO+4NH₃+2O₂→3N₂+6H₂O\]

SNCR residence time can vary between 0.001 seconds and 10 seconds. However, increasing the residence time available for mass transfer and chemical reactions at the proper temperature generally increases the NOₓ removal. There is a slight gain in performance for residence times greater than 0.5 seconds. The EPA Control Cost Manual indicates that SNCR requires a higher temperature range than SCR of between approximately 1,650°F and 2,100°F (urea solution) due to the lack of a catalyst to lower the activation energies of the reactions; however, the control efficiencies achieved by SNCR vary across that range of temperatures. That said, the effectiveness of SNCR on lime kilns is largely unproven. Lime kilns present unique technical challenges not experienced by cement kilns. While mid-kiln injection is often the most effective method of implementing SNCR on cement kilns, injection at that location is not feasible for a lime kiln. Lime kilns experience lower NOₓ concentrations at a given point in the kiln, have shorter residence times, and face issues in the stability of temperature profiles when compared to cement kilns. At higher temperatures, NOₓ reduction is less effective. In addition, a greater residence time is required when operating at lower temperatures.

Lhoist has installed an SNCR control system at its Nelson facility in Peach Springs, AZ and O'Neal facility in Calera, AL. Both installations have demonstrated that SNCR is a successful control option for NOx emissions from preheater lime kilns. With that in mind, there are substantial differences between the

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19 Air Pollution Control Cost Manual, Section 4, Chapter 2, Selective Catalytic Reduction, NOₓ Controls, EPA/452/B-02-001, Page 2-9 and 2-10.

20 Air Pollution Control Cost Manual, Section 4, Chapter 1, Selective Non-Catalytic Reduction, NOₓ Controls, EPA/452/B-02-001, Page 1-8

21 Ibid, Page 1-6

kilns at the Nelson and O’Neal facilities as compared to Kilns 1, 2, and 3 at Apex. The primary differences include kiln production/fuel rate, combustion gas residence time in the transfer chute (the ideal location for reagent injection), and area available for injection of reagent. These differences are described in more detail in Table 6-2. Given the variability in kiln operation and design, the control efficiency demonstrated by SNCR at the other Lhoist facilities cannot be guaranteed at the Apex kilns.

Table 6-2. Comparison of Nelson, O’Neal and Apex Kilns

<table>
<thead>
<tr>
<th>Stack Test Data</th>
<th>O’Neal</th>
<th>Nelson</th>
<th>Apex</th>
<th>Kiln 1</th>
<th>Kiln 2</th>
<th>Kiln 3</th>
<th>Kiln 1</th>
<th>Kiln 2</th>
<th>Kiln 3</th>
<th>Kiln 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stack Temp (F)</td>
<td>429</td>
<td>363</td>
<td>406</td>
<td>437</td>
<td>327</td>
<td>338</td>
<td>344</td>
<td>392</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2 Content at Stack (%)</td>
<td>8.7</td>
<td>10.8</td>
<td>10.8</td>
<td>9.9</td>
<td>13.6</td>
<td>12.0</td>
<td>11.5</td>
<td>8.0</td>
<td></td>
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<tr>
<td>Stack Flow Rate (dcscfm)</td>
<td>88,018</td>
<td>89,060</td>
<td>85,970</td>
<td>98,055</td>
<td>44,580</td>
<td>48,032</td>
<td>41,635</td>
<td>119,067</td>
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<td>Kiln Data</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Transfer Chute Temp (F)</td>
<td>2,039</td>
<td>1,854</td>
<td>2,054</td>
<td>2,091</td>
<td>1,823</td>
<td>1,834</td>
<td>1,839</td>
<td>2,047</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preheater Temp (F)</td>
<td>-</td>
<td>-</td>
<td>1,910</td>
<td>2,032</td>
<td>1,724</td>
<td>1,775</td>
<td>1,832</td>
<td>2,067</td>
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<td>O2 Content at Transfer Chute (%)</td>
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<td>1.0</td>
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<td>0.6</td>
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<td>2.7</td>
<td>2.3</td>
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<tr>
<td>Kiln Design Data</td>
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<tr>
<td>Transfer Chute Height (ft)</td>
<td>9.82</td>
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<td>5.9</td>
<td>9.9</td>
<td>4.60</td>
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<tr>
<td>Transfer Chute Width (ft)</td>
<td>10.5</td>
<td>10.5</td>
<td>10.4</td>
<td>11.8</td>
<td>8.5</td>
<td>8.5</td>
<td>5</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer Chute Length (ft)</td>
<td>10.5</td>
<td>9</td>
<td>10.4</td>
<td>11.8</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>9</td>
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</tr>
<tr>
<td>Approx Volume of Transfer Chute (ft³)</td>
<td>1,083</td>
<td>931</td>
<td>639</td>
<td>1,874</td>
<td>290</td>
<td>290</td>
<td>250</td>
<td>783</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. SNCR Lances</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kiln Firing Rate (MMBtu/hr)</td>
<td>281</td>
<td>281</td>
<td>275.6</td>
<td>412.7</td>
<td>81.25</td>
<td>81.25</td>
<td>91.1</td>
<td>281.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permitted Production Rate (tpd)</td>
<td>1,500</td>
<td>1,500</td>
<td>800</td>
<td>1,000</td>
<td>300</td>
<td>300</td>
<td>400</td>
<td>1,300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculated Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inleakage from kiln exit to stack (%)</td>
<td>63%</td>
<td>96%</td>
<td>97%</td>
<td>84%</td>
<td>145%</td>
<td>106%</td>
<td>93%</td>
<td>44%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kiln Exit/Transfer Chute Flow (dcscfm)</td>
<td>54,131</td>
<td>45,421</td>
<td>43,648</td>
<td>53,249</td>
<td>18,196</td>
<td>23,304</td>
<td>22,615</td>
<td>82,710</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kiln Exit/Transfer Chute Flow (acfm)</td>
<td>260,141</td>
<td>202,122</td>
<td>211,023</td>
<td>261,228</td>
<td>79,887</td>
<td>102,806</td>
<td>99,984</td>
<td>398,758</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer Chute Cross Sectional Area (ft²)</td>
<td>110.25</td>
<td>94.5</td>
<td>108.7849</td>
<td>189.3376</td>
<td>34</td>
<td>34</td>
<td>25</td>
<td>81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Velocity in Transfer Chute (ft/min)</td>
<td>2.360</td>
<td>2.139</td>
<td>1.940</td>
<td>1.380</td>
<td>2.350</td>
<td>3.024</td>
<td>3.999</td>
<td>4.923</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residence Time in Transfer Chute (s)</td>
<td>0.25</td>
<td>0.28</td>
<td>0.18</td>
<td>0.43</td>
<td>0.12</td>
<td>0.09</td>
<td>0.15</td>
<td>0.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6.2. STEP 2: ELIMINATE TECHNICALLY INFEASIBLE NOₓ CONTROL TECHNOLOGIES

Step 2 of the top-down control review is to eliminate technically infeasible NOₓ control technologies that were identified in Step 1.

6.2.1. Combustion Controls

6.2.1.1. Reduce Peak Flame Zone Temperature

In a lime kiln, product quality is co-dependent on temperature and atmospheric conditions within the system. Although low temperatures inhibit NOₓ formation, they also inhibit the calcination of limestone. For this reason, methods to reduce the peak flame zone temperature in a lime kiln burner are technically infeasible.

6.2.1.2. Low NOₓ Burners

Kiln 3 currently operates a KFS burner which is classified as low NOₓ while Kilns 1, 2, and 4 do not operate LN Bs. Vendor documentation of KFS burners operating as LN Bs is included in Appendix D. LN Bs are considered a technically feasible control technology and have been evaluated further for cost effectiveness. Please note the use of LNB's does add some operational risk, including high kiln shell temperatures, premature refractory failures, and adverse flame shapes which has the potential to affect
the kiln production rate and/or increase the rate of routine maintenance). The expected NOx removal efficiency of implementing LNBS on Kilns 1, 2, and 4 is approximately 10% based on performance achieved at Lhoist’s Nelson facility. Vendor guarantee of the reduction efficiency of KFS burners at the Nelson Facility has been provided in Appendix D.

The LNB for Kiln 3 was installed during 2019. As such, the emissions from Kiln 3 were reduced by 10% as well in the LNB analysis for all four kilns. Therefore, baseline emissions for Kiln 3 are not reflective of the operation of these low NOx burners.

6.2.1.3. Preheater Kiln Design/Proper Combustion Practices

Proper combustion practices and preheater kiln design are considered technically feasible for the Facility. These practices are already being applied at the Facility and considered part of the baseline.

6.2.2. Post Combustion Controls

6.2.2.1. Selective Catalytic Reduction

Efficient operation of the SCR process requires constant exhaust temperatures (usually ± 200°F). Fluctuation in exhaust gas temperatures reduces removal efficiency. If the temperature is too low, ammonia slip occurs. Ammonia slip is caused by low reaction rates and results in both higher NOx emissions and appreciable ammonia emissions. If the temperature is too high, oxidation of the NH3 to NO can occur. Also, at higher removal efficiencies (beyond 80 percent), an excess of NH3 is necessary, thereby resulting in some ammonia slip. Other emissions possibly affected by SCR include increased PM emissions (as ammonia salts result from the reduction of NOx and are emitted in a detached plume) and increased SOx emissions (from oxidation of SO2 on the catalyst).

To reduce fouling the catalyst bed with the PM in the exhaust stream, an SCR unit can be located downstream of the particulate matter control device (PMCD). However, due to the low exhaust gas temperature exiting the PMCD (approximately 350°F), a heat exchanger system would be required to reheat the exhaust stream to the desired reaction temperature range of between 480°F to 800°F. The source of heat for the heat exchanger would be the combustion of fuel, with combustion products that would enter the process gas stream and generate additional NOx. Therefore, in addition to storage and handling equipment for the ammonia, the required equipment for the SCR system will include a catalytic reactor, heat exchanger and potentially additional NOx control equipment for the emissions associated with the heat exchanger fuel combustion.

High dust and semi-dust SCR technologies are still highly experimental. A high dust SCR would be installed prior to the dust collectors, where the kiln exhaust temperature is closer to the optimal operating range for an SCR. It requires a larger volume of catalyst than a tail pipe unit, and a mechanism for periodic cleaning of catalyst. A high dust SCR also uses more energy than a tail pipe system due to catalyst cleaning and pressure losses.

A semi-dust system is similar to a high dust system. However, the SCR is placed downstream of an ESP or cyclone.

23 Ibid, Page 2-11
The main concern with high dust or semi-dust SCR is the potential for dust buildup on the catalyst, which can be influenced by site specific raw material characteristics present in the facility's quarry, such as trace contaminants that may produce a stickier particulate than is experienced at sites where the technology is being demonstrated. This buildup could reduce the effectiveness of the SCR technology, and make cleaning of the catalyst difficult, resulting in kiln downtime and significant costs.

No lime kiln in the United States is using any of these SCR technologies. For the technical issues noted above, tail pipe, high dust and semi-dust SCR's are considered technically infeasible at this time.

6.2.2.2. Selective Non-Catalytic Reduction

At temperatures above 2,100°F, NOx generation starts to occur as shown in the reaction below:

\[ 4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O} \]

This reaction causes ammonia to oxidize and form NO instead of removing NO. When temperatures exceed 2,200°F, NO formation dominates. This would likely be the case if ammonia were directly injected into the kiln. At temperatures below the required range, appreciable quantities of un-reacted ammonia will be released to the atmosphere via ammonia slip.

Based on the temperature profile, there are three locations in a rotary preheater lime kiln system where the ammonia/urea injection could theoretically occur: the stone/preheater chamber, the transfer chute, or after the PMCD. A fourth location that will be considered in this analysis is the kiln itself. For SNCR to be technically feasible, at least one of these locations must meet the following criteria: placement of injector to ensure adequate mixing of the ammonia or urea with the combustion gases, residence time of the ammonia with the combustion gases, and temperature profile for ammonia injection.

Figure 6-1 provides a schematic of a preheater/kiln system including typical process temperatures in the system.

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24 Preamble to NSPS subpart F, 75 FR 54970.
An SNCR trial has been conducted at a different Lhoist facility in order to determine the best location and nozzle configuration for reagent injection and to determine whether SNCR can be considered an economically viable alternative for NOx reduction. During this trial, data was collected by the plant CEMS and ammonia slip was monitored. The results of this trial concluded that SNCR should be considered technically feasible as a reduction option for preheater lime kilns. In this case, the preheater cone with four nozzles represented the best configuration with approximately 50% reduction shown.

While the findings of this trial are certainly promising, this one example of SNCR installation on a preheater rotary lime kiln does not necessarily transfer to other lime kilns. Effectiveness of SNCR is highly source-dependent, with a variety of factors having the potential to heavily influence the quantities of NOx controlled. Specifically, the following design parameters on Apex Kilns 1, 2, and 3 may reduce the SNCR removal efficiency, as compared to the kilns at Nelson and O'Neal (see Table 6-2):

- **Residence Time:** While the residence time for Kilns 1, 2, and 3 falls within the timeframe required for the SNCR reaction to take place, the calculated residence time for the Apex kilns is less than that observed at the reference kilns. As noted previously, SNCR performance is expected to increase with residence time in the range from 0 to 0.5 seconds.

- **Area for Injection:** In comparison to Apex Kilns 1, 2, and 3, the reference kilns are much larger in size in terms of daily production rate and size of the transfer chute where the reaction is expected to take place. The O'Neal and Nelson kilns utilize a series of 2 and 4 lances, respectively to achieve the required reagent distribution and NOx reduction. See Appendix E for
a process flow diagram of the SNCR configuration at Nelson. Given Apex Kilns 1, 2, and 3 operate at less than 50% of the flow rate and have approximately 1/3 of the area for injection, it is unknown if multiple lances can be arranged in the space allowed to achieve similar removal efficiencies. Additionally, LNA is not aware of any SNCR installations on lime kilns with a production capacity less than 800 tons per day. Kilns 1, 2, and 3 each are permitted at less than 50% of this known production rate. Given the high rate of urea injection that will likely be required to accommodate a high removal efficiency and the small area for injection available, there is significant concern of over-injection of urea, resulting in high levels of ammonia slip at Kilns 1, 2, and 3.

Due to the differences in kiln technology between the reference facilities, it is unclear whether the Apex kilns will meet those required for successful SNCR implementation. Given the significant range (35-58%) of control efficiencies found for cement kilns, a control efficiency considerably lower than the average for cement of 40% is expected given ideal temperature scenarios (many kilns in the cement industry that utilize SNCR do so in the combustion zone in the calciner, where temperatures are lower than in the kiln). Lime kilns experience significant technical barriers to successful SNCR implementation not shared by the cement industry. When compared to the cement process, lower NOx concentrations, shorter residence times, and temperatures more frequently outside the optimal range for SNCR application yield lower control efficiencies for lime kilns. Therefore, a control efficiency of no more than 20% at Kiln 1, 2, and 3, and no more than 50% at Kiln 4, can be guaranteed at the Facility's kilns without testing. Trying to achieve a 50% removal efficiency on Kilns 1, 2, and 3 is more likely to result in ammonia slip which can cause its own health and visibility problems as described in the EPA Cost Control Manual (Figure 6-2). 25

Figure 6-2. Potential Ammonia Slip at Various NOx Reduction Efficiencies

Though there are potential challenges in implementing this technology, SCNR is considered as a technically feasible option and cost calculations for the implementation of SNCR are included.

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25 Air Pollution Control Cost Manual, Section 4, Chapter 1, Selective Non-Catalytic Reduction, NOx Controls, EPA/452/B-02-001, Page 1-12

Lhoist North America of Arizona Inc. | Apex Plant Four Factor Analysis
Trinity Consultants
6.3. STEP 3: RANK OF TECHNICALLY FEASIBLE NOx CONTROL OPTIONS BY EFFECTIVENESS

Step 3 of the top-down control review is to rank the technically feasible options to effectiveness. Table 6-3 presents potential NOx control technologies for the kilns and their associated control efficiencies.

Table 6-3. Ranking of NOx Control Technologies by Effectiveness

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Control Technology</th>
<th>Potential Control Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx</td>
<td>SNCR</td>
<td>20-50*</td>
</tr>
<tr>
<td>NOx</td>
<td>Low NOx Burner</td>
<td>10**</td>
</tr>
</tbody>
</table>

* 20% - 50% control efficiency is used for cost evaluation based on evaluation of feasibility of SNCR at a similar facility.

** 10% control efficiency is used for cost evaluation based on evaluation of LNBs at a similar facility.

6.4. STEP 4: EVALUATION OF IMPACTS FOR FEASIBLE NOx CONTROLS

Step 4 of the top-down control review is the impact analysis. The impact analysis considers the:

> Cost of compliance
> Energy impacts
> Non-air quality impacts; and
> The remaining useful life of the source

6.4.1. Low NOx Burners

6.4.1.1. Cost of Compliance

The capital costs of installing Low NOx Burners on Kilns 1, 2, and 4 were evaluated using the cost of installation at a similar Lhoist facility. The capital cost of installation was annualized assuming a 20-year life span for depreciation, as well as an interest rate of 3.25%. No additional operational costs associated with Low-NOx burners were identified. The LNB for Kiln 3 was installed during 2019 and therefore the 10% reduction has not been accounted for in the baseline emissions. As a result, the NOx reductions from Kiln 3's burner are included in the combined cost effectiveness determination. The total costs and cost effectiveness of control are summarized for all kilns in Table 6-4 below. Detailed calculations are provided in Appendix C.

Table 6-4. LNB Cost Calculation Summary

<table>
<thead>
<tr>
<th>Unit</th>
<th>Total Capital Investment</th>
<th>Total Annual Cost</th>
<th>NOx Emissions Removed (tpy)</th>
<th>Cost Effectiveness ($/ton removed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 1</td>
<td>$375,000</td>
<td>$25,792</td>
<td>30.35</td>
<td>$850</td>
</tr>
</tbody>
</table>
### 6.4.1.1. Timing for Compliance

It is anticipated that this change could be implemented during the second planning period of regional haze, approximately ten years following EPA's reasonable progress determination. Lhoist would undergo a demonstration period to confirm the control efficiency estimates from this analysis.

### 6.4.1.2. Energy Impacts and Non-Air Quality Impacts

As previously stated, there are no additional operation costs associated with the installation of LNBs, other than the potential for high shell temperatures, premature refractory wear, etc. (these potential costs have not been included as it is unknown if these issues will arise). Additionally, there are no adverse environmental impacts associated with this technology that has been identified for the purposes of this evaluation.

### 6.4.1.3. Remaining Useful Life

Lhoist has assumed this control equipment will last for the entirety of the 20-year amortization period, which is reflected in the cost calculations.

### 6.4.2. SNCR

**6.4.2.1. Cost of Compliance**

In order to assess the cost of compliance for the installation of SNCR, installation and annual operation costs from Lhoist's Nelson facility were used and scaled up to represent 2019 costs. Capital costs for the installation of the SNCR assumed a 20-year life span for depreciation, as well as an interest rate of 3.25%. The total capital investment includes the capital cost for the SNCR itself and the dry urea system. Annual costs consist of operational costs estimated from a similar Lhoist facility which includes urea costs, power costs, operating labor costs, maintenance material costs, and the annualized capital costs as a capital recovery value. The amount of NOx emissions removed and the cost effectiveness value were determined using the same baseline emission rate as the LNB analysis. The total costs and cost effectiveness of control are summarized for Kilns 1-4 in Table 6-5., below. Detailed calculations are provided in Appendix C.

**Table 6-5. SNCR Cost Calculation Summary**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Total Capital Investment</th>
<th>Total Annual Cost</th>
<th>NOx Emissions Removed (tpy)</th>
<th>Cost Effectiveness ($/ton removed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 1</td>
<td>$591,441</td>
<td>$164,394</td>
<td>60.70</td>
<td>$2,708</td>
</tr>
</tbody>
</table>

Lhoist North America of Arizona Inc. | Apex Plant Four Factor Analysis
Trinity Consultants
6.4.2.2. Timing for Compliance

Lhoist believes that reasonable progress compliant controls can be achieved with the installation of LNB at Kilns 1, 2, and 4. However, if NDEP determines that SNCR is necessary to achieve reasonable progress, it is anticipated that SNCR can be implemented during the period of the second long-term planning period for regional haze (approximately ten years following EPA’s reasonable progress determination).

6.4.2.3. Energy Impacts and Non-Air Quality Impacts

The installation is expected to decrease the efficiency of the overall facility, particularly as significant energy and water use is needed beyond current plan operation requirements. The power costs associated with successful operation of the SNCR are estimated to be $16,272 per kiln based on data from Lhoist’s Nelson facility. Additionally, the implementation of SNCR would introduce some degree of ammonia slip, which in itself generates visibility impairing compounds.

6.4.2.4. Remaining Useful Life

Lhoist has assumed this control equipment will last for the entirety of the 20-year amortization period, which is reflected in the cost calculations.

6.4.3. Installing Low-NOx Burners Before SNCR

The following sections provide an assessment associated with installing SNCR as well LNB with the assumption that the Facility already has LNB installed and operational (which is not the current case for Kilns 1, 2, and 4). LNB costs are not included in the evaluations.

6.4.3.1. Cost of Compliance

In the event that Lhoist must install NOx controls, Lhoist has prioritized the implementation of Low-NOx burners over SNCR due to lower capital costs and annual operating costs. As requested by NDEP, Lhoist has evaluated the cost of SNCR assuming that Low-NOx burners have been installed and the anticipated 10% reduction occurred prior to SNCR installation. In order to assess the incremental cost of compliance for the installation of SNCR, installation and annual operation costs from Lhoist’s Nelson facility were used and scaled up to represent 2019 costs. Capital costs for the installation of the SNCR assumed a 20-year life span for depreciation, as well as an interest rate of 3.25%. The total capital investment includes the capital cost for the SNCR itself and the dry urea system. Annual costs consist of operational costs estimated from a similar Lhoist facility which includes urea costs, power costs, operating labor costs, maintenance material costs, and the annualized capital costs as a capital recovery value. The amount of NOx emissions removed, and the cost effectiveness value were determined using a 10% reduction from the baseline emission rate used in the LNB analysis. The total costs and cost effectiveness of control are summarized for Kilns 1-4 in Table 6-6, below.

<table>
<thead>
<tr>
<th>Kiln 2</th>
<th>$591,441</th>
<th>$144,681</th>
<th>3.82</th>
<th>$37,847</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 3</td>
<td>$591,441</td>
<td>$154,044</td>
<td>30.84</td>
<td>$4,995</td>
</tr>
<tr>
<td>Kiln 4</td>
<td>$591,441</td>
<td>$262,344</td>
<td>343.34</td>
<td>$764</td>
</tr>
<tr>
<td>Kilns 1-4 Combined</td>
<td>$2,365,764</td>
<td>$725,463</td>
<td>438.71</td>
<td>$1,654</td>
</tr>
</tbody>
</table>
6.4.3.3. Energy Impacts and Non-Air Quality Impacts

The installation is expected to decrease the efficiency of the overall facility, particularly as significant energy and water use is needed beyond current plan operation requirements. The power costs associated with successful operation of the SNCR are estimated to be $16,272 per kiln based on data from Lhoist's Nelson facility. Additionally, the implementation of SNCR would introduce some degree of ammonia slip, which in itself generates visibility impairing compounds.

6.4.3.4. Remaining Useful Life

Lhoist has assumed this control equipment will last for the entirety of the 20-year amortization period, which is reflected in the cost calculations.

6.4.4. Average Cost of Installing Low-NOx Burners and SNCR

The following sections provide an assessment associated with installing SNCR as well LNB with the assumption that the Facility does not have LNB installed and operational (i.e., LNB as well as SNCR costs are included in the evaluations).

6.4.4.1. Cost of Compliance

In order to evaluate the average cost of the installation of NOx controls at the facility, the average cost of installing Low-NOx burners and SNCR has been evaluated (note - the cost of adding an LNB to Kiln 3 in this scenario has not been included as Kiln 3 already utilizes an LNB). This average cost was determined by dividing the annual costs for both LNB and SNCR installation by the annual emissions reductions. The annual costs and emissions reduced for each control technology was determined as detailed above. The total costs and cost effectiveness of control are summarized for Kilns 1-4 in Table 6-7, below.

Table 6-6. LNB then SNCR Cost Calculation Summary

<table>
<thead>
<tr>
<th>Unit</th>
<th>Total Capital Investment</th>
<th>Total Annual Cost</th>
<th>NOx Emissions Removed (tpy)</th>
<th>Cost Effectiveness ($/ton removed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 1</td>
<td>$591,441</td>
<td>$162,290</td>
<td>54.63</td>
<td>$2,971</td>
</tr>
<tr>
<td>Kiln 2</td>
<td>$591,441</td>
<td>$144,549</td>
<td>3.44</td>
<td>$42,014</td>
</tr>
<tr>
<td>Kiln 3</td>
<td>$591,441</td>
<td>$154,044</td>
<td>30.84</td>
<td>$4,995</td>
</tr>
<tr>
<td>Kiln 4</td>
<td>$591,441</td>
<td>$250,445</td>
<td>309.01</td>
<td>$810</td>
</tr>
<tr>
<td>Kilns 1-4 Combined</td>
<td>$2,365,764</td>
<td>$711,328</td>
<td>397.92</td>
<td>$1,788</td>
</tr>
</tbody>
</table>
### Table 6-7. SNCR and LNB Average Cost Calculation Summary

<table>
<thead>
<tr>
<th>Unit</th>
<th>Total Capital Investment</th>
<th>Total Annual Cost</th>
<th>NOx Emissions Removed (tpy)</th>
<th>Cost Effectiveness ($/ton removed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiln 1</td>
<td>$966,441</td>
<td>$188,082</td>
<td>84.98</td>
<td>$2,213</td>
</tr>
<tr>
<td>Kiln 2</td>
<td>$966,441</td>
<td>$170,341</td>
<td>5.35</td>
<td>$31.828</td>
</tr>
<tr>
<td>Kiln 3</td>
<td>$591,441</td>
<td>$154,044</td>
<td>30.84</td>
<td>$4,995</td>
</tr>
<tr>
<td>Kiln 4</td>
<td>$1,041,441</td>
<td>$281,396</td>
<td>377.68</td>
<td>$745</td>
</tr>
<tr>
<td>Kilns 1-4 Combined</td>
<td>$3,565,764</td>
<td>$793,863</td>
<td>498.85</td>
<td>$1,591</td>
</tr>
</tbody>
</table>

### 6.4.4.2. Timing for Compliance

Lhoist believes that reasonable progress compliant controls can be achieved with the installation of LNB at Kilns 1, 2, and 4. However, if NDEP determines that LNB's and SNCR are necessary to achieve reasonable progress, it is anticipated that these controls can be implemented during the period of the second long-term planning period for regional haze (approximately ten years following EPA's reasonable progress determination).

### 6.4.4.3. Energy Impacts and Non-Air Quality Impacts

The installation is expected to decrease the efficiency of the overall facility, particularly as significant energy and water use is needed beyond current plan operation requirements. The power costs associated with successful operation of the SNCR are estimated to be $16,272 per kiln based on data from Lhoist’s Nelson facility. Additionally, the implementation of SNCR would introduce some degree of ammonia slip, which in itself generates visibility impairing compounds.

### 6.4.4.4. Remaining Useful Life

Lhoist has assumed this control equipment will last for the entirety of the 20-year amortization period, which is reflected in the cost calculations.

### 6.5. NOx CONCLUSION

The facility currently uses a low NOx burner in Kiln 3 to minimize NOx emissions. The use of low NOx burners is a commonly applied technology in current BACT determinations for new rotary preheater lime kilns today. The cost of installing low NOx burners on the remaining kilns is below the anticipated $5,000 per ton cost effectiveness threshold and will be installed should NDEP deem the installation necessary in order to achieve reasonable progress. The application of SCR has never been attempted on a lime kiln. SNCR has been demonstrated as an effective control technology for NOx at similar Lhoist facilities and has fairly low costs for Apex Kilns 1, 3, and 4; however, as previously discussed there are significant barriers associated with the implementation of SNCR on the smaller kilns at Apex. Kilns 1 through 3 have various design and process differences which creates some uncertainty if SNCR will achieve even the 20% control efficiency assumed in this analysis. Kiln 4 is more similar in design to the reference kilns and is not expected to face the same technical challenges with implementation of SNCR as Kilns 1 through 3; however Kiln 4 met BACT for Rotary Lime Kilns at the time it was permitted in October 1995. If necessary to achieve reasonable progress, Lhoist is proposing the installation of LNBs on Kilns 1, 2, and 4 which will result in the installation of NOx controls exceeding those
implemented at other lime production facilities. At Kiln 2, SNCR has been determined to be cost-ineffective at the Facility assuming that LNBs will be installed on the kilns. Therefore, the installation of LNBs is considered the most effective control technology evaluated on a $/ton basis for NOx reduction.
7. CONCLUSION

This report outlines Lhoist’s evaluation of possible options for reducing the emissions of NOx and SO2 at its Apex facility in North Las Vegas, Nevada. The installation of low NOx burners on Kilns 1, 2, and 4 has been identified as a technically feasible and cost-effective reduction option at the Apex facility should it be deemed necessary in order to achieve reasonable progress. There are currently no additional technically feasible and cost-effective reduction options available for the Apex facility that would achieve additional reasonable progress goals for visibility impacts. Therefore, the emissions provided for the 2028 on-the-books/on-the-way modeling baseline will assume the installation of the economically feasible control technologies and use the reduced emission rates as compared to those used in the “control scenario” for the Facility.
Authorization of a new natural gas-fired vertical kiln along with associated material handling equipment including conveyors, crushers, vibrating screens, and product loading. increase the facility’s lime production capacity. The new kiln will have a production rate of 660 short tons per day on a 30-day average basis.

PROCESS NAME: Vertical Lime Kiln
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel: NATURAL GAS
Throughput: 660.00 T/DAY

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
**Test Method:** Unspecified  
**Pollutant Group(s):** (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))  
**Emission Limit 1:** 0.3500 LB/TON  
**Emission Limit 2:**

**Did factors, other than air pollution technology considerations influence the BACT decisions: N**

**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:** NSPS  
**Control Method:** (P) Proper kiln design (vertical PFR), good combustion techniques, Natural Gas Fuel, no add-on controls.

**Est. % Efficiency:**  
**Cost Effectiveness:** 0 $/ton  
**Incremental Cost Effectiveness:** 0 $/ton  
**Compliance Verified:** Unknown  
**Pollutant/Compliance Notes:** NSPS HH

**POLLUTANT NAME:** Particulate matter, total (TPM)  
**CAS Number:** PM  
**Test Method:** Unspecified  
**Pollutant Group(s):** (Particulate Matter (PM))  
**Emission Limit 1:** 0.0090 GR/DSCF  
**Emission Limit 2:**

**Did factors, other than air pollution technology considerations influence the BACT decisions: N**

**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:** NSPS  
**Control Method:** (A) BAGHOUSE  
**Est. % Efficiency:**  
**Cost Effectiveness:** 0 $/ton  
**Incremental Cost Effectiveness:** 0 $/ton  
**Compliance Verified:** Unknown  
**Pollutant/Compliance Notes:** NSPS HH

**POLLUTANT NAME:** Particulate matter, total < 10 µ (TPM10)  
**CAS Number:** PM  
**Test Method:** Unspecified  
**Pollutant Group(s):** (Particulate Matter (PM))  
**Emission Limit 1:** 0.0090 GR/DSCF  
**Emission Limit 2:**

**Standard Emission:**
Did factors, other than air pollution technology considerations influence the BACT decisions: N

<table>
<thead>
<tr>
<th>Case-by-Case Basis</th>
<th>BACT-PSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Applicable Requirements</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method</td>
<td>(A) BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes</td>
<td>NSPS HH</td>
</tr>
</tbody>
</table>

**POLLUTANT NAME:** Particulate matter, total < 2.5 μ (TPM2.5)

| CAS Number:     | PM                  |
| Test Method:    | Unspecified         |
| Pollutant Group(s): | ( Particulate Matter (PM) ) |
| Emission Limit 1: | 0.0090 GR/DSCF      |
| Emission Limit 2: |                    |

Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N

<table>
<thead>
<tr>
<th>Case-by-Case Basis</th>
<th>BACT-PSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Applicable Requirements</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method</td>
<td>(A) BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes</td>
<td>NSPS HH</td>
</tr>
</tbody>
</table>

**POLLUTANT NAME:** Carbon Dioxide Equivalent (CO2e)

| CAS Number:     | CO2e                 |
| Test Method:    | Unspecified          |
| Pollutant Group(s): | ( Greenhouse Gasses (GHG) ) |
| Emission Limit 1: | 3.6100 HHV/TON      |
| Emission Limit 2: |                    |

Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N

<table>
<thead>
<tr>
<th>Case-by-Case Basis</th>
<th>BACT-PSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Applicable Requirements</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method</td>
<td>(P) Proper kiln design (vertical PFR), good combustion techniques, Natural Gas Fuel, no add-on controls.</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
</tr>
</tbody>
</table>
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS HH

**Process/Pollutant Information**

**PROCESS NAME:** Material Handling (Conveyors and Feeders)
**Process Type:** 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
**Primary Fuel:**
**Throughput:** 0

**POLLUTANT NAME:** Particulate matter, filterable (FPM)
**CAS Number:** PM
**Test Method:** Unspecified
**Pollutant Group(s):** (Particulate Matter (PM))
**Emission Limit 1:** 0.0050 GR/DSCF
**Emission Limit 2:**
**Standard Emission:**
Did factors, other than air pollution technology considerations influence the BACT decisions: N
**Case-by-Case Basis:** BACT-PSD
**Other Applicable Requirements:** NSPS
**Control Method:** (A) BAGHOUSE
**Ext. % Efficiency:**
**Cost Effectiveness:** 0 $/ton
**Incremental Cost Effectiveness:** 0 $/ton
**Compliance Verified:** Unknown
**Pollutant/Compliance Notes:** NSPS OOO

**POLLUTANT NAME:** Particulate matter, filterable < 10 μ (FPM10)
**CAS Number:** PM
**Test Method:** Unspecified
**Pollutant Group(s):** (Particulate Matter (PM))
**Emission Limit 1:** 0.0050 GR/DSCF
**Emission Limit 2:**
**Standard Emission:**
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency: 0
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

POLLUTANT NAME: Particulate matter, filtrable < 2.5 μ (FPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency: 0
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

Process/Pollutant Information
PROCESS NAME: Stone Handling Area Crusher
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel:
Throughput: 1428.00 TON/H
Process Notes: 521200 TON/yr

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) WATER SPRAYS
Est. % Efficiency: 70.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Particulate matter, total &lt; 10 μ (TPM10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>PM</td>
</tr>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>( Particulate Matter (PM) )</td>
</tr>
</tbody>
</table>

Emission Limit 1:
Emission Limit 2:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) WATER SPRAYS
Est. % Efficiency: 70.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Particulate matter, total &lt; 2.5 μ (TPM2.5)</th>
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</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>PM</td>
</tr>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>( Particulate Matter (PM) )</td>
</tr>
</tbody>
</table>

Emission Limit 1:
Emission Limit 2:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) WATER SPRAYS  
Est. % Efficiency: 70.000  
Cost Effectiveness: 0 $/ton  
Incremental Cost Effectiveness: 0 $/ton  
Compliance Verified: Unknown  
Pollutant/Compliance Notes: NSPS OOO

<table>
<thead>
<tr>
<th>PROCESS NAME: Lime Belt Crusher</th>
<th>Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Fuel:</td>
<td>0</td>
</tr>
<tr>
<td>Process Notes:</td>
<td></td>
</tr>
</tbody>
</table>

| POLLUTANT NAME: Particulate matter, total (TPM) |
|-----------------|-----------------------------------------------|
| CAS Number: PM  |
| Test Method: Unspecified                          |
| Pollutant Group(s): ( Particulate Matter (PM) ) |
| Emission Limit 1: 0.0090 GR/DSCF                   |
| Emission Limit 2:                                                                                     |
| Standard Emission:                                                                                     |
| Did factors, other then air pollution technology considerations influence the BACT decisions: N |
| Case-by-Case Basis: BACT-PSD                                                                                   |
| Other Applicable Requirements: NSPS                                                                     |
| Control Method: (A) BAGHOUSE                                                                         |
| Est. % Efficiency: 0 $/ton                                                                               |
| Cost Effectiveness: 0 $/ton                                                                            |
| Incremental Cost Effectiveness: 0 $/ton                                                               |
| Compliance Verified: Unknown                                                                           |
| Pollutant/Compliance Notes: NSPS OOO                                                                    |

| POLLUTANT NAME: Particulate matter, total < 10 μm (TPM10) |
|-----------------|------------------------------------------------------------|
| CAS Number: PM  |
| Test Method: Unspecified                          |
| Pollutant Group(s): ( Particulate Matter (PM) ) |
| Emission Limit 1: 0.0090 GR/DSCF                   |
| Emission Limit 2:                                                                                     |
| Standard Emission:                                                                                     |
Did factors, other than air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Ext. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

POLLUTANT NAME: Particulate matter, total < 2.5 μ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): ( Particulate Matter (PM) )
Emission Limit 1: 0.0090 GR/DSCF
Emission Limit 2: 
Standard Emission: 
Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: 
Control Method: (A) BAGHOUSE
Ext. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

Process/Pollutant Information

PROCESS NAME: Product Loadout
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel: 
Throughput: 240900.00 TON/yr
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
<table>
<thead>
<tr>
<th>Case-by-Case Basis:</th>
<th>BACT-PSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Applicable Requirements:</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method:</td>
<td>(A) BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>Unknown</td>
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<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>NSPS OOO</td>
</tr>
</tbody>
</table>

**Facility Information**

<table>
<thead>
<tr>
<th>RBLC ID:</th>
<th>WI-0291 (draft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate/Company Name:</td>
<td>GRAYMONT WESTERN LIME-EDEN</td>
</tr>
<tr>
<td>Facility Name:</td>
<td>GRAYMONT WESTERN LIME-EDEN</td>
</tr>
<tr>
<td>Facility Description:</td>
<td>Lime Manufacturing</td>
</tr>
<tr>
<td>Permit Type:</td>
<td>D: Both B (Add new process to existing facility) &amp; C (Modify process at existing facility)</td>
</tr>
<tr>
<td>Permit URL:</td>
<td><a href="https://dnr.wi.gov/cias/am/amexternal/AM_DownloadObject.aspx?id=800031">https://dnr.wi.gov/cias/am/amexternal/AM_DownloadObject.aspx?id=800031</a></td>
</tr>
<tr>
<td>EPA Region:</td>
<td>5</td>
</tr>
<tr>
<td>Facility County:</td>
<td>FOND DU LAC</td>
</tr>
<tr>
<td>Facility State:</td>
<td>WI</td>
</tr>
<tr>
<td>Facility ZIP Code:</td>
<td>53019</td>
</tr>
<tr>
<td>Permit Issued By:</td>
<td>WISCONSIN DEPT OF NATURAL RESOURCES; AIR MGMT. PROGRAM (Agency Name)</td>
</tr>
<tr>
<td>MS. KRISTIN HART (Agency Contact) (608)266-6876 <a href="mailto:kristin.hart@wisconsin.gov">kristin.hart@wisconsin.gov</a></td>
<td></td>
</tr>
<tr>
<td>Permit Notes:</td>
<td>Replacing burners on Kiln #1 and Kiln #2 to allow the kilns to fire natural gas. The permit also allows for the installation of a natural gas heater and diesel emergency generator.</td>
</tr>
<tr>
<td>Facility-wide Emissions:</td>
<td></td>
</tr>
<tr>
<td>Pollutant Name:</td>
<td>Facility-wide Emissions Increase:</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>243.2600 (Tons/Year)</td>
</tr>
<tr>
<td>Nitrogen Oxides (NOx)</td>
<td>178.4500 (Tons/Year)</td>
</tr>
<tr>
<td>Particulate Matter (PM)</td>
<td>9.6900 (Tons/Year)</td>
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<tr>
<td>Sulfur Oxides (SOx)</td>
<td>32.1200 (Tons/Year)</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOC)</td>
<td>3.7300 (Tons/Year)</td>
</tr>
</tbody>
</table>

**Process/Pollutant Information**

<table>
<thead>
<tr>
<th>PROCESS NAME:</th>
<th>P33 Lime Kiln #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type:</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
<td>Natural Gas/Coal</td>
</tr>
</tbody>
</table>
Throughput: 0
Process Notes: Maximum Continuous Rating Natural Gas: 85 mmBTU/hr Coal: 109 mmBTU/hr

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 15.0000 % OPACITY 6-MINUTE AVERAGE
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP
Control Method: (P) The available options described for controlling visible emissions are generally the controls for controlling nitrogen oxides emissions.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 43.8000 LB/HR 30 DAY AVERAGE
Emission Limit 2: 1.5000 LB/TON STONE FEED 365 DAY AVERAGE
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP
Control Method: (P) Good Combustion Practices and the Use of Low-NOx Burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NOx emissions during startup, shutdown, or low-load (8.8 tons/hr) operation of the kiln shall not be used in determining compliance with the BACT emission

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds)
Emission Limit 1: 58.3000 LB/HR 30 DAY AVERAGE
Emission Limit 2: 2.0000 LB/TON STONE FEED 365 DAY AVERAGE
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP
Control Method: (P) Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: CO emissions during startup, shutdown, or low-load (8.8 tons/hr) operation of the kiln shall not be used in determining compliance with the BACT emission

Process/Pollutant Information

PROCESS NAME: P34 Lime Kiln #2
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel: Natural Gas/Coal
Throughput: 0
Process Notes: Maximum Continuous Rating Natural Gas: 113 mmBTU/hr Coal: 123 mmBTU/hr

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 15.0000 % OPACITY 6-MINUTE AVERAGE
Emission Limit 2: 
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NESHAP, NSPS
Control Method: (P) The available options described for controlling visible emissions are generally the controls for controlling nitrogen oxides emissions.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
<table>
<thead>
<tr>
<th>Pollutant/Compliance Notes:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POLLUTANT NAME:</strong></td>
<td>Nitrogen Oxides (NOx)</td>
<td></td>
</tr>
<tr>
<td>CAS Number:</td>
<td>10102</td>
<td></td>
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<tr>
<td>Test Method:</td>
<td>Unspecified</td>
<td></td>
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<tr>
<td>Pollutant Group(s):</td>
<td>Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM)</td>
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</tr>
<tr>
<td>Emission Limit 1:</td>
<td>68.8000 LB/HR 30 DAY AVERAGE</td>
<td></td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td>1.5000 LB/TON STONE FEED 365 DAY AVERAGE</td>
<td></td>
</tr>
<tr>
<td>Standard Emission:</td>
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<td></td>
</tr>
<tr>
<td>Did factors, other than air pollution technology considerations influence the BACT decisions:</td>
<td>N</td>
<td></td>
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<tr>
<td>Case-by-Case Basis:</td>
<td>BACT-PSD</td>
<td></td>
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<tr>
<td>Other Applicable Requirements:</td>
<td>NSPS, NESHAP</td>
<td></td>
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<tr>
<td>Control Method:</td>
<td>(P) Good Combustion Practices and the Use of Low-NOx Burners</td>
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<tr>
<td>Est. % Efficiency:</td>
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<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
<td></td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>0 $/ton</td>
<td></td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>NOx emissions during startup, shutdown, or low-load (13.8 tons/hr) operation of the kiln shall not be used in determining compliance with the BACT emission</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pollutant/Compliance Notes:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POLLUTANT NAME:</strong></td>
<td>Carbon Monoxide</td>
<td></td>
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<tr>
<td>CAS Number:</td>
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</tr>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
<td></td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>Inorganic Compounds</td>
<td></td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>45.8000 LB/HR 30 DAY AVERAGE</td>
<td></td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td>1.0000 LB/TON STONE FEED 365 DAY AVERAGE</td>
<td></td>
</tr>
<tr>
<td>Standard Emission:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did factors, other than air pollution technology considerations influence the BACT decisions:</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Case-by-Case Basis:</td>
<td>BACT-PSD</td>
<td></td>
</tr>
<tr>
<td>Other Applicable Requirements:</td>
<td>NSPS, NESHAP</td>
<td></td>
</tr>
<tr>
<td>Control Method:</td>
<td>(P) Good Combustion Practices</td>
<td></td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
<td></td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>0 $/ton</td>
<td></td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>CO emissions during startup, shutdown, or low-load (13.8 tons/hr) operation of the kiln shall not be used in determining compliance with the BACT emission</td>
<td></td>
</tr>
</tbody>
</table>
## Process/Pollutant Information

**PROCESS NAME:** P04 Emergency Diesel Generator  
**Process Type:** 17.210 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))  
**Primary Fuel:** Diesel Fuel  
**Throughput:** 0.22 mmBTU/hr  
**Process Notes:** Generac Industrial Diesel Generator Set, 3.4 liter, 35kW

<table>
<thead>
<tr>
<th>POLLUTANT NAME</th>
<th>Visible Emissions (VE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAS Number:</strong></td>
<td>VE</td>
</tr>
<tr>
<td><strong>Test Method:</strong></td>
<td>Unspecified</td>
</tr>
<tr>
<td><strong>Pollutant Group(s):</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Emission Limit 1:</strong></td>
<td>10.0000 % OPACITY 6-MINUTE AVERAGE</td>
</tr>
<tr>
<td><strong>Emission Limit 2:</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Did factors, other than air pollution technology considerations influence the BACT decisions:** N

**CASE-BY-CASE BASIS:** BACT-PSD

**Other Applicable Requirements:** NSPS, NESHAP

**Control Method:** (P) The available options described for controlling visible emissions are generally the controls for controlling particulate matter, sulfur dioxide, and nitrogen oxides emissions.

**Est. % Efficiency:**
- Cost Effectiveness: 0 $/ton
- Incremental Cost Effectiveness: 0 $/ton

**Compliance Verified:** Unknown

**Pollutant/Compliance Notes:**

---

<table>
<thead>
<tr>
<th>POLLUTANT NAME</th>
<th>Nitrogen Oxides (NOx)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAS Number:</strong></td>
<td>10102</td>
</tr>
<tr>
<td><strong>Test Method:</strong></td>
<td>Unspecified</td>
</tr>
<tr>
<td><strong>Pollutant Group(s):</strong></td>
<td>(Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))</td>
</tr>
<tr>
<td><strong>Emission Limit 1:</strong></td>
<td>4.7000 G/KWH</td>
</tr>
<tr>
<td><strong>Emission Limit 2:</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Did factors, other than air pollution technology considerations influence the BACT decisions:** N

**CASE-BY-CASE BASIS:** BACT-PSD

**Other Applicable Requirements:** NSPS, NESHAP

**Control Method:** (P) Good Combustion Practices

**Est. % Efficiency:**
- Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: The total hours of operation of each emergency generator may not exceed 500 hours during each consecutive 12-month period.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds)
Emission Limit 1: 5.0000 G/KWH
Emission Limit 2: 
Standard Emission: 
Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP
Control Method: (P) Good Combustion Practices
Emission Limit 2: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: The total hours of operation of each emergency generator may not exceed 500 hours during each consecutive 12-month period.

<table>
<thead>
<tr>
<th>PROCESS NAME: P05 Natural Gas Fired Line Heater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type: 13.310 (Natural Gas (includes propane and liquefied petroleum gas))</td>
</tr>
<tr>
<td>Primary Fuel: Natural Gas</td>
</tr>
<tr>
<td>Throughput: 1.50 mmBTU/hr</td>
</tr>
</tbody>
</table>

Process Notes:

<table>
<thead>
<tr>
<th>POLLUTANT NAME: Visible Emissions (VE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number: VE</td>
</tr>
<tr>
<td>Test Method: Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s): 10.000 % OPACITY 6-MINUTE AVERAGE</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
</tr>
<tr>
<td>Standard Emission:</td>
</tr>
<tr>
<td>Did factors, other than air pollution technology considerations influence the BACT decisions: N</td>
</tr>
</tbody>
</table>
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: 
Control Method: (P) The available options described for controlling visible emissions are generally the controls for controlling particulate matter, sulfur dioxide, and nitrogen oxides emissions.
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM) )
Emission Limit 1: 0.1000 LB/MMBTU
Emission Limit 2: 
Standard Emission: 
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: 
Control Method: (P) Good Combustion Practices
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0820 LB/MMBTU
Emission Limit 2: 
Standard Emission: 
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: 
Control Method: (P) Good Combustion Practices
Est. % Efficiency: 
**Facility Information**

**RBLC ID:** AL-0313 (final)

**Corporate/Company Name:** LHOIST NORTH AMERICA OF ALABAMA, LLC

**Facility Name:** MONTEVALLO PLANT

**Facility Contact:** MICHAEL WILL 2054021553 MICHAEL.WILL@LHOIST.COM

**Facility Description:** LIME MANUFACTURING FACILITY

**Permit Type:** B: Add new process to existing facility

**Permit URL:** HTTP:

**EPA Region:** 4

**Facility County:** SHELBY

**Facility State:** AL

**Facility ZIP Code:** 35040

**Permit Issued By:** ALABAMA DEPT OF ENVIRONMENTAL MGMT (Agency Name) MR. DALE HURST (Agency Contact) (334) 271-7882 ADH@ADEM.STATE.AL.US

**Process/Pollutant Information**

**PROCESS NAME:** LIMESTONE FEED SYSTEM

**Process Type:** 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)

**Primary Fuel:** N/A

**Throughput:** 110000.00 LB/H

**Process Notes:** 110,000 LB/H THROUGHPUT OF LIMESTONE

**POLLUTANT NAME:** Particulate matter, fugitive

**CAS Number:** PM

**Test Method:** Other

**Other Test Method:**

**Pollutant Group(s):**

**Emission Limit 1:** 7.0000 % OPACITY 6 MIN AVG

**Emission Limit 2:**

**Date Determination**

**Last Updated:** 11/30/2017

**Permit Number:** 411-0008

**Permit Date:** 05/04/2016 (actual)

**FRS Number:** Not Found

**SIC Code:** 3274

**NAICS Code:** 327410

**COUNTRY:** USA
### Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N

**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:** NSPS  
**Control Method:** (A) WET LIMESTONE  
**Ext. % Efficiency:**  
**Cost Effectiveness:** 0 $/ton  
**Incremental Cost Effectiveness:** 0 $/ton  
**Compliance Verified:** Unknown  
**Pollutant/Compliance Notes:** METHOD 9

#### POLLUTANT NAME:
Particulate matter, filterable (FPM)

**CAS Number:** PM  
**Test Method:** EPA/OAR Mtd 5  
**Pollutant Group(s):** (Particulate Matter (PM))  
**Emission Limit 1:** 7.0000 % OPACITY 6 MIN AVG  
**Emission Limit 2:** 0.0140 GR/DSCF  

### Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N

**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:** MACT  
**Control Method:** (P) WET LIMESTONE  
**Ext. % Efficiency:**  
**Cost Effectiveness:** 0 $/ton  
**Incremental Cost Effectiveness:** 0 $/ton  
**Compliance Verified:** Unknown  
**Pollutant/Compliance Notes:**

---

### Process/Pollutant Information

**PROCESS NAME:** VERTICAL LIME KILN  
**Process Type:** 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)  
**Primary Fuel:** NATURAL GAS  
**Throughput:** 100.00 MMBTU/H  
**Process Notes:**

#### POLLUTANT NAME:
Particulate matter, total < 10 µ (TPM10)  
**CAS Number:** PM
<table>
<thead>
<tr>
<th>Test Method:</th>
<th>EPA/OAR Mtd 201 and 202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollutant Group(s):</td>
<td>(Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>0.0090 GR/DSCF</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td>3.7700 LB/H</td>
</tr>
<tr>
<td>Standard Emission:</td>
<td></td>
</tr>
<tr>
<td>Did factors, other then air pollution technology considerations influence the BACT decisions:</td>
<td>N</td>
</tr>
<tr>
<td>Case-by-Case Basis:</td>
<td>BACT-PSD</td>
</tr>
<tr>
<td>Other Applicable Requirements:</td>
<td>MACT</td>
</tr>
<tr>
<td>Control Method:</td>
<td>(A) FABRIC FILTER BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>TEST METHODS: METHOD 5 OF 40 CFR PART 60 OR METHOD 201/201A AND METHOD 202 OF 40 CFR PART 60</td>
</tr>
</tbody>
</table>

**POLLUTANT NAME:** Particulate matter, total < 2.5 μ (TPM2.5)

| CAS Number: | PM                          |
| Test Method: | Other                      |
| Other Test Method: |                                  |
| Pollutant Group(s): | (Particulate Matter (PM))    |
| Emission Limit 1: | 0.0040 GR/DSCF              |
| Emission Limit 2: | 1.6800 LB/H                 |
| Standard Emission: |                                  |
| Did factors, other then air pollution technology considerations influence the BACT decisions: | N                           |
| Case-by-Case Basis: | BACT-PSD                      |
| Other Applicable Requirements: | MACT                        |
| Control Method:  | (A) FABRIC FILTER BAGHOUSE  |
| Est. % Efficiency: |                                  |
| Cost Effectiveness: | 0 $/ton                      |
| Incremental Cost Effectiveness: | 0 $/ton                      |
| Compliance Verified: | Unknown                      |
| Pollutant/Compliance Notes: | TEST METHODS: METHOD 5 OF 40 CFR PART 60 OR METHOD 201/201A AND METHOD 202 OF 40 CFR PART 60 |

**POLLUTANT NAME:** Nitrogen Oxides (NOx)

| CAS Number: | 10102                  |
| Test Method: | EPA/OAR Mtd 7           |
| Pollutant Group(s): | (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM)) |
| Emission Limit 1: | 27,5000 LB/H 3 HR AVG    |
Emission Limit 2: 0.5000 LB/TON LIME PRODUCED 30 DAY ROLLING AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) PARALLEL FLOW REGENERATIVE VERTICAL KILN DESIGN GOOD COMBUSTION AND PROCESS CONTROL TECHNIQUES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: COMPLIANCE DETERMINED BY CEMS

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): ( Greenhouse Gasses (GHG) )
Emission Limit 1: 4.0000 MMBTU HHV/TON LIME 12 MONTH AVG

Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) PARALLEL FLOW REGENERATIVE KILN DESIGN ENERGY EFFICIENT OPERATING PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Methane
CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): ( Greenhouse Gasses (GHG), Organic Compounds (all), Organic Non-HAP Compounds )
Emission Limit 1: 4.0000 MMBTU HHV/TON LIME

Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) PARALLEL FLOW REGENERATIVE VERTICAL KILN ENERGY EFFICIENT OPERATING PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrous Oxide (N2O)
CAS Number: 10024-97-2
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), InOrganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 4.0000 MMBTU HHV/TON LIME
Emission Limit 2: Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) PARALLEL FLOW REGENERATIVE VERTICAL KILN DESIGN ENERGY EFFICIENT OPERATING PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: EPA/OAR Meth 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 36.0000 LB/H
Emission Limit 2: 1.3000 LB/TON LIME PRODUCED
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) PARALLEL FLOW REGENERATIVE VERTICAL KILN DESIGN GOOD COMBUSTION AND PROCESS CONTROL TECHNOLOGIES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 GR/DSCF
Emission Limit 2: 3.7700 LB/H
Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: DIESEL EMERGENCY GENERATOR
Process Type: 11.220 (Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: DIESEL
Throughput: 500.00 BHP
Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: EPA/OAR Mthd 7A
Pollutant Group(s): (InOrganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 4.0000 G/KW-H
Emission Limit 2: 0.0066 LB/HP-H
Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Incremental Cost Effectiveness: 0 $/ton  
Compliance Verified: Unknown  
Pollutant/Compliance Notes:

**POLUTANT NAME:** Particulate matter, filterable < 10 μ (FPM10)  
CAS Number: PM  
Test Method: Unspecified  
Pollutant Group(s): (Particulate Matter (PM))  
Emission Limit 1: 0.2300 G/KW-H  
Emission Limit 2: 0.0004 LB/HP-H  
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: Y  
Case-by-Case Basis: BACT-PSD  
Other Applicable Requirements: NSPS  
Control Method: (N) TIER 3 ENGINE  
Est. % Efficiency:  
Cost Effectiveness: 0 $/ton  
Incremental Cost Effectiveness: 0 $/ton  
Compliance Verified: Unknown  
Pollutant/Compliance Notes:

**POLUTANT NAME:** Particulate matter, filterable < 2.5 μ (FPM2.5)  
CAS Number: PM  
Test Method: Unspecified  
Pollutant Group(s): (Particulate Matter (PM))  
Emission Limit 1: 0.2300 G/KW-H  
Emission Limit 2: 0.0004 LB/HP-H  
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: Y  
Case-by-Case Basis: BACT-PSD  
Other Applicable Requirements: NSPS  
Control Method: (N) TIER 3 ENGINE  
Est. % Efficiency:  
Cost Effectiveness: 0 $/ton  
Incremental Cost Effectiveness: 0 $/ton  
Compliance Verified: Unknown  
Pollutant/Compliance Notes:

**POLUTANT NAME:** Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 7000.0000 BTU/HP-H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Methane
CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), Organic Compounds (all), Organic Non-HAP Compounds)
Emission Limit 1: 7000.0000 BTU/HP-H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrous Oxide (N2O)
CAS Number: 10024-97-2
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), InOrganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 7000.0000 BTU/HP-H
Emission Limit 2:
Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

<table>
<thead>
<tr>
<th>Process/Pollutant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROCESS NAME:</strong></td>
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<tr>
<td>Process Type:</td>
</tr>
<tr>
<td>Primary Fuel:</td>
</tr>
<tr>
<td>Throughput:</td>
</tr>
<tr>
<td>Process Notes:</td>
</tr>
<tr>
<td><strong>POLLUTANT NAME:</strong></td>
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<tr>
<td>CAS Number:</td>
</tr>
<tr>
<td>Test Method:</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
</tr>
<tr>
<td>Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: N</td>
</tr>
<tr>
<td>Case-by-Case Basis:</td>
</tr>
<tr>
<td>Other Applicable Requirements:</td>
</tr>
<tr>
<td>Control Method:</td>
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<tr>
<td>Est. % Efficiency:</td>
</tr>
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<td>Cost Effectiveness:</td>
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<tr>
<td>Incremental Cost Effectiveness:</td>
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<td>Compliance Verified:</td>
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<td>Pollutant/Compliance Notes:</td>
</tr>
<tr>
<td><strong>POLLUTANT NAME:</strong></td>
</tr>
<tr>
<td>CAS Number:</td>
</tr>
</tbody>
</table>
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0020 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: FILTERABLE PM2.5 EMISSIONS SHALL BE DETERMINED IN ACCORDANCE WITH METHOD 5 OF 40 CFR 60 OR METHOD 201/201A OF 40 CFR PART 60
Incremental Cost Effectiveness: 0 $/ton  
Compliance Verified: Unknown  
Pollutant/Compliance Notes: FILTERABLE PM2.5 EMISSIONS SHALL BE DETERMINED IN ACCORDANCE WITH METHOD 5 OF 40 CFR 60 OR METHOD 201/201A OF 40 CFR PART 60.

POLLUTANT NAME: Particulate matter, filterable < 10 μ (FPM10)
CAS Number: PM  
Test Method: EPA/OAR Meth 201  
Pollutant Group(s): (Particulate Matter (PM))  
Emission Limit 1: 0.0020 GR/DSCF  
Emission Limit 2:  
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N  
Case-by-Case Basis: BACT-PSD  
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE  
Est. % Efficiency:
Cost Effectiveness: 0 $/ton  
Incremental Cost Effectiveness: 0 $/ton  
Compliance Verified: Unknown  
Pollutant/Compliance Notes:

<table>
<thead>
<tr>
<th>Process/Pollutant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROCESS NAME:</strong> KILN HEATER</td>
</tr>
<tr>
<td>Process Type: 11.310 (Natural Gas (includes propane and liquefied petroleum gas))</td>
</tr>
<tr>
<td>Primary Fuel: NATURAL GAS</td>
</tr>
<tr>
<td>Throughput: 6.20 MMBTU/H</td>
</tr>
<tr>
<td>Process Notes:</td>
</tr>
<tr>
<td>POLLUTANT NAME: Nitrogen Oxides (NOx)</td>
</tr>
<tr>
<td>CAS Number: 10102</td>
</tr>
<tr>
<td>Test Method: EPA/OAR Meth 7</td>
</tr>
<tr>
<td>Pollutant Group(s): (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
</tr>
<tr>
<td>Standard Emission:</td>
</tr>
<tr>
<td>Did factors, other than air pollution technology considerations influence the BACT decisions: Y</td>
</tr>
<tr>
<td>Case-by-Case Basis: BACT-PSD</td>
</tr>
</tbody>
</table>
Other Applicable Requirements:
Control Method: (A) LOW NOX BURNER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): ( InOrganic Compounds )
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION TECHNIQUES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): ( Particulate Matter (PM) )
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Particulate matter, filterable < 10 μ (FPM10)
CAS Number: PM
Test Method: EPA/OAR Mthd 201
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE
Ext. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Particulate matter, filterable < 2.5 μ (FPM2.5)
CAS Number: PM
Test Method: Other
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE
Ext. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2c
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))

Did factors, other than air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) NATURAL GAS ENERGY EFFICIENT OPERATING PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Methane
CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), Organic Compounds (all), Organic Non-HAP Compounds)

Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) NATURAL GAS ENERGY EFFICIENT OPERATING PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrous Oxide (N2O)
CAS Number: 10024-97-2
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))

Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) NATURAL GAS ENERGY EFFICIENT OPERATING PRACTICES
Ext. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Facility Information

RBLC ID: IL-0117 (final)
Corporate/Company: MISSISSIPPI LIME COMPANY
Name: KIMBERLY BAUMAN 573-883-4046 KSLBAUMAN@MISSISSIPPILIME.COM
Facility Contact: KIMBERLY BAUMAN 573-883-4046 KSLBAUMAN@MISSISSIPPILIME.COM
Facility Description: Lime manufacturing plant at existing limestone mine located in Prairie Du Rocher. The lime manufacturing plant would include two pre-heater rotary kilns; limestone crushing, storing and handling; fuel storage and handling; lime dehydrators; lime storage, handling and loadout; and other ancillary operations.
Permit Type: A: New/Greenfield Facility
Permit URL: http://yosemite.epa.gov/r5/in_permits.nsf/6f1ebc583aad454a82d625763f0053e08f56b26b2c13f0f23af086257f410057b897/$FILE/ATTIHCVP9.pdf/08100063.pdf
EPA Region: 5
Facility County: RANDOLPH
Facility State: IL
Facility ZIP Code: 63127
Permit Issued By: ILLINOIS EPA, BUREAU OF AIR (Agency Name) MR. RAY PILAPIL (Agency Contact) (217) 782-2113 ray.pilapil@illinois.gov
Other Agency Contact: Minesh Patel, 217-785-5152
Permit Notes:

Facility-wide Emissions:
Pollutant Name: Facility-wide Emissions Increase:
Carbon Monoxide: 1095.0000 (Tons/Year)
Nitrogen Oxides (NOx): 1533.0000 (Tons/Year)
Particulate Matter (PM): 98.6300 (Tons/Year)
Sulfur Oxides (SOx): 219.0000 (Tons/Year)
Volatile Organic Compounds (VOC): 22.0000 (Tons/Year)
<table>
<thead>
<tr>
<th>Process/Pollutant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROCESS</strong></td>
</tr>
<tr>
<td><strong>NAME:</strong></td>
</tr>
<tr>
<td><strong>Process Type:</strong></td>
</tr>
<tr>
<td><strong>Primary Fuel:</strong></td>
</tr>
<tr>
<td><strong>Throughput:</strong></td>
</tr>
<tr>
<td><strong>Process Notes:</strong></td>
</tr>
</tbody>
</table>

| **POLUTANT NAME:** | Nitrogen Oxides (NOx) |
| **CAS Number:** | 10102 |
| **Test Method:** | Other |
| **Other Test Method:** | CEMS |
| **Pollutant Group(s):** | (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM)) |
| **Emission Limit 1:** | 3.5000 LBS/TON LIME PRODUCE 30-DAY ROLLING AVERAGE |
| **Emission Limit 2:** | 2.6100 LBS/TON LIME PRODUCE 12-MONTH ROLLING AVERAGE |
| **Standard Emission:** |  |

Did factors, other than air pollution technology considerations influence the BACT decisions: N

**Case-by-Case Basis:** BACT-PSD
**Other Applicable Requirements:** SIP
**Control Method:** (B) Low excess air to minimize formation of NOx and selective non-catalytic reduction (SNCR) technology.

**Est. % Efficiency:**
**Cost Effectiveness:** 0 $/ton
**Incremental Cost Effectiveness:** 0 $/ton
**Compliance Verified:** No
**Pollutant/Compliance Notes:** Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 175.0 lbs NOx/hr, 1-hour avg continues to apply during these periods and serves as BACT. Note: 12-month running average limit (2.61 lb/ton) may be lowered based on the demonstrated performance of SNCR technology.

| **POLUTANT NAME:** | Carbon Monoxide |
| **CAS Number:** | 630-08-0 |
| **Test Method:** | Other |
| **Other Test Method:** | CEMS |
| **Pollutant Group(s):** | (Inorganic Compounds) |
| **Emission Limit 1:** | 2.5000 LBS/TON LIME 24-HOUR AVERAGE |
| **Standard Emission:** |  |

Did factors, other than air pollution technology considerations influence the BACT decisions: N
### POLLUTANT NAME: Sulfur Dioxide (SO2)

**CAS Number:** 7446-09-5  
**Test Method:** Other  
**Other Test Method:** CEMS  
**Pollutant Group(s):** [Inorganic Compounds, Oxides of Sulfur (SOx)]  
**Emission Limit 1:** 0.5000 LBS/TON LIME 30-DAY ROLLING AVERAGE  
**Emission Limit 2:**

**Did factors, other than air pollution technology considerations influence the BACT decisions:** N  
**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:** SIP  
**Control Method:** (P) Natural absorptive capacity of lime kiln dust.  
**Est. % Efficiency:**  
**Cost Effectiveness:** 0 $/ton  
**Incremental Cost Effectiveness:** 0 $/ton  
**Compliance Verified:** No  
**Pollutant/Compliance Notes:** Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 125.0 lbs CO/hr, 24-hour avg continues to apply during these periods and serves as BACT.

### POLLUTANT NAME: Particulate matter, filterable (FPM)

**CAS Number:** PM  
**Test Method:** EPA/OAR Mthd 5  
**Pollutant Group(s):** [Particulate Matter (PM)]  
**Emission Limit 1:** 0.1400 LB/TON 3-HOUR AVERAGE  
**Emission Limit 2:**  
**Did factors, other than air pollution technology considerations influence the BACT decisions:** N  
**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:** SIP  
**Control Method:** (P) Good combustion practices to minimize CO emissions.  
**Est. % Efficiency:**  
**Cost Effectiveness:** 0 $/ton  
**Incremental Cost Effectiveness:** 0 $/ton  
**Compliance Verified:** No  
**Pollutant/Compliance Notes:** Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 40.0 lbs SO2/hr, 1-hour avg and 32.3 lbs SO2/hr, 3-hour avg continues to apply during these periods and serves as BACT.
Other Applicable Requirements: NSPS, NESHAP, SIP
Control Method: (A) Baghouse
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: No
Compliance Verified: Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 7.1 lbs PM/hr, 3-hour avg continues to apply during these periods and serves as BACT.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: EPA/OAR Mthd 201A and 202
Pollutant Group(s): Particulate Matter (PM)
Emission Limit 1: 0.1800 LBS/TON 3-HOUR AVERAGE
Emission Limit 2: 0.1800 LB/T 3-HOUR AVERAGE
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NESHAP, NSPS, SIP
Control Method: (A) Baghouse
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: Unknown
Compliance Verified: Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 8.8 lbs PM10/hr, 3-hour avg continues to apply during these periods and serves as BACT.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): Particulate Matter (PM)
Emission Limit 1: 0.1050 LBS/TON 3-HOUR AVERAGE
Emission Limit 2: 0.1050 LBT 3-HOUR AVERAGE
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP, SIP
Control Method: (A) Baghouse
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 5.24 lbs PM2.5/hr, 3-hour avg continues to apply during these periods and serves as BACT.

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2e
Test Method: Other
Other Test Method: CEMS
Pollutant Group(s): (Greenhouse Gases (GHG))
Emission Limit 1: 2744.0000 LBS/TON LIME 12-MONTH ROLLING AVERAGE
Emission Limit 2:
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of preheater or other similar heat recovery system, selection of refractory and implementation of kiln seal management program.

Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Limit may be lowered based on the demonstrated performance of kilns.

Process/Pollutant Information

PROCESS Limestone Handling Operations (Stack Emissions)
NAME:
Process Type: 90.019 (Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel:
Throughput: 0
Process Notes: Limestone handling operation includes storage bins, conveying system, transfer points, bulk loading or unloading system, screening operations, bucket elevators, and belt conveyors subject to 40 CFR 63 Subpart 5A. Limestone handling operation also includes crushers, grinding mills, screening operations, bucket or belt conveyors, conveyor transfer points, storage bins and enclosed truck loading station subject to 40 CFR 60 Subpart OOO.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0140 GR/DSCF
Emission Limit 2: Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP, SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 7 percent opacity

<table>
<thead>
<tr>
<th>Process/Pollutant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESS NAME: Limestone Handling Operations (Fugitive Emissions)</td>
</tr>
<tr>
<td>Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
</tr>
<tr>
<td>Throughput: 0</td>
</tr>
<tr>
<td>Process Notes:</td>
</tr>
<tr>
<td>POLLUTANT NAME: Particulate matter, filterable (FPM)</td>
</tr>
<tr>
<td>CAS Number: PM</td>
</tr>
<tr>
<td>Test Method: Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s): (Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
</tr>
<tr>
<td>Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: N</td>
</tr>
<tr>
<td>Case-by-Case Basis: BACT-PSD</td>
</tr>
<tr>
<td>Other Applicable Requirements: NSPS, NESHAP, SIP</td>
</tr>
<tr>
<td>Control Method: (N)</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
</tr>
<tr>
<td>Cost Effectiveness: 0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness: 0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified: No</td>
</tr>
</tbody>
</table>
Pollutant/Compliance Notes: Limit 1: opacity of emissions less than 7%. Limit 2: opacity of emissions less than 12% for each crusher without capture system.

### Process/Pollutant Information

<table>
<thead>
<tr>
<th>PROCESS NAME</th>
<th>Limestone Handling Operations (Enclosed Building Emissions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel</td>
<td>—</td>
</tr>
<tr>
<td>Throughput</td>
<td>0</td>
</tr>
<tr>
<td>Process Notes</td>
<td>—</td>
</tr>
</tbody>
</table>

**POLLUTANT NAME:** Visible Emissions (VE)

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>VE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Method</td>
<td>EPA/OAR Mthd 9</td>
</tr>
</tbody>
</table>

**Pollutant Group(s):**

**Emission Limit 1:**

**Emission Limit 2:**

**Standard Emission:**

**Did factors, other than air pollution technology considerations influence the BACT decisions:** U

**Case-by-Case Basis:** BACT-PSD

**Other Applicable Requirements:** NSPS, NESHAP, SIP

**Control Method:** (P) Enclosure

**Est. % Efficiency:**

**Cost Effectiveness:** 0 $/ton

**Incremental Cost Effectiveness:** 0 $/ton

**Compliance Verified:** Unknown

**Pollutant/Compliance Notes:** No visible emissions from buildings.

### Process/Pollutant Information

<table>
<thead>
<tr>
<th>PROCESS NAME</th>
<th>Solid Fuel Handling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel</td>
<td>—</td>
</tr>
<tr>
<td>Throughput</td>
<td>0</td>
</tr>
<tr>
<td>Process Notes</td>
<td>—</td>
</tr>
</tbody>
</table>

**POLLUTANT NAME:** Visible Emissions (VE)

| CAS Number | VE |
Test Method: EPA/OAR Mthd 22
Pollutant Group(s): Particulate Matter (PM)
Emission Limit 1: 0.0040 GR/SCF
Emission Limit 2: Unknown
Standard Emission: If not in a building: Fugitive: Opacity < 10%; and Stack: 0.004 gr/scf; opacity < 7% If unit is enclosed in a building:

<table>
<thead>
<tr>
<th>Process/Pollutant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESS NAME:</td>
</tr>
<tr>
<td>Process Type:</td>
</tr>
<tr>
<td>Primary Fuel:</td>
</tr>
<tr>
<td>Throughput:</td>
</tr>
<tr>
<td>Process Notes:</td>
</tr>
</tbody>
</table>

| POLLUTANT NAME: | Particulate matter, filterable (FPM) |
| CAS Number: | PM |
| Test Method: | EPA/OAR Mthd 5 |
| Pollutant Group(s): | Particulate Matter (PM) |
| Emission Limit 1: | 0.0040 GR/SCF |
| Emission Limit 2: | Unknown |
| Standard Emission: | If not in a building: Fugitive: Opacity < 10%; and Stack: 0.004 gr/scf; opacity < 7% If unit is enclosed in a building: |

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Telescoping loading spout with suction or aspiration at discharge end and a filter system.
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
### Process/Pollutant Information

**PROCESS NAME:** Truck and Rail Loadout  
**Process Type:** 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)  
**Primary Fuel:**  
**Throughput:** 0  
**Process Notes:** Loadout of quicklime and off-specification lime

<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Particulate matter, filterable (FPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>PM</td>
</tr>
<tr>
<td>Test Method:</td>
<td>EPA/OAR Meth 5</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>(Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>0.0040 GR/SCF</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
</tr>
</tbody>
</table>

**Standard Emission:**  
Did factors, other than air pollution technology considerations influence the BACT decisions: **N**

**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:** SIP  
**Control Method:** (A) Partial enclosure; fabric filters to treat displaced air during loadout; and loadout practices to minimize spillage.

**Est. % Efficiency:**  
**Cost Effectiveness:** $0/ton  
**Incremental Cost Effectiveness:** $0/ton  
**Compliance Verified:** No  
**Pollutant/Compliance Notes:** Opacity: 7%

<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Visible Emissions (VE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>VE</td>
</tr>
<tr>
<td>Test Method:</td>
<td>EPA/OAR Meth 22</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>VE</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>VE</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
</tr>
</tbody>
</table>

**Standard Emission:**  
Did factors, other than air pollution technology considerations influence the BACT decisions: **N**

**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:** SIP
**Control Method:**

(A) Partial enclosure; fabric filters to treat displaced air during loadout; and loadout practices to minimize spillage.

**Est. % Efficiency:**

N/A

**Cost Effectiveness:**

0 $/ton

**Incremental Cost Effectiveness:**

0 $/ton

**Compliance Verified:**

No

**Pollutant/Compliance Notes:**

No visible emissions of fugitive PM except for periods not to exceed a total of 2.5 minutes in any one hour period.

### Facility Information

<table>
<thead>
<tr>
<th>RBLC ID:</th>
<th>FL-0341 (final)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate/Company Name:</td>
<td>JACKSONVILLE LIME</td>
</tr>
<tr>
<td>Facility Name:</td>
<td>JACKSONVILLE LIME</td>
</tr>
<tr>
<td>Facility Contact:</td>
<td>NICK CAGGIANO <a href="mailto:NICK.CAGGIANO@CARMEUSENA.COM">NICK.CAGGIANO@CARMEUSENA.COM</a></td>
</tr>
<tr>
<td>Facility Description:</td>
<td>Lime manufacturing plant with two twin-shaft vertical parallel-flow regenerative lime kilns, capable of firing petcoke, coal, natural gas, and wood chips. Nominal average production rate is 330 tons/day of lime (maximum 396 tons/day).</td>
</tr>
<tr>
<td>Permit Type:</td>
<td>A: New/Greenfield Facility</td>
</tr>
<tr>
<td>Permit URL:</td>
<td><a href="http://arm-permit2k.dep.state.fl.us/nontv/0310583.002.AC.F.ZIP">http://arm-permit2k.dep.state.fl.us/nontv/0310583.002.AC.F.ZIP</a></td>
</tr>
<tr>
<td>EPA Region:</td>
<td>4</td>
</tr>
<tr>
<td>Facility County:</td>
<td>DUVAL</td>
</tr>
<tr>
<td>Facility State:</td>
<td>FL</td>
</tr>
<tr>
<td>Facility ZIP Code:</td>
<td>32206</td>
</tr>
<tr>
<td>Permit Issued By:</td>
<td>FLORIDA DEPT. OF ENVIRONMENTAL PROTECTION (Agency Name) MR. DAVID READ (Agency Contact) (850) 717-9000 <a href="mailto:David.Read@dep.state.fl.us">David.Read@dep.state.fl.us</a></td>
</tr>
<tr>
<td>Permit Notes:</td>
<td>Technical evaluation of BACT available at <a href="http://arm-permit2k.dep.state.fl.us/nontv/0310583.002.AC.D.ZIP">http://arm-permit2k.dep.state.fl.us/nontv/0310583.002.AC.D.ZIP</a></td>
</tr>
<tr>
<td>Affected Boundaries:</td>
<td>Boundary Type: CLASS1, CLASS2 GA, Boundary: Okefenokee, Distance: &lt; 100 km, Boundary: Wolf Island, Distance: 100 km - 50 km</td>
</tr>
<tr>
<td>Facility-wide Pollutant Name:</td>
<td>Carbon Monoxide, Nitrogen Oxides (NOx), Particulate Matter (PM), Sulfur Oxides (SOx), Volatile Organic Compounds (VOC)</td>
</tr>
<tr>
<td>Facility-wide Emissions Increase:</td>
<td>Carbon Monoxide: 412.0000 (Tons/Year), Nitrogen Oxides (NOx): 345.0000 (Tons/Year), Particulate Matter (PM): 62.0000 (Tons/Year), Sulfur Oxides (SOx): 157.0000 (Tons/Year), Volatile Organic Compounds (VOC): 19.0000 (Tons/Year)</td>
</tr>
</tbody>
</table>

---

**Process/Pollutant Information**
**PROCESS NAME:** Two vertical lime kilns

**Process Type:** 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)

**Primary Fuel:** Natural gas

**Throughput:** 330.00 tons of lime per day

**Process Notes:** Fueled by natural gas, petcoke, coal, and wood chips. Nominal production rate of 330 tons of lime per day per kiln (maximum of 396 tons/day per kiln). Twin-shaft vertical parallel flow regenerative lime kilns (Cimprogetti – FS Design, or equivalent). Approx. 44 MMBtu/hr heat input per kiln.

**POLLUTANT NAME:** Nitrogen Oxides (NOx)

**CAS Number:** 10102

**Test Method:** Other

**Other Test Method:** NOx CEMS

**Pollutant Group(s):** (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))

**Emission Limit 1:** 350.0000 MG / N CU METER 30-DAY ROLLING AVERAGE, FOR COAL & PETCOKE

**Emission Limit 2:** 100.0000 MG / N CU METER 30-DAY ROLLING AVERAGE, FOR NATURAL GAS

**Did factors, other than air pollution technology considerations influence the BACT decisions:** U

**Case-by-Case Basis:** BACT-PSD

**Other Applicable Requirements:**

**Control Method:** (P) Production capacity cap of 396 tons of lime per day per kiln. Operations, Maintenance and Monitoring (OM&M) Plan and Startup, Shutdown, and Malfunction (SSM) Plan required. Required to maintain low-temperature combustion to reduce thermal NOx emissions. Required to use efficient PFR kiln design to minimize fuel use and pollutant emissions.

**Est. % Efficiency:**

**Cost Effectiveness:** 0 $/ton

**Incremental Cost Effectiveness:** 0 $/ton

**Compliance Verified:** Unknown

**Pollutant/Compliance Notes:** NOx CEMS required. Compliance is based on 30-operating-day rolling average, based on the relative heat inputs of the four authorized fuels. Petcoke/coal: 350 milligrams per normal cubic meter (approx. 31.9 lb/hr) Natural gas: 100 milligrams per normal cubic meter (approx. 8.3 lb/hr) Wood chips: 500 milligrams per normal cubic meter (approx. 43.6 lb/hr) Permittee must maintain records of the use of the various permitted fuels.

**POLLUTANT NAME:** Sulfur Dioxide (SO2)

**CAS Number:** 7446-09-5

**Test Method:** Other

**Other Test Method:** SO2 CEMS

**Pollutant Group(s):** (Inorganic Compounds, Oxides of Sulfur (SOx))

**Emission Limit 1:** 200.0000 MG / N CU METER 30-DAY ROLLING AVERAGE, PETCOKE & COAL

**Emission Limit 2:** 50.0000 MG / N CU METER 30-DAY ROLLING AVERAGE, NAT GAS & WOOD

**Did factors, other than air pollution technology considerations influence the BACT decisions:** U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) - Inherent scrubbing of burning zone exhaust gases by hot lime and of kiln exhaust gases by incoming limestone to reduce SO2 and sulfuric acid mist (SAM); - Use of fabric filters (baghouses) to control emissions of PM, PM10 and PM2.5 and provide further control of SO2 and SAM on the filter cake. - Overall lime production cap
Est. % Efficiency: 0 $/ton
Cost Effectiveness: Incremental Cost Effectiveness: Unknown
Pollutant/Compliance Notes: SO2 CEMS required. Compliance based on 30-day rolling average and weighted 30-day fuel usage records. Petcoke & coal: 200 milligrams per normal cubic meter (approx. 18.2 lb/hr) Natural gas & wood: 50 milligrams per normal cubic meter (approx. 4.2 lb/hr) Record of fuel usage required.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 400.0000 MG / N CU METER PETCOKE, COAL, WOOD
Emission Limit 2: 200.0000 MG / N CU METER NATURAL GAS
Standard Emission: Did factors, other than pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) - Efficient, vertical twin shaft PFR kiln design to minimize fuel use and resulting emissions of all pollutants; - Thorough mixing and residence time through preheat section to complete burnout of CO and volatile organic compounds (VOC); - Lime production cap
Est. % Efficiency: 0 $/ton
Cost Effectiveness: Incremental Cost Effectiveness: Unknown
Pollutant/Compliance Notes: Method 10 stack tests -- one compliance test for solid fuels, and one for natural gas.

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Other
Other Test Method: EPA Method 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 10.0000 MG / N CU METER
Emission Limit 2: 0.1000 LB / TON STONE FEED
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NESHAP
Control Method: (A) - Baghouse for each kiln; - Efficient, vertical twin shaft PFR kiln design to minimize fuel use and resulting emissions of all pollutants;
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 0.10 lb/ton of stone feed from NESHAP Subpart AAAAA 10 milligrams per normal standard cubic meter for BACT PM standard, may be demonstrated using any combination of fuels.

POLLUTANT NAME: Particulate matter, total < 2.5 μ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Baghouse
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Compliance using the methods for BACT PM, SO2 and NOX shall indicate compliance with BACT for PM10 and PM2.5.

POLLUTANT NAME: Particulate matter, total < 10 μ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Baghouse
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Compliance using the methods for BACT PM, SO2 and NOX shall indicate compliance with BACT for PM10 and PM2.5.

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Other
Other Test Method: Continuous opacity monitor
Pollutant Group(s):
Emission Limit 1: 15.0000 % OPACITY NTE 15% IN ANY 6-MIN BLOCK
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Baghouse
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: COMS in lieu of bag leak detection system or PM detector, per NESHAP Subpart AAAAA

Process/Pollutant Information

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>Material Handling Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME:</td>
<td></td>
</tr>
<tr>
<td>Process</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Type:</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td></td>
</tr>
<tr>
<td>Fuel:</td>
<td></td>
</tr>
<tr>
<td>Throughput:</td>
<td>0</td>
</tr>
<tr>
<td>Process Notes:</td>
<td>a. Limestone Handling and Storage Process, including: conveyors; surge hopper; pan feeders; enclosed building containing a screen used to segregate limestone according to size and transferred into a charging bin; two enclosures containing surge bins; reject bin; load-out weigh bins; truck loadout area; two mechanical (blower) rooms; and baghouses throughout the process. b. Lime Handling, Crushing, Rejects, and Lime Kiln Dust Process, including: four hoppers each equipped with a pan feeder; conveyors; vents; an enclosed building containing 2-deck screen, 4-roller crusher and baghouse; two weigh bins; two rotary feeders; blowers; a kiln reject dust bin; two portable tote containers; rotary feeder; truck loadout area; and baghouses throughout the process. c. Lime Handling, Screening and Storage Process, including: vents; conveyors, an enclosed building containing a 3-deck screen and a</td>
</tr>
</tbody>
</table>
baghouse; chute magnets; lime bins equipped with a self contained dustless truck loading spout; an enclosure containing a silo truck load-out area equipped with a truck scale; railcar load-out area; and baghouses throughout the process. d. Fuel Handling Processes: (1) Wood Grinding System, including: walking floor truck and screw conveyor area; raw wood storage bin; conveyors; an enclosure containing a mill; CO2 systems; ground chip storage, shared ribbon mixer, dosing bin, blowers, baghouses; and a stack. (2) Petroleum Coke/Coal Grinding System, including: front-end loader/dump truck area; dump hopper; conveyors; feeders; petroleum coke and coal storage bin; an enclosure containing bowl mill. 3.5 Million British thermal units/hour (MMBtu/hour) heater; CO2 systems; ground coke bin, dosing bin; shared ribbon mixer; blowers; baghouses; and a stack.

**POLUTANT NAME:** Visible Emissions (VE)

**CAS Number:** VE

**Test Method:** EPA/OAR Mthd 22

**Pollutant Group(s):**

- Emission Limit 1:
  - 5.0000 % OPACITY

**Did factors, other than air pollution technology considerations influence the BACT decisions: U**

**Case-by-Case Basis:** BACT-PSD

**Other Applicable Requirements:** NSPS, NESHAP

**Control Method:** (A) Wet suppression, fabric filters, partial enclosure, and enclosure to reduce PM and visible emissions. Baghouse must have design removal efficiency of at least 99%.

**Est. % Efficiency:**

**Cost Effectiveness:** 0 $/ton

**Incremental Cost Effectiveness:** 0 $/ton

**Compliance Verified:** Unknown

**Pollutant/Compliance Notes:** NSPS OOO and NESHAP AAAAA prescribe 7% opacity standard. The compliance procedures specified by NSPS Subpart OOO and NESHAP Subpart AAAAA shall be used to demonstrate compliance with 5% opacity (instead of 7%).

### Facility Information

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>PA-0283 (final)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate/Company</td>
<td>GRAYMONT PA INC</td>
</tr>
<tr>
<td>Name</td>
<td>GRAYMONT PA INC/PLEASANT GAP &amp; BELLEFONTE PLTS</td>
</tr>
<tr>
<td>Facility Contact</td>
<td>JOHN MAITLAND 814-353-2106</td>
</tr>
<tr>
<td>Facility Description</td>
<td>This plan approval is for the Kiln No. 8 project. WASTE OIL HEATER [BEL], PROPANE HEATER, PULVERIZED LIMESTONE SYSTEM, 136 HP DIESEL GENERATOR [PG], MISCELLANEOUS EMERGENCY GENERATORS, KILN NO. 8 PROJECT STONE RECLAMATION SYSTEM, PROCESSED STONE HANDLING, LIME KILN DUST HANDLING AND LOADING SYSTEM, LIME HANDLING AND STORAGE SYSTEM, LIME LOADING SYSTEM, EMERGENCY GENERATOR-ENGINES FOR COOLING FANS, PLS FABRIC COLLECTOR, ROTARY DRYER FABRIC COLLECTOR, STONE RECLAMATION FABRIC COLLECTOR, PROCESSED STONE AND LKD FABRIC COLLECTOR, LIME HANDLING AND STORAGE FABRIC COLLECTOR, LIME LOADING FABRIC COLLECTOR, KILN 6 BAGHOUSE, LIME</td>
</tr>
</tbody>
</table>

**Date Determination:**

- **Last Updated:** 01/29/2018
- **Permit:** 14-00002N
- **Number:** 25-1527520-1
- **SIC Code:** 3274
KILN 7 SEMI-WET SCRUBBER, LIME KILN 7 FABRIC COLLECTOR, KILN NO. 8 BAGHOUSE
NATURAL GAS SUPPLY BITUMINOUS COAL SUPPLY PETROLEUM COKE SUPPLY NO. 2 FUEL OIL
STORAGE PROPANE STORAGE DIESEL FUEL STORAGE SPACE HEATER EXHAUSTS PLS FABRIC
COLLECTOR STACK DRYER FABRIC COLLECTOR STACK GENERATOR STACK MISC EMERGENCY
GENERATORS STACKS FABRIC COLLECTOR VENT FABRIC COLLECTOR STACK FABRIC
COLLECTOR STACK FABRIC COLLECTOR STACK GENERATOR-ENGINE STACKS KILN 6 STACK
LIME KILN 7 STACK KILN NO. 8 STACK PROPANE HEATER EMISSIONS

PERMIT TYPE: U: Unspecified

PERMIT URL:

EPA REGION: 3

FACILITY COUNTY: CENTRE

FACILITY STATE: PA

FACILITY ZIP CODE: 16823

PERMIT ISSUED BY: PENNSYLVANIA DEPT OF ENVIRONMENTAL PROTECTION, BUREAU OF AIR QUALITY (Agency Name)
MR. ROBERT COOK (Agency Contact) 717-772-3974 rwcook@pa.gov

OTHER AGENCY: MUHAMMAD Q. ZAMAN,

CONTACT INFO: ENVIRONMENTAL PROGRAM MANAGER, NORTHCENTRAL REGION
570-327-3648

PERMIT NOTES:
Pursuant to the plantwide applicability limit (PAL) provisions of 40 CFR § 52.21(aa), the total combined sulfur dioxide (SO2) emissions, including fugitive emissions, from the facility shall not exceed 302.6 tons in any 12 consecutive month period.

FACILITY-WIDE EMISSIONS:

Pollutant Name: Sulfur Oxides (SOX)
Facility-wide Emissions Increase: 302.6000 (Tons/Year)

Pollutant Name: Volatile Organic Compounds (VOC)
Facility-wide Emissions Increase: 50.0000 (Tons/Year)

PROCESS/POLLUTANT INFORMATION

PROCESS: KILN NO. 8
NAME:
Process: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Type:
Primary: Pipeline quality natural gas
Fuel:
Throughput: 0

Process Notes:
Source ID P418 consists of a 660 tons per day, twin-shaft vertical lime kiln, designated as Kiln No. 8, that is equipped with 66 natural gas fuel delivery lances (2 sets of 33) with a total approximate heat input (HHV) equal to 100.4 MMBtu/hr. The air contaminant emissions from the kiln shall be controlled by the installation of ID C418 which is a pulse jet fabric collector, designated as 328-PDC-870. The fabric collector shall have a minimum fabric area of 25,536 square feet and handle no more than 75,000 actual cubic feet per minute. The permittee shall install, maintain, certify and operate a continuous emission monitoring system (CEMS) for nitrogen oxides (expressed as NO2), carbon monoxide, and sulfur oxides (expressed as SO2) emissions and opacity monitoring.

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: EPA/OAR Mthd 17 and 202
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.2500 LB/H FILTERABLE AND CONDENSABLE PM
Emission Limit 2: 0.0040 GRAIN/DSCF FILTERABLE PM

Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (A) Baghouse
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 μ (FPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): ( Particulate Matter (PM) )
Emission Limit 1: 0.0030 GRAINS/DSCF FILTERABLE
Emission Limit 2: 1.9100 LB/H FILTERABLE AND CONDENSABLE

Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (A) Baghouse
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 μ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): ( Particulate Matter (PM) )
Emission Limit 1: 0.0020 GRAINS/DSCF FILTERABLE
Emission Limit 2: 1.5600 LB/H FILTERABLE AND CONDENSABLE

Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (A) Baghouse
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Oxides (SOx)
CAS Number: 7446
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds, Oxides of Sulfur(SOx))
Emission Limit 1: 23.0000 LB/H ROLLING 30-DAY AVERAGE
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 10.0000 % OPACITY FOR ANY 6-MINUTE BLOCK PERIOD
Emission Limit 2: 20.0000 % OPACITY  20-60% FOR ANY 3-MINUTE BLOCK PERIOD
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.1000 LB/TON OF LIME
Emission Limit 2: 
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (N)
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 7.9000 LB/H ROLLING 30-DAY AVERAGE
Emission Limit 2: 34.6000 T/YR IN ANY 12 CONSECUTIVE MONTH PERIOD
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (N)
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Expressed as NO2

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
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<tr>
<td>Emission Limit 1:</td>
<td>6.9600 LB/HR ROLLING 30-DAY AVERAGE</td>
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<td>Emission Limit 2:</td>
<td>26.5000 T/yr ANY 12 CONSECUTIVE MONTH PERIOD</td>
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<td>Cost Effectiveness:</td>
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<td>Incremental Cost Effectiveness:</td>
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<td>Pollutant/Compliance Notes:</td>
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**POLLUTANT NAME:** methane

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<tbody>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
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<tr>
<td>Pollutant Group(s):</td>
<td>(Greenhouse Gasses (GHG), Organic Compounds (all), Organic Non-HAP Compounds)</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>3.6500 MMBTU/TON LIME (HHV)</td>
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<tr>
<td>Emission Limit 2:</td>
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<td>Standard Emission:</td>
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<td>Did factors, other than air pollution technology considerations influence the BACT decisions:</td>
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<td>Case-by-Case Basis:</td>
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<td>Other Applicable Requirements:</td>
<td>NSPS</td>
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<td>Est. % Efficiency:</td>
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<td>Cost Effectiveness:</td>
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<td>Pollutant/Compliance Notes:</td>
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**POLLUTANT NAME:** Sulfur Dioxide (SO2)

<table>
<thead>
<tr>
<th>CAS Number:</th>
<th>7446-09-5</th>
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</thead>
<tbody>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>(Inorganic Compounds, Oxides of Sulfur (SOx))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>500.0000 PPMVD 1-HOUR BLOCK AVERAGE</td>
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<td>Standard Emission:</td>
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Did factors, other than air pollution technology considerations influence the BACT decisions? U
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (N)
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown

Facility Information

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<tr>
<th>RBLC ID</th>
<th>TX-0726 (final)</th>
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<tbody>
<tr>
<td>Corporate/Company</td>
<td>CHEMICAL LIME, LTD</td>
</tr>
<tr>
<td>Name</td>
<td>ROTARY LIME KILN AND ASSOCIATED EQUIPMENT</td>
</tr>
<tr>
<td>Facility Contact</td>
<td>STEVEN CURRERI (817) 806-1548</td>
</tr>
<tr>
<td>Facility Description</td>
<td>Chemical Lime operates a lime production plant in Comal County consisting of two operational kilns: Kiln 2 and Kiln 3. Kiln 2 (and associated supporting equipment) is authorized under Permit 5640A; Kiln 3 (and associated supporting equipment) is authorized under Permit 7808. Both kilns are authorized under a federal Prevention of Significant Deterioration (PSD) permit; this modification to the PSD permit will make the current permit number PSDTX256M3. Limestone is quarried on-site or delivered from off-site sources, crushed to specific size requirements, and charged to the kilns along with coal, coke and/or natural gas to produce the product lime. The quarry is owned by Chemical Lime, but is currently operated under separate permits by an independent contractor. After exiting the kilns, the product lime is cooled and transferred to silos for intermediate storage. At this point, the lime is either sized to customer specifications or is hydrated and then shipped. Product lime is transported from the plant by rail and truck. Lime is also packaged in bulk bags and shipped by truck to customers. Hydrated product is shipped in bulk or bags.</td>
</tr>
<tr>
<td>Permit Type</td>
<td>C: Modify process at existing facility</td>
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<tr>
<td>Permit URL</td>
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<tr>
<td>EPA Region</td>
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<tr>
<td>Facility County</td>
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</tr>
<tr>
<td>Facility State</td>
<td>TX</td>
</tr>
<tr>
<td>Facility ZIP Code</td>
<td>78132</td>
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<tr>
<td>Permit Issued By</td>
<td>TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name)</td>
</tr>
<tr>
<td>Agency Contact</td>
<td>MICHAEL PARTEE (Agency Contact) (512) 239-3312 <a href="mailto:michael.partee@tceq.texas.gov">michael.partee@tceq.texas.gov</a></td>
</tr>
<tr>
<td>Other Agency</td>
<td>Tan Nguyen 512-239-3445</td>
</tr>
<tr>
<td>Contact Info</td>
<td></td>
</tr>
<tr>
<td>Permit Notes</td>
<td></td>
</tr>
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<td>Affected Boundaries: Boundary Type: Class 1 Area State: Boundary: Distance:</td>
<td></td>
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</tbody>
</table>
### Process/Pollutant Information

**Process Name:** Rotary Kiln 2  
**Process Type:** 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)  
**Primary Fuel:** natural gas, coal, and petroleum coke  
**Throughput:** 504.00 tons per day

**Pollutant Name:** Nitrogen Oxides (NOx)  
**CAS Number:** 10102  
**Test Method:** Unspecified  
**Pollutant Group(s):** (InOrganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))  
**Emission Limit 1:** 5.0000 LB/TON OF LIME PROD  
**Standard Emission:** Did factors, other than air pollution technology considerations influence the BACT decisions: U  
**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:**  
**Control Method:** (N)  
**Est. % Efficiency:**  
**Cost Effectiveness:** 0 $/ton  
**Incremental Cost Effectiveness:** 0 $/ton  
**Compliance Verified:** Unknown  
**Pollutant/Compliance Notes:**

**Pollutant Name:** Sulfur Dioxide (SO2)  
**CAS Number:** 7446-09-5  
**Test Method:** Unspecified  
**Pollutant Group(s):** (InOrganic Compounds, Oxides of Sulfur (SOx))  
**Emission Limit 1:**  
**Emission Limit 2:**  
**Standard Emission:** Did factors, other than air pollution technology considerations influence the BACT decisions: U  
**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:**  
**Control Method:** (A) Limiting the fuel sulfur input, in addition to the dry scrubbing inherent in these systems.  
**Est. % Efficiency:** 92.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 μ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 
Emission Limit 2: 
Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
  Control Method: (A) The use of fabric filter to achieve a 0.01 gr/dscf filterable and condensable PM10.
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds, Particulate Matter (PM))
Emission Limit 1: 
Emission Limit 2: 
Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
  Control Method: (P) Proper kiln design and operation.
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:
**POLLUTANT NAME:** Carbon Monoxide  
**CAS Number:** 630-08-0  
**Test Method:** Unspecified  
**Pollutant Group(s):** (Inorganic Compounds)  
**Emission Limit 1:** 3.0000 LB/TON FEED  
**Emission Limit 2:**  
**Standard Emission:**  
**Did factors, other than air pollution technology considerations influence the BACT decisions:** U  
**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:**  
**Control Method:** (P) Proper kiln design and operation (good engineering practice/best management practice) to minimize the products of incomplete combustion.  
**Est. % Efficiency:**  
**Cost Effectiveness:** 0$/ton  
**Incremental Cost Effectiveness:** 0$/ton  
**Compliance Verified:** Unknown  
**Pollutant/Compliance Notes:**

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**Process/Pollutant Information**

**PROCESS NAME:** Rotary Kiln 3  
**Process Type:** 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)  
**Primary Fuel:** natural gas, coal, and petroleum coke  
**Throughput:** 850.00 tons per day  
**Process Notes:**

**POLLUTANT NAME:** Nitrogen Oxides (NOx)  
**CAS Number:** 10102  
**Test Method:** Unspecified  
**Pollutant Group(s):** (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))  
**Emission Limit 1:** 2.6000 LB/TON OF LIME PROD  
**Emission Limit 2:**  
**Standard Emission:**  
**Did factors, other than air pollution technology considerations influence the BACT decisions:** U  
**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:**  
**Control Method:** (N)  
**Est. % Efficiency:**  
**Cost Effectiveness:** 0$/ton
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<th>Pollutant/Compliance Notes:</th>
<th>Pollutant/Compliance Notes:</th>
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<tr>
<td><strong>POLLUTANT NAME:</strong></td>
<td><strong>POLLUTANT NAME:</strong></td>
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<td>Sulfur Dioxide (SO2)</td>
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<td>CAS Number:</td>
<td>CAS Number:</td>
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<td>7446-09-5</td>
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<td>(Particulate Matter (PM))</td>
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<td>Did factors, other than air pollution technology considerations influence the BACT decisions:</td>
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<td>(A) Limiting the fuel sulfur input, in addition to the dry scrubbing inherent in these systems.</td>
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<td>Est. % Efficiency:</td>
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CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds, Particulate Matter (PM))
Emission Limit 1: Unspecified
Emission Limit 2: Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Proper kiln design and operation.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds)
Emission Limit 1: 2,2000 LB/TON FEED
Emission Limit 2: Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Proper kiln design and operation (good engineering practice/best management practice) to minimize the products of incomplete combustion.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Facility Information
RBLIC ID: WI-0250 (final)
Corporate/Company Name: GRAYMONT (WI) LLC
Date Determination
Last Updated: 10/26/2009
Permit Number: 08-DCF-103
Facility Name: GRAYMONT (WI) LLC
Facility Contact: PHIL MARQUIS 7153925146 PMARQUIS@GRAYMONT.COM
Facility Description: LIME MANUFACTURING FACILITY (FORMER CLM)
Permit Type: A: New/Greenfield Facility
Permit URL:
EPA Region: 5
Facility County: BAYFIELD
Facility State: WI
Facility ZIP Code: 54880
Permit Issued By: WISCONSIN DEPT OF NATURAL RESOURCES, AIR MGMT. PROGRAM (Agency Name)
Other Agency Contact Info: DON C. FAITH III, (608) 267-3135
Permit Notes:

Process/Pollutant Information

PROCESS P50 (550). PREHEATER EQUIPPED, ROTARY LIME KILN
NAME:
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary COAL
Fuel: 54.00 T/H STONE
Throughput: KILN LIMITED TO 2% S COAL OR COAL / PET COKE BLEND. NATURAL GAS USED FOR STARTUP. KILN STACK EQUIPPED WITH CEMS FOR NOX, SO2, CO (AND OPACITY). FABRIC FILTER (MEMBRANE TYPE) HIGH TEMPERATURE BAGHOUSE. KILN CAPACITY IDENTIFIED AND PERMITTED AT 54 TONS PER HOUR OF STONE (LIMESTONE) FEED. SOME OF THE STONE USED HAS A HIGHER ORGANIC (CARBON) CONTENT, AND SEPARATE LIMITS ESTABLISHED FOR USE OF THIS TYPE OF LIMESTONE.

POLLUTANT NAME: Particulate matter, fugitive
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 0.4600 LB/T HIGH ORGANIC CARBON STONE
Emission Limit 2: 0.1500 LB/T LOW ORGANIC CARBON STONE
Standard Emission: 0.1000 LB/T FRONT HALF ONLY (MACT/ BACT)
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT, SIP, NSPS
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: TOTAL PM (AND PM10) INCLUDES BACK HALF, EXCEPT WHERE SPECIFICALLY EXCLUDED. HIGH ORGANIC CARBON STONE HAD ORGANIC CONTENT OF 0.05% OR MORE. FABRIC FILTER BAGHOUSE REQUIRED TO ACHIEVE 0.010 GR/DSCF (FRONT HALF (FILTERABLE, NON-CONDENSIBLE) ONLY).

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds, Oxides of Sulfur (SOx))
Emission Limit 1: 0.6200 LB/T 24 HOUR AVERAGE
Emission Limit 2: 2.0000 PERCENT S FUEL SULFUR LIMIT
Standard Emission: 33.7000 LB/H 3 HOUR AVERAGE

Did factors, other than air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) FUEL SULFUR LIMIT, INHERENT PROCESS COLLECTION OF SULFUR OXIDES.
Est. % Efficiency: 92.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 54 T/H STONE FEED RATE (24 HOUR AVERAGE). 2% FUEL SULFUR CONTENT LIMIT. PROCESS (PREHEATER KILN WITH BAGHOUSE) IS REQUIRED TO ACHIEVE AT LEAST 92% COLLECTION OF FUEL SULFUR. LIMIT ESTABLISHED IN PRIOR PERMIT (05-DCF-412).

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 1.8300 LB/T 24 HOUR AVG.
Emission Limit 2: 0.7000 LB/MMBTU MONTHLY AVG.
Standard Emission: 98.8000 LB/H 3 HOUR AVG.

Did factors, other than air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION CONTROL, OPTIMIZATION
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NOX CEM. OPTIMIZATION IS THE USE OF TUNING AND ANALYSIS TO MINIMIZE NOX (IN ADDITION TO MEETING ALL OF THE BACT LIMITS, INCLUDING CO AND VOC LIMITS). LIMIT ESTABLISHED IN PRIOR PERMIT (05-DCF-412).

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 33.0000 LB/H USING HIGH ORGANIC CONTENT LIMESTONE
Emission Limit 2: 5.4000 LB/H USING LOW ORGANIC CONTENT LIMESTONE
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (P) USE OF A PREHEATER KILN AND GOOD OPERATING PRACTICES: GOOD COMBUSTION CONTROL
Est. % Efficiency: 0 %
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: HIGH ORGANIC CONTENT LIMESTONE CONTAINS 0.05% OR MORE ORGANIC CARBON. VOC LIMIT IS CITED "AS PROPANE." THE 33 LBS/HR VOC LIMIT IS PROVISIONAL, AND MAY BE INCREASED TO 38.6 LBS/HR.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds)
Emission Limit 1: 1.5600 LB/T 24 HR AVG., FIRING LOW ORGANIC STONE
Emission Limit 2: 71.2000 T/MO. 12 MO. AVG.
Standard Emission: 310.0000 LB/H 3 HR AVG., FIRING HIGH ORGANIC STONE
Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) PREHEATER KILN, GOOD OPERATING PRACTICES (GOOD COMBUSTION CONTROL)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: HIGH ORGANIC CONTENT STONE IS A LIMESTONE CONTAINING 0.05 WT% ORGANIC CARBON CONTENT OR HIGHER. 54 TON PER HOUR LIMESTONE BASIS / LIMITATION (24 HR. AVG.)

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): ( InOrganic Compounds, Particulate Matter (PM) )
Emission Limit 1: 1.5000 LB/H
Emission Limit 2: 
Standard Emission: 
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: N/A
Other Applicable Requirements: 
Control Method: (P) FUEL SULFUR LIMIT (2%) AND INHERENT COLLECTION FROM PREHEATER / FABRIC FILTER (92% OF S COMPOUNDS).
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 

POLLUTANT NAME: Hazardous Air Pollutants (HAP)
CAS Number: HAP
Test Method: Unspecified
Pollutant Group(s): ( Hazardous Air Pollutants (HAP) )
Emission Limit 1: 2.8500 LB/H BENZENE
Emission Limit 2: 4.9000 LB/H VINYL CHLORIDE
Standard Emission: 2.0000 LB/H FORMALDEHYDE
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: N/A
Other Applicable Requirements: (P) USE OF PREHEATER KILN USING GOOD OPERATING PRACTICES (GOOD COMBUSTION PRACTICES)
Control Method: 
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: LIMITS BASED ON STATE (ONLY) HAZARDOUS AIR RULE. USE OF HIGH ORGANIC CARBON LIMESTONE (0.05 WT. % ORGANIC CARBON) WAS FOUND TO RESULT IN CONSIDERABLE PRODUCTS OF INCOMPLETE COMBUSTION WHEN PREHEATER KILN WAS OPERATED AT THE PERMITTED CAPACITY.
### Facility Information

<table>
<thead>
<tr>
<th>Field</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBLC ID:</td>
<td>TX-0869 (draft)</td>
</tr>
<tr>
<td>Corporate/Company</td>
<td>LHOIST NORTH AMERICA OF TEXAS, LTD.</td>
</tr>
<tr>
<td>Name:</td>
<td></td>
</tr>
<tr>
<td>Facility Name:</td>
<td>LIME MANUFACTURING PLANT</td>
</tr>
<tr>
<td>Facility Contact:</td>
<td>AARON JONES 830-625-0552</td>
</tr>
<tr>
<td>Facility Description:</td>
<td>Authorization of a new natural gas-fired vertical kiln along with associated material handling equipment including conveyors, crushers, vibrating screens, and product loading. Increase the facility’s lime production capacity. The new kiln will have a production rate of 660 short tons per day on a 30-day average basis.</td>
</tr>
<tr>
<td>Permit Type:</td>
<td>B: Add new process to existing facility</td>
</tr>
<tr>
<td>Permit Issued By:</td>
<td>TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name)</td>
</tr>
<tr>
<td>Other Agency Contact</td>
<td>MICHAEL PARTEE (Agency Contact) (512) 239-3312 <a href="mailto:michael.partee@tceq.texas.gov">michael.partee@tceq.texas.gov</a></td>
</tr>
<tr>
<td>Affected Boundaries:</td>
<td>CLASS1 TX Big Bend NP &gt; 250 km</td>
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<td>Pollutant Information:</td>
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<tr>
<td>PROCESS NAME:</td>
<td>Vertical Lime Kiln</td>
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<tr>
<td>Process Type:</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
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<tr>
<td>Primary Fuel:</td>
<td>NATURAL GAS</td>
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<td>Throughput:</td>
<td>660.00 T/DAY</td>
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<tr>
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<td>Nitrogen Oxides (NOx)</td>
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<td>CAS Number:</td>
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Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 0.3500 LB/TON
Emission Limit 2: 

Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Proper kiln design (vertical PFR), good combustion techniques, Natural Gas Fuel, no add-on controls.
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS HH

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 GR/DSCF
Emission Limit 2: 

Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS HH

POLLUTANT NAME: Particulate matter, total < 10 μ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 GR/DSCF
Emission Limit 2: 

Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N

<table>
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<tr>
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<tbody>
<tr>
<td>Other Applicable Requirements:</td>
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**POLLUTANT NAME:** Particulate matter, total < 2.5 μ (TPM2.5)

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Did factors, other than air pollution technology considerations influence the BACT decisions: N

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<td>Other Applicable Requirements:</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method:</td>
<td>(A) BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>NSPS HH</td>
</tr>
</tbody>
</table>

**POLLUTANT NAME:** Carbon Dioxide Equivalent (CO2e)

<table>
<thead>
<tr>
<th>CAS Number:</th>
<th>CO2e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>( Greenhouse Gasses (GHG) )</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>3.6100 HHV/TON</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
</tr>
</tbody>
</table>

Did factors, other than air pollution technology considerations influence the BACT decisions: N

<table>
<thead>
<tr>
<th>Case-by-Case Basis:</th>
<th>BACT-PSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Applicable Requirements:</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method:</td>
<td>(P) Proper kiln design (vertical PFR), good combustion techniques, Natural Gas Fuel, no add-on controls.</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>NSPS HH</td>
</tr>
</tbody>
</table>

### Process/Pollutant Information

<table>
<thead>
<tr>
<th>PROCESS NAME:</th>
<th>Material Handling (Conveyors and Feeders)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type:</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
<td></td>
</tr>
<tr>
<td>Throughput:</td>
<td>0</td>
</tr>
</tbody>
</table>

#### POLLUTANT NAME: Particulate matter, filterable (FPM)

<table>
<thead>
<tr>
<th>CAS Number:</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>(Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>0.0050 GR/DSCF</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
</tr>
<tr>
<td>Standard Emission:</td>
<td></td>
</tr>
<tr>
<td>Did factors, other than air pollution technology considerations influence the BACT decisions:</td>
<td>N</td>
</tr>
<tr>
<td>Case-by-Case Basis:</td>
<td>BACT-PSD</td>
</tr>
<tr>
<td>Other Applicable Requirements:</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method:</td>
<td>(A) BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>NSPS 000</td>
</tr>
</tbody>
</table>

#### POLLUTANT NAME: Particulate matter, filterable < 10 μ (FPM10)

<table>
<thead>
<tr>
<th>CAS Number:</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>(Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>0.0050 GR/DSCF</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
</tr>
<tr>
<td>Standard Emission:</td>
<td></td>
</tr>
<tr>
<td>Did factors, other than air pollution technology considerations influence the BACT decisions:</td>
<td>N</td>
</tr>
</tbody>
</table>
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: $0/ton
Incremental Cost Effectiveness: $0/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

POLLUTANT NAME: Particulate matter, filterable < 2.5 μ (FPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): Particulate Matter (PM)
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: $0/ton
Incremental Cost Effectiveness: $0/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

Process/Pollutant Information

PROCESS NAME: Stone Handling Area Crusher
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel:
Throughput: 1428.00 TON/H
Process Notes: 521200 TON/YR

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): Particulate Matter (PM)
Emission Limit 1:
<table>
<thead>
<tr>
<th>Emission Limit 2:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Emission:</td>
<td></td>
</tr>
<tr>
<td>Did factors, other then air pollution technology considerations influence the BACT decisions:</td>
<td>N</td>
</tr>
<tr>
<td>Case-by-Case Basis:</td>
<td>BACT-PSD</td>
</tr>
<tr>
<td>Other Applicable Requirements:</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method:</td>
<td>(A) WATER SPRAYS</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td>70.000</td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>NSPS OOO</td>
</tr>
</tbody>
</table>

**POLUTANT NAME:** Particulate matter, total < 10 \( \mu \) (TPM10)

| CAS Number: | PM |
| Test Method: | Unspecified |
| Pollutant Group(s): | (Particulate Matter (PM)) |
| Emission Limit 1: |  |
| Emission Limit 2: |  |

**POLUTANT NAME:** Particulate matter, total < 2.5 \( \mu \) (TPM2.5)

| CAS Number: | PM |
| Test Method: | Unspecified |
| Pollutant Group(s): | (Particulate Matter (PM)) |
| Emission Limit 1: |  |
| Emission Limit 2: |  |

**POLUTANT NAME:** Particulate matter, total < 2.5 \( \mu \) (TPM2.5)

| CAS Number: | PM |
| Test Method: | Unspecified |
| Pollutant Group(s): | (Particulate Matter (PM)) |
| Emission Limit 1: |  |
| Emission Limit 2: |  |

**POLUTANT NAME:** Particulate matter, total < 2.5 \( \mu \) (TPM2.5)

| CAS Number: | PM |
| Test Method: | Unspecified |
| Pollutant Group(s): | (Particulate Matter (PM)) |
| Emission Limit 1: |  |
| Emission Limit 2: |  |
Control Method: (A) WATER SPRAYS
Est. % Efficiency: 70.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

Process/Pollutant Information:

PROCESS NAME: Lime Belt Crusher
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel: 0
Throughput:

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other than pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: **U**

<table>
<thead>
<tr>
<th>Case-by-Case Basis</th>
<th>BACT-PSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Applicable Requirements</td>
<td>NSPS</td>
</tr>
<tr>
<td>Control Method</td>
<td>(A) BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes</td>
<td>NSPS OOO</td>
</tr>
</tbody>
</table>

**POLLUTANT NAME:** Particulate matter, total < 2.5 µ (TPM2.5)

**CAS Number:** PM
**Test Method:** Unspecified
**Pollutant Group(s):** (Particulate Matter (PM))
**Emission Limit 1:** 0.0090 GR/DSCF

Did factors, other then air pollution technology considerations influence the BACT decisions: **N**

<table>
<thead>
<tr>
<th>Case-by-Case Basis</th>
<th>BACT-PSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Applicable Requirements</td>
<td></td>
</tr>
<tr>
<td>Control Method</td>
<td>(A) BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes</td>
<td>NSPS OOO</td>
</tr>
</tbody>
</table>

**Process/Pollutant Information**

<table>
<thead>
<tr>
<th>PROCESS NAME:</th>
<th>Product Loadout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type:</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
<td></td>
</tr>
<tr>
<td>Throughput:</td>
<td>240900.00 TON/YR</td>
</tr>
<tr>
<td>Process Notes:</td>
<td></td>
</tr>
</tbody>
</table>

**POLLUTANT NAME:** Particulate matter, filterable (FPM)
**CAS Number:** PM
**Test Method:** Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: (A) BAGHOUSE
Control Method:
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency: Unknown
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NSPS OOO

**Facility Information**

<table>
<thead>
<tr>
<th>RBLID:</th>
<th>WI-0291 (draft)</th>
<th>Date Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate/Company Name:</td>
<td>GRAYMONT WESTERN LIME-EDEN</td>
<td>Last Updated: 08/30/2019</td>
</tr>
<tr>
<td>Facility Name:</td>
<td>GRAYMONT WESTERN LIME-EDEN</td>
<td>Permit Number: 18-RAB-010</td>
</tr>
<tr>
<td>Facility Description:</td>
<td>Lime Manufacturing</td>
<td>Permit Date: 01/28/2019 (actual)</td>
</tr>
<tr>
<td>Permit Type:</td>
<td>D: Both B (Add new process to existing facility) &amp; C (Modify process at existing facility)</td>
<td>FRS Number: 110000593910</td>
</tr>
<tr>
<td>Permit Issued By:</td>
<td>WISCONSIN DEPT OF NATURAL RESOURCES; AIR MGMT. PROGRAM (Agency Name)</td>
<td>SIC Code: 3274</td>
</tr>
<tr>
<td>Permit Notes:</td>
<td>Replacing burners on Kiln #1 and Kiln #2 to allow the kilns to fire natural gas. The permit also allows for the installation of a natural gas heater and diesel emergency generator.</td>
<td>NAICS Code: 327410</td>
</tr>
<tr>
<td>Facility-wide Emissions:</td>
<td>Pollutant Name: Carbon Monoxide</td>
<td>Facility-wide Emissions Increase: 243.2600 (Tons/Year)</td>
</tr>
<tr>
<td></td>
<td>Nitrogen Oxides (NOx)</td>
<td>178.4500 (Tons/Year)</td>
</tr>
<tr>
<td></td>
<td>Particulate Matter (PM)</td>
<td>9.6900 (Tons/Year)</td>
</tr>
<tr>
<td></td>
<td>Sulfur Oxides (SOx)</td>
<td>32.1200 (Tons/Year)</td>
</tr>
<tr>
<td></td>
<td>Volatile Organic Compounds (VOC)</td>
<td>3.7300 (Tons/Year)</td>
</tr>
</tbody>
</table>

**Process/Pollutant Information**

| PROCESS NAME: | P33 Lime Kiln #1 |
| Process Type: | 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing) |
| Primary Fuel: | Natural Gas/Coal |
Throughput: 0
Process Notes: Maximum Continuous Rating Natural Gas: 85 mmBTU/hr Coal: 109 mmBTU/hr

**POLLUTANT NAME:** Visible Emissions (VE)
**CAS Number:** VE
**Test Method:** Unspecified
**Pollutant Group(s):**
**Emission Limit 1:** 15.0000 % OPACITY 6-MINUTE AVERAGE
**Emission Limit 2:**
**Standard Emission:**
*Did factors, other than air pollution technology considerations influence the BACT decisions:* N
**Case-by-Case Basis:** BACT-PSD
**Other Applicable Requirements:** NSPS, NESHAP
**Control Method:** (P) The available options described for controlling visible emissions are generally the controls for controlling nitrogen oxides emissions.
**Est. % Efficiency:**
**Cost Effectiveness:** 0 $/ton
**Incremental Cost Effectiveness:** 0 $/ton
**Compliance Verified:** Unknown

**POLLUTANT NAME:** Nitrogen Oxides (NOx)
**CAS Number:** 10102
**Test Method:** Unspecified
**Pollutant Group(s):** (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
**Emission Limit 1:** 43.8000 LB/HR 30 DAY AVERAGE
**Emission Limit 2:** 1.5000 LB/TON STONE FEED 365 DAY AVERAGE
**Standard Emission:**
*Did factors, other than air pollution technology considerations influence the BACT decisions:* N
**Case-by-Case Basis:** BACT-PSD
**Other Applicable Requirements:** NSPS, NESHAP
**Control Method:** (P) Good Combustion Practices and the Use of Low-NOx Burners
**Est. % Efficiency:**
**Cost Effectiveness:** 0 $/ton
**Incremental Cost Effectiveness:** 0 $/ton
**Compliance Verified:** Unknown

**Pollutant/Compliance Notes:** NOx emissions during startup, shutdown, or low-load (8.8 tons/hr) operation of the kiln shall not be used in determining compliance with the BACT emission

**POLLUTANT NAME:** Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (Inorganic Compounds)
Emission Limit 1: 58.3000 LB/HR 30 DAY AVERAGE
Emission Limit 2: 2.0000 LB/TON STONE FEED 365 DAY AVERAGE
Standard Emission: 
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP
Control Method: (P) Good Combustion Practices
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: CO emissions during startup, shutdown, or low-load (8.8 tons/hr) operation of the kiln shall not be used in determining compliance with the BACT emission

Process/Pollutant Information

<table>
<thead>
<tr>
<th>PROCESS NAME:</th>
<th>P34 Lime Kiln #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type:</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
<td>Natural Gas/Coal</td>
</tr>
<tr>
<td>Throughput:</td>
<td>0</td>
</tr>
<tr>
<td>Process Notes:</td>
<td>Maximum Continuous Rating Natural Gas: 113 mmBTU/hr Coal: 123 mmBTU/hr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Visible Emissions (VE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>VE</td>
</tr>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td></td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>15.0000 % OPACITY 6-MINUTE AVERAGE</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
</tr>
<tr>
<td>Standard Emission:</td>
<td></td>
</tr>
</tbody>
</table>
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NESHAP, NSPS
Control Method: (P) The available options described for controlling visible emissions are generally the controls for controlling nitrogen oxides emissions.
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Nitrogen Oxides (NOx)</th>
<th>Carbon Monoxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>10102</td>
<td>630-08-0</td>
</tr>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>(Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))</td>
<td>(Inorganic Compounds)</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>68.8000 LB/HR 30 DAY AVERAGE</td>
<td>45.8000 LB/HR 30 DAY AVERAGE</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td>1.5000 LB/TON STONE FEED 365 DAY AVERAGE</td>
<td>1.0000 LB/TON STONE FEED 365 DAY AVERAGE</td>
</tr>
<tr>
<td>Standard Emission:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did factors, other than pollution technology considerations influence the BACT decisions:</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Case-by-Case Basis:</td>
<td>BACT-PSD</td>
<td>BACT-PSD</td>
</tr>
<tr>
<td>Other Applicable Requirements:</td>
<td>NSPS, NESHAP</td>
<td>NSPS, NESHAP</td>
</tr>
<tr>
<td>Control Method:</td>
<td>(P) Good Combustion Practices and the Use of Low-NOx Burners</td>
<td>(P) Good Combustion Practices</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness:</td>
<td>0 $/ton</td>
<td>0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified:</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes:</td>
<td>NOx emissions during startup, shutdown, or low-load (13.8 tons/hr) operation of the kiln shall not be used in determining compliance with the BACT emission</td>
<td>CO emissions during startup, shutdown, or low-load (13.8 tons/hr) operation of the kiln shall not be used in determining compliance with the BACT emission</td>
</tr>
<tr>
<td>Process/Pollutant Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PROCESS NAME:</strong></td>
<td>P04 Emergency Diesel Generator</td>
<td></td>
</tr>
<tr>
<td><strong>Process Type:</strong></td>
<td>17.210  (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))</td>
<td></td>
</tr>
<tr>
<td><strong>Primary Fuel:</strong></td>
<td>Diesel Fuel</td>
<td></td>
</tr>
<tr>
<td><strong>Throughput:</strong></td>
<td>0.22 mmBTU/hr</td>
<td></td>
</tr>
<tr>
<td><strong>Process Notes:</strong></td>
<td>Generac Industrial Diesel Generator Set, 3.4 liter, 35kW</td>
<td></td>
</tr>
</tbody>
</table>

| **POLLUTANT NAME:**           | Visible Emissions (VE) |
| **CAS Number:**               | VE |
| **Test Method:**              | Unspecified |
| **Pollutant Group(s):**       | 10.0000 % OPACITY 6-MINUTE AVERAGE |
| **Emission Limit 1:**         | |
| **Emission Limit 2:**         | |
| **Standard Emission:**        | |
| **Did factors, other then air pollution technology considerations influence the BACT decisions:** | N |
| **Case-by-Case Basis:**       | BACT-PSD |
| **Other Applicable Requirements:** | NSPS, NESHAP |
| **Control Method:**           | (P) The available options described for controlling visible emissions are generally the controls for controlling particulate matter, sulfur dioxide, and nitrogen oxides emissions. |
| **Est. % Efficiency:**        | |
| **Cost Effectiveness:**       | 0 $/ton |
| **Incremental Cost Effectiveness:** | 0 $/ton |
| **Compliance Verified:**      | Unknown |
| **Pollutant/Compliance Notes:** | |

| **POLLUTANT NAME:**           | Nitrogen Oxides (NOx) |
| **CAS Number:**               | 10102 |
| **Test Method:**              | Unspecified |
| **Pollutant Group(s):**       | (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM)) |
| **Emission Limit 1:**         | 4.7000 G/KWH |
| **Emission Limit 2:**         | |
| **Standard Emission:**        | |
| **Did factors, other then air pollution technology considerations influence the BACT decisions:** | N |
| **Case-by-Case Basis:**       | BACT-PSD |
| **Other Applicable Requirements:** | NSPS, NESHAP |
| **Control Method:**           | (P) Good Combustion Practices |
| **Est. % Efficiency:**        | |
| **Cost Effectiveness:**       | 0 $/ton |
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: The total hours of operation of each emergency generator may not exceed 500 hours during each consecutive 12-month period.

**POLLUTANT NAME:** Carbon Monoxide
**CAS Number:** 630-08-0
**Test Method:** Unspecified
**Pollutant Group(s):** (Inorganic Compounds)
**Emission Limit 1:** 5.0000 G/KWH
**Emission Limit 2:**
**Standard Emission:**
Did factors, other than air pollution technology considerations influence the BACT decisions: N
**Case-by-Case Basis:** BACT-PSD
**Other Applicable Requirements:** NSPS, NESHAP
**Control Method:** (P) Good Combustion Practices
**Est. % Efficiency:**
**Cost Effectiveness:** 0 $/ton
**Incremental Cost Effectiveness:** 0 $/ton
**Compliance Verified:** Unknown
**Pollutant/Compliance Notes:** The total hours of operation of each emergency generator may not exceed 500 hours during each consecutive 12-month period.

### Process/Pollutant Information

<table>
<thead>
<tr>
<th>PROCESS NAME</th>
<th>P05 Natural Gas Fired Line Heater</th>
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</thead>
<tbody>
<tr>
<td>Process Type</td>
<td>13.310 (Natural Gas (includes propane and liquefied petroleum gas))</td>
</tr>
<tr>
<td>Primary Fuel</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Throughput</td>
<td>1.50 mmBTU/hr</td>
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<tr>
<td>Process Notes</td>
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**POLLUTANT NAME:** Visible Emissions (VE)
**CAS Number:** VE
**Test Method:** Unspecified
**Pollutant Group(s):**
**Emission Limit 1:** 10.0000 % OPACITY 6-MINUTE AVERAGE
**Emission Limit 2:**
**Standard Emission:**
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) The available options described for controlling visible emissions are generally the controls for controlling particulate matter, sulfur dioxide, and nitrogen oxides emissions.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

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<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Nitrogen Oxides (NOx)</th>
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<tr>
<td>CAS Number:</td>
<td>10102</td>
</tr>
<tr>
<td>Test Method:</td>
<td>Unspecified</td>
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<tr>
<td>Pollutant Group(s):</td>
<td>( InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM) )</td>
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<tr>
<td>Emission Limit 1:</td>
<td>0.1000 LB/MMBTU</td>
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<td>Emission Limit 2:</td>
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Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

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<th>POLLUTANT NAME:</th>
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<tr>
<td>CAS Number:</td>
<td>630-08-0</td>
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<tr>
<td>Test Method:</td>
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<tr>
<td>Pollutant Group(s):</td>
<td>( InOrganic Compounds )</td>
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<tr>
<td>Emission Limit 1:</td>
<td>0.0820 LB/MMBTU</td>
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<td>Emission Limit 2:</td>
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Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

**Facility Information**

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<tr>
<th>Field</th>
<th>Value</th>
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<tbody>
<tr>
<td>RBLC ID</td>
<td>AL-0313 (final)</td>
</tr>
<tr>
<td>Corporate/Company Name</td>
<td>LHOIST NORTH AMERICA OF ALABAMA, LLC</td>
</tr>
<tr>
<td>Facility Name</td>
<td>MONTEVALLO PLANT</td>
</tr>
<tr>
<td>Facility Contact</td>
<td>MICHAEL WILL 2054021553 <a href="mailto:MICHAEL.WILL@LHOIST.COM">MICHAEL.WILL@LHOIST.COM</a></td>
</tr>
<tr>
<td>Facility Description</td>
<td>LIME MANUFACTURING FACILITY</td>
</tr>
<tr>
<td>Permit Type</td>
<td>B: Add new process to existing facility</td>
</tr>
<tr>
<td>Permit URL</td>
<td>HTTP</td>
</tr>
<tr>
<td>EPA Region</td>
<td>4</td>
</tr>
<tr>
<td>Facility County</td>
<td>SHELBY</td>
</tr>
<tr>
<td>Facility State</td>
<td>AL</td>
</tr>
<tr>
<td>Facility ZIP Code</td>
<td>35040</td>
</tr>
<tr>
<td>Permit Issued By</td>
<td>ALABAMA DEPT OF ENVIRONMENTAL MGMT (Agency Name)</td>
</tr>
<tr>
<td>Permit Notes</td>
<td>MR. DALE HURST(Agency Contact) (334) 271-7882 <a href="mailto:ADH@ADEM.STATE.AL.US">ADH@ADEM.STATE.AL.US</a></td>
</tr>
<tr>
<td>Date Determination</td>
<td></td>
</tr>
<tr>
<td>Last Updated</td>
<td>11/30/2017</td>
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<tr>
<td>Permit Number</td>
<td>411-0008</td>
</tr>
<tr>
<td>Permit Date</td>
<td>05/04/2016 (actual)</td>
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**Process/Pollutant Information**

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<tr>
<td>PROCESS NAME</td>
<td>LIMESTONE FEED SYSTEM</td>
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<tr>
<td>Process Type</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
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<tr>
<td>Primary Fuel</td>
<td>N/A</td>
</tr>
<tr>
<td>Throughput</td>
<td>110000.00 LB/H</td>
</tr>
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<td>Process Notes</td>
<td>110,000 LB/H THROUGHPUT OF LIMESTONE</td>
</tr>
<tr>
<td>POLLUTANT NAME</td>
<td>Particulate matter, fugitive</td>
</tr>
<tr>
<td>CAS Number</td>
<td>PM</td>
</tr>
<tr>
<td>Test Method</td>
<td>Other</td>
</tr>
<tr>
<td>Other Test Method</td>
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</tr>
<tr>
<td>Pollutant Group(s):</td>
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<tr>
<td>Emission Limit 1</td>
<td>7.0000 % OPAQUE 6 MIN AVG</td>
</tr>
<tr>
<td>Emission Limit 2</td>
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</tr>
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</table>
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) WET LIMESTONE
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: METHOD 9

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 7.0000 % OPACITY 6 MIN AVG
Emission Limit 2: 0.0140 GR/DSCF
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) WET LIMESTONE
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 

<table>
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<th>Process/Pollutant Information</th>
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<tr>
<td>PROCESS NAME:</td>
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<td>VERTICAL LIME KILN</td>
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<td>Process Type:</td>
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<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
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<tr>
<td>Primary Fuel:</td>
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<td>Process Notes:</td>
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<tr>
<td></td>
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<tr>
<td>POLLUTANT NAME:</td>
</tr>
<tr>
<td>Particulate matter, total &lt; 10 µ (TPM10)</td>
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<tr>
<td>CAS Number:</td>
</tr>
<tr>
<td>PM</td>
</tr>
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</table>
Test Method: EPA/OAR Mthd 201 and 202
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 GR/DSCF
Emission Limit 2: 3.7700 LB/H
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: TEST METHODS: METHOD 5 OF 40 CFR PART 60 OR METHOD 201/201A AND METHOD 202 OF 40 CFR PART 60

POLLUTANT NAME: Particulate matter, total < 2.5 μ (TPM2.5)
CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF
Emission Limit 2: 1.6800 LB/H
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: TEST METHODS: METHOD 5 OF 40 CFR PART 60 OR METHOD 201/201A AND METHOD 202 OF 40 CFR PART 60

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: EPA/OAR Mthd 7
Pollutant Group(s): (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 27.5000 LB/H 3 HR AVG
Emission Limit 2: 0.5000 LB/TON LIME PRODUCED 30 DAY ROLLING AVG

Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) PARALLEL FLOW REGENERATIVE VERTICAL KILN DESIGN GOOD COMBUSTION AND PROCESS CONTROL TECHNIQUES

Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: COMPLIANCE DETERMINED BY CEMS

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): ( Greenhouse Gasses (GHG) )
Emission Limit 1: 4.0000 MMBTU HHV/TON LIME 12 MONTH AVG
Emission Limit 2: 

Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: 
Control Method: (P) PARALLEL FLOW REGENERATIVE KILN DESIGN ENERGY EFFICIENT OPERATING PRACTICES
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 

POLLUTANT NAME: Methane
CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): ( Greenhouse Gasses (GHG), Organic Compounds (all), Organic Non-HAP Compounds )
Emission Limit 1: 4.0000 MMBTU HHV/TON LIME
Emission Limit 2: 
Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) PARALLEL FLOW REGENERATIVE VERTICAL KILN ENERGY EFFICIENT OPERATING PRACTICES

Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrous Oxide (N2O)
CAS Number: 10024-97-2
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 4.0000 MMBTU HHV/TON LIME
Emission Limit 2: Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) PARALLEL FLOW REGENERATIVE VERTICAL KILN DESIGN ENERGY EFFICIENT OPERATING PRACTICES

Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (Inorganic Compounds)
Emission Limit 1: 36.0000 LB/H
Emission Limit 2: 1.3000 LB/TON LIME PRODUCED
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) PARALLEL FLOW REGENERATIVE VERTICAL KILN DESIGN GOOD COMBUSTION AND PROCESS CONTROL TECHNOLOGIES

Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

**POLLUTANT NAME:** Particulate matter, filterable (FPM)
**CAS Number:** PM
**Test Method:** EPA/OAR Mtd 5
**Pollutant Group(s):** (Particulate Matter (PM))
**Emission Limit 1:** 0.0090 GR/DSCF
**Emission Limit 2:** 3.7700 LB/H
**Standard Emission:**

Did factors, other then air pollution technology considerations influence the BACT decisions: N

**Case-by-Case Basis:** BACT-PSD
**Other Applicable Requirements:** MACT
**Control Method:** (A) FABRIC FILTER BAGHOUSE
**Est. % Efficiency:**
**Cost Effectiveness:** 0 $/ton
**Incremental Cost Effectiveness:** 0 $/ton
**Compliance Verified:** Unknown
**Pollutant/Compliance Notes:**

### Process/Pollutant Information

**PROCESS NAME:** DIESEL EMERGENCY GENERATOR
**Process Type:** 11.220 (Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
**Primary Fuel:** DIESEL
**Throughput:** 500.00 BHP
**Process Notes:**

**POLLUTANT NAME:** Nitrogen Oxides (NOx)
**CAS Number:** 10102
**Test Method:** EPA/OAR Mtd 7A
**Pollutant Group(s):** (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
**Emission Limit 1:** 4.0000 G/KW-H
**Emission Limit 2:** 0.0066 LB/HP-H
**Standard Emission:**

Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): InOrganic Compounds
Emission Limit 1: 3.5000 G/KW-H
Emission Limit 2: 0.0058 LB/HP-H
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): Particulate Matter (PM)
Emission Limit 1: 0.2300 G/KW-H
Emission Limit 2: 0.0004 LB/HP-H
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
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<tr>
<th>Pollutant/Compliance Notes</th>
<th>Pollutant Name</th>
<th>CAS Number</th>
<th>Test Method</th>
<th>Pollutant Group(s)</th>
<th>Emission Limit 1</th>
<th>Emission Limit 2</th>
<th>Standard Emission</th>
<th>Did factors, other than air pollution technology considerations influence the BACT decisions?</th>
<th>Case-by-Case Basis</th>
<th>Other Applicable Requirements</th>
<th>Control Method</th>
<th>Est. % Efficiency</th>
<th>Cost Effectiveness</th>
<th>Incremental Cost Effectiveness</th>
<th>Compliance Verified</th>
<th>Pollutant/Compliance Notes</th>
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<tbody>
<tr>
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<td>Particulate matter, filterable &lt; 10 μ (FPM10)</td>
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<td>0.0004 LB/HP-H</td>
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<td>Y</td>
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<td>NSPS</td>
<td>(N) TIER 3 ENGINE</td>
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<td>0.0004 LB/HP-H</td>
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<td>NSPS</td>
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CAS Number: CO2c
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 7000.0000 BTU/HP-H
Emission Limit 2:
Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Methane
CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), Organic Compounds (all), Organic Non-HAP Compounds)
Emission Limit 1: 7000.0000 BTU/HP-H
Emission Limit 2:
Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrous Oxide (N2O)
CAS Number: 10024-97-2
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 7000.0000 BTU/HP-H
Emission Limit 2:
Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:
Control Method: (N) TIER 3 ENGINE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown

Pollutant/Compliance Notes:

<table>
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<tr>
<th>Process/Pollutant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESS NAME: PRODUCT HANDLING SYSTEM</td>
</tr>
<tr>
<td>Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel: N/A</td>
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<tr>
<td>Throughput: 55000.00 LB/H OF LIME</td>
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<tr>
<td>Process Notes:</td>
</tr>
<tr>
<td>POLLUTANT NAME: Particulate matter, filterable &lt; 10 μ (FPM10)</td>
</tr>
<tr>
<td>CAS Number: PM</td>
</tr>
<tr>
<td>Test Method: EPA/OAR Mtd 201</td>
</tr>
<tr>
<td>Pollutant Group(s): (Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1: 0.0020 GR/DSCF</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
</tr>
<tr>
<td>Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: N</td>
</tr>
<tr>
<td>Case-by-Case Basis: BACT-PSD</td>
</tr>
<tr>
<td>Other Applicable Requirements:</td>
</tr>
<tr>
<td>Control Method: (A) FABRIC FILTER BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
</tr>
<tr>
<td>Cost Effectiveness: 0 $/ton</td>
</tr>
<tr>
<td>Incremental Cost Effectiveness: 0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified: Unknown</td>
</tr>
<tr>
<td>Pollutant/Compliance Notes: FILTERABLE PM10 EMISSIONS SHALL BE DETERMINED IN ACCORDANCE WITH METHOD 5 OF 40 CFR 60 OR METHOD 201/201A OF 40 CFR PART 60.</td>
</tr>
</tbody>
</table>

POLLUTANT NAME: Particulate matter, filterable < 2.5 μ (FPM2.5)
CAS Number: PM
**Test Method:** Other  
**Other Test Method:**  
**Pollutant Group(s):** (Particulate Matter (PM))  
**Emission Limit 1:** 0.0020 GR/DSCF  
**Emission Limit 2:**  
**Standard Emission:** Did factors, other than air pollution technology considerations influence the BACT decisions: N  
**Case-by-Case Basis:** BACT-PSD  
**Other Applicable Requirements:**  
**Control Method:** (A) FABRIC FILTER BAGHOUSE  
**Est. % Efficiency:**  
**Cost Effectiveness:** 0 $/ton  
**Incremental Cost Effectiveness:** 0 $/ton  
**Compliance Verified:** Unknown  
**Pollutant/Compliance Notes:** FILTERABLE PM2.5 EMISSIONS SHALL BE DETERMINED IN ACCORDANCE WITH METHOD 5 OF 40 CFR 60 OR METHOD 201201A OF 40 CFR PART 60

### Process/Pollutant Information

<table>
<thead>
<tr>
<th>PROCESS NAME:</th>
<th>CA-08 EAST LKD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type:</td>
<td>90.019  (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
<td>N/A</td>
</tr>
<tr>
<td>Throughput:</td>
<td>0</td>
</tr>
</tbody>
</table>

**Process Notes:**

<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Particulate matter, filterable &lt; 2.5 μ (FPM2.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>PM</td>
</tr>
<tr>
<td>Test Method:</td>
<td>Other</td>
</tr>
<tr>
<td>Other Test Method:</td>
<td></td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>(Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>0.0020 GR/DSCF</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
</tr>
<tr>
<td>Standard Emission:</td>
<td></td>
</tr>
<tr>
<td>Did factors, other than air pollution technology considerations influence the BACT decisions:</td>
<td>N</td>
</tr>
<tr>
<td>Case-by-Case Basis:</td>
<td>BACT-PSD</td>
</tr>
<tr>
<td>Other Applicable Requirements:</td>
<td>(A) FABRIC FILTER BAGHOUSE</td>
</tr>
<tr>
<td>Control Method:</td>
<td>(A) FABRIC FILTER BAGHOUSE</td>
</tr>
<tr>
<td>Est. % Efficiency:</td>
<td></td>
</tr>
<tr>
<td>Cost Effectiveness:</td>
<td>0 $/ton</td>
</tr>
</tbody>
</table>
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: FILTERABLE PM2.5 EMISSIONS SHALL BE DETERMINED IN ACCORDANCE WITH METHOD 5 OF 40 CFR 60 OR METHOD 201/201A OF 40 CFR PART 60.

**POLLUTANT NAME:** Particulate matter, filterable < 10 μ (FPM10)
CAS Number: PM
Test Method: EPA/OAR Methd 201
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0020 GR/DSCF
Emission Limit 2: 
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE
Ext. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

**Process/Pollutant Information**

**PROCESS NAME:** KILN HEATER
Process Type: 11.310 (Natural Gas (includes propane and liquefied petroleum gas))
Primary Fuel: NATURAL GAS
Throughput: 6.20 MMBTU/H
Process Notes:

**POLLUTANT NAME:** Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: EPA/OAR Methd 7
Pollutant Group(s): (InOrganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 
Emission Limit 2: 
Standard Emission: Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) LOW NOX BURNER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: EPA/OAR Method 10
Pollutant Group(s): Inorganic Compounds
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION TECHNIQUES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: EPA/OAR Method 5
Pollutant Group(s): Particulate Matter (PM)
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Particulate matter, filterable < 10 μ (FPM10)
CAS Number: PM
Test Method: EPA/OAR Meth 201
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Particulate matter, filterable < 2.5 μ (FPM2.5)
CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FABRIC FILTER BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: EMISSIONS COMBINED WITH VERTICAL KILN STACK. KILN EMISSIONS LIMITS APPLY.

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 
Emission Limit 2: 
Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: 
Control Method: (P) NATURAL GAS ENERGY EFFICIENT OPERATING PRACTICES
Est. % Efficiency: 
Cost Effectiveness: $0/ton
Incremental Cost Effectiveness: $0/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 

POLLUTANT NAME: Methane
CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), Organic Compounds (all), Organic Non-HAP Compounds)
Emission Limit 1: 
Emission Limit 2: 
Standard Emission: Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: 
Control Method: (P) NATURAL GAS ENERGY EFFICIENT OPERATING OPERATING PRACTICES
Est. % Efficiency: 
Cost Effectiveness: $0/ton
Incremental Cost Effectiveness: $0/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 

POLLUTANT NAME: Nitrous Oxide (N2O)
CAS Number: 10024-97-2
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG), InOrganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))
Emission Limit 1: 
Emission Limit 2: 
Standard Emission:  
Did factors, other then air pollution technology considerations influence the BACT decisions: Y  

Case-by-Case Basis: BACT-PSD  
Other Applicable Requirements:  
Control Method: (P) NATURAL GAS ENERGY EFFICIENT OPERATING PRACTICES  
Est. % Efficiency:  
Cost Effectiveness: $0/ton  
Incremental Cost Effectiveness: $0/ton  
Compliance Verified: Unknown  
Pollutant/Compliance Notes:  

**Facility Information**

<table>
<thead>
<tr>
<th>Corporate/Company</th>
<th>MISSISSIPPI LIME COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>KIMBERLY BAUMAN 573-883-4046 <a href="mailto:KSLBAUMAN@MISSISSIPPILIME.COM">KSLBAUMAN@MISSISSIPPILIME.COM</a></td>
</tr>
<tr>
<td>Facility Contact:</td>
<td>Lime manufacturing plant at existing limestone mine located in Prairie Du Rocher. The lime manufacturing plant would include two pre-heater rotary kilns; limestone crushing, storing and handling; fuel storage and handling; lime dehydrators; lime storage, handling and loadout; and other ancillary operations.</td>
</tr>
<tr>
<td>Permit Type:</td>
<td>A: New/Greenfield Facility</td>
</tr>
<tr>
<td>Permit URL:</td>
<td><a href="http://yosemite.epa.gov/r5/in_permit">http://yosemite.epa.gov/r5/in_permit</a> NSF/6F1e6bc583aad45448625763f0053e08e/56b26b2e13f02af686257f410057b897/SFABLE/ATTHCVP9.pdf/08100063.pdf</td>
</tr>
<tr>
<td>EPA Region:</td>
<td>5</td>
</tr>
<tr>
<td>Facility County:</td>
<td>RANDOLPH</td>
</tr>
<tr>
<td>Facility State:</td>
<td>IL</td>
</tr>
<tr>
<td>Facility ZIP Code:</td>
<td>63127</td>
</tr>
<tr>
<td>Permit Issued By:</td>
<td>ILLINOIS EPA, BUREAU OF AIR (Agency Name) MR. RAY PILAPIL(Agency Contact) (217) 782-2113 <a href="mailto:ray.pilapil@illinois.gov">ray.pilapil@illinois.gov</a></td>
</tr>
<tr>
<td>Other Agency:</td>
<td>Minesh Patel, 217-785-5152</td>
</tr>
<tr>
<td>Contact Info:</td>
<td></td>
</tr>
<tr>
<td>Permit Notes:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facility-wide Emissions:</th>
<th>Pollutant Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide:</td>
<td>1095.0000 (Tons/Year)</td>
</tr>
<tr>
<td>Nitrogen Oxides (NOx):</td>
<td>1533.0000 (Tons/Year)</td>
</tr>
<tr>
<td>Particulate Matter (PM):</td>
<td>98.6300 (Tons/Year)</td>
</tr>
<tr>
<td>Sulfur Oxides (SOx):</td>
<td>219.0000 (Tons/Year)</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOC):</td>
<td>22.0000 (Tons/Year)</td>
</tr>
</tbody>
</table>
### Process/Pollutant Information

**PROCESS** | Two Rotary Kilns  
**NAME:** |  
**Process Type:** | 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)  
**Primary Fuel:** | Coal; petroleum coke  
**Throughput:** | 50.00 tons lime/hour, each  
**Process Notes:** | Ultra low sulfur distillate fuel oil with sulfur content of 15 ppm by weight or other ultra low sulfur fuels will be used during startup, malfunction and breakdown.  

#### Pollutant Information

| POLLUTANT NAME: | Nitrogen Oxides (NOx)  
| CAS Number: | 10102  
| Test Method: | Other  
| Other Test Method: | CEMS  
| Pollutant Group(s): | (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))  
| Emission Limit 1: | 3.5000 LBS/TON LIME PRODUCE 30-DAY ROLLING AVERAGE  
| Emission Limit 2: | 2.6100 LBS/TON LIME PRODUCE 12-MONTH ROLLING AVERAGE  

**Standard Emission:**

Did factors, other than air pollution technology considerations influence the BACT decisions: **N**

**Case-by-Case Basis:** BACT-PSD

**Other Applicable Requirements:** SIP

**Control Method:** (B) Low excess air to minimize formation of NOx and selective non-catalytic reduction (SNCR) technology.

**Est. % Efficiency:**

**Cost Effectiveness:** 0 $/ton

**Incremental Cost Effectiveness:** 0 $/ton

**Compliance Verified:** No

**Pollutant/Compliance Notes:** Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 175.0 lbs NOx/hr, 1-hour avg continues to apply during these periods and serves as BACT. Note: 12-month running average limit (2.61 lb/ton) may be lowered based on the demonstrated performance of SNCR technology.

| POLLUTANT NAME: | Carbon Monoxide  
| CAS Number: | 630-08-0  
| Test Method: | Other  
| Other Test Method: | CEMS  
| Pollutant Group(s): | (Inorganic Compounds)  
| Emission Limit 1: | 2.5000 LBS/TON LIME 24-HOUR AVERAGE  
| Emission Limit 2: |  

**Standard Emission:**

Did factors, other than air pollution technology considerations influence the BACT decisions: **N**
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practices to minimize CO emissions.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 125.0 lbs CO/hr, 24-hour avg continues to apply during these periods and serves as BACT.

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Other
Other Test Method: CEMS
Pollutant Group(s): (Inorganic Compounds, Oxides of Sulfur (SOx))
Emission Limit 1: 0.5000 LBS/TON LIME 30-DAY ROLLING AVERAGE
Emission Limit 2:
Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (P) Natural absorptive capacity of lime kiln dust.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 40.0 lbs SO2/hr, 1-hour avg and 32.3 lbs SO2/hr, 3-hour avg continues to apply during these periods and serves as BACT.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1400 LB/TON 3-HOUR AVERAGE
Emission Limit 2:
Standard Emission: 0.1400 LB/T 3-HOUR AVERAGE

Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
**Other Applicable Requirements:** NSPS, NESHAP, SIP

**Control Method:** (A) Baghouse

**Est. % Efficiency:**

**Cost Effectiveness:** 0 $/ton

**Incremental Cost Effectiveness:** 0 $/ton

**Compliance Verified:** No

**Pollutant/Compliance Notes:** Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 7.1 lbs PM/hr, 3-hour avg continues to apply during these periods and serves as BACT.

**POLLUTANT NAME:** Particulate matter, total < 10 μm (TPM10)

**CAS Number:** PM

**Test Method:** EPA/OAR Mhdb 201A and 202

**Pollutant Group(s):** (Particulate Matter (PM))

**Emission Limit 1:** 0.1800 LBS/TON 3-HOUR AVERAGE

**Emission Limit 2:**

**Standard Emission:** 0.1800 LB/T 3-HOUR AVERAGE

**Did factors, other than air pollution technology considerations influence the BACT decisions:** U

**Case-by-Case Basis:** BACT-PSD

**Other Applicable Requirements:** NESHAP, NSPS, SIP

**Control Method:** (A) Baghouse

**Est. % Efficiency:**

**Cost Effectiveness:** 0 $/ton

**Incremental Cost Effectiveness:** 0 $/ton

**Compliance Verified:** Unknown

**Pollutant/Compliance Notes:** Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 8.8 lbs PM10/hr, 3-hour avg continues to apply during these periods and serves as BACT.

**POLLUTANT NAME:** Particulate matter, total < 2.5 μm (TPM2.5)

**CAS Number:** PM

**Test Method:** Unspecified

**Pollutant Group(s):** (Particulate Matter (PM))

**Emission Limit 1:** 0.1050 LBS/TON 3-HOUR AVERAGE

**Emission Limit 2:**

**Standard Emission:** 0.1050 LB/T 3-HOUR AVERAGE

**Did factors, other than air pollution technology considerations influence the BACT decisions:** N

**Case-by-Case Basis:** BACT-PSD

**Other Applicable Requirements:** NSPS, NESHAP, SIP

**Control Method:** (A) Baghouse
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Emission 3: BACT limit does not apply during periods when the kiln is on hot stand-by with no stone feed to kiln or kiln is operating at less than 30 percent of capacity, provided, however, the emission limit of 5.24 lbs PM2.5/hr, 3-hour avg continues to apply during these periods and serves as BACT.

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2e
Test Method: Other
Other Test Method: CEMS
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 2744.0000 LBS/TON LIME 12-MONTH ROLLING AVERAGE
Emission Limit 2: Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of preheater or other similar heat recovery system, selection of refractory and implementation of kiln seal management program.

Process/Pollutant Information

PROCESS: Limestone Handling Operations (Stack Emissions)
NAME:
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel:
Throughput: 0
Process Notes: Limestone handling operation includes storage bins, conveying system, transfer points, bulk loading or unloading system, screening operations, bucket elevators, and belt conveyors subject to 40 CFR 63 Subpart 5A. Limestone handling operation also includes crushers, grinding mills, screening operations, bucket or belt conveyors, conveyor transfer points, storage bins and enclosed truck loading station subject to 40 CFR 60 Subpart OOO.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0140 GR/DSCF
Emission Limit 2:  
Standard Emission: 
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP, SIP
Control Method: (N)
Est. % Efficiency:  
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 7 percent opacity

Process/Pollutant Information

PROCESS NAME: Limestone Handling Operations (Fugitive Emissions)
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel:  
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 
Emission Limit 2: 
Standard Emission: 
Did factors, other than air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS, NESHAP, SIP
Control Method: (N)
Est. % Efficiency:  
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Limit 1: opacity of emissions less than 7%. Limit 2: opacity of emissions less than 12% for each crusher without capture system.

<table>
<thead>
<tr>
<th>Process/Pollutant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESS NAME: Limestone Handling Operations (Enclosed Building Emissions)</td>
</tr>
<tr>
<td>Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
</tr>
<tr>
<td>Throughput: 0</td>
</tr>
<tr>
<td>Process Notes:</td>
</tr>
<tr>
<td>POLLUTANT NAME: Visible Emissions (VE)</td>
</tr>
<tr>
<td>CAS Number: VE</td>
</tr>
<tr>
<td>Test Method: EPA/OAR Mthd 9</td>
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<tr>
<td>Pollutant Group(s):</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
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<tr>
<td>Emission Limit 2:</td>
</tr>
<tr>
<td>Standard Emission:</td>
</tr>
<tr>
<td>Did factors, other then air pollution technology considerations influence the BACT decisions: U</td>
</tr>
<tr>
<td>Case-by-Case Basis: BACT-PSD</td>
</tr>
<tr>
<td>Other Applicable Requirements: NSPS, NESHAP, SIP</td>
</tr>
<tr>
<td>Control Method: (P) Enclosure</td>
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<tr>
<td>Est. % Efficiency:</td>
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<td>Cost Effectiveness: 0 $/ton</td>
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<td>Incremental Cost Effectiveness: 0 $/ton</td>
</tr>
<tr>
<td>Compliance Verified: Unknown</td>
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<tr>
<td>Pollutant/Compliance Notes: No visible emissions from buildings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process/Pollutant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESS NAME: Solid Fuel Handling</td>
</tr>
<tr>
<td>Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
</tr>
<tr>
<td>Throughput: 0</td>
</tr>
<tr>
<td>Process Notes:</td>
</tr>
<tr>
<td>POLLUTANT NAME: Visible Emissions (VE)</td>
</tr>
<tr>
<td>CAS Number: VE</td>
</tr>
</tbody>
</table>
Process/Pollutant Information

PROCESS NAME: Lime Barge Loadout

Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: EPA/OAR Mthd 5

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0040 GR/SCF

Emission Limit 2:

Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Telescoping loading spout with suction or aspiration at discharge end and a filter system.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No
**Pollutant/Compliance Notes:** Opacity from fugitive emissions: 20% Opacity from control device: 7%

### Process/Pollutant Information

<table>
<thead>
<tr>
<th>PROCESS NAME:</th>
<th>Truck and Rail Loadout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Type:</td>
<td>90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)</td>
</tr>
<tr>
<td>Primary Fuel:</td>
<td></td>
</tr>
<tr>
<td>Throughput:</td>
<td>0</td>
</tr>
<tr>
<td>Process Notes:</td>
<td>Loadout of quicklime and off-specification lime</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Particulate matter, filterable (FPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>PM</td>
</tr>
<tr>
<td>Test Method:</td>
<td>EPA/OAR Mthd 5</td>
</tr>
<tr>
<td>Pollutant Group(s):</td>
<td>(Particulate Matter (PM))</td>
</tr>
<tr>
<td>Emission Limit 1:</td>
<td>0.0040 GR/SCF</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
</tr>
<tr>
<td>Standard Emission:</td>
<td></td>
</tr>
</tbody>
</table>

**Did factors, other than air pollution technology considerations influence the BACT decisions:** N

**Case-by-Case Basis:** BACT-PSD

**Other Applicable Requirements:** SIP

**Control Method:** (A) Partial enclosure; fabric filters to treat displaced air during loadout; and loadout practices to minimize spillage.

**Est. % Efficiency:**

**Cost Effectiveness:** 0 $/ton

**Incremental Cost Effectiveness:** 0 $/ton

**Compliance Verified:** No

**Pollutant/Compliance Notes:** Opacity: 7%

<table>
<thead>
<tr>
<th>POLLUTANT NAME:</th>
<th>Visible Emissions (VE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Number:</td>
<td>VE</td>
</tr>
<tr>
<td>Test Method:</td>
<td>EPA/OAR Mthd 22</td>
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<tr>
<td>Pollutant Group(s):</td>
<td>VE</td>
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<tr>
<td>Emission Limit 1:</td>
<td>VE</td>
</tr>
<tr>
<td>Emission Limit 2:</td>
<td></td>
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</table>

**Did factors, other than air pollution technology considerations influence the BACT decisions:** N

**Case-by-Case Basis:** BACT-PSD

**Other Applicable Requirements:** SIP
Control Method: (A) Partial enclosure; fabric filters to treat displaced air during loadout; and loadout practices to minimize spillage.
Est. % Efficiency: 
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: No visible emissions of fugitive PM except for periods not to exceed a total of 2.5 minutes in any one hour period.

Facility Information

RBLC ID: FL-0341 (final)  
Corporate/Company Name: JACKSONVILLE LIME  
Facility Name: JACKSONVILLE LIME  
Facility Contact: NICK.CAGGIANO NICK.CAGGIANO@CARMUSENA.COM  
Facility Description: Lime manufacturing plant with two twin-shaft vertical parallel-flow regenerative lime kilns, capable of firing petcoke, coal, natural gas, and wood chips. Nominal average production rate is 330 tons/day of lime (maximum 396 tons/day).
Permit Type: A: New/Greenfield Facility  
Permit URL: http://arm-permit2k.dep.state.fl.us/nontrv/0310583.002.AC.F.ZIP  
EPA Region: 4
Facility County: DUVAL  
Facility State: FL  
Facility ZIP Code: 32206  
Permit Issued By: FLORIDA DEPT. OF ENVIRONMENTAL PROTECTION (Agency Name)  
MR. DAVID READ (Agency Contact)  
(850) 717-9000  
David.Read@dep.state.fl.us  
Permit Notes: Technical evaluation of BACT available at http://arm-permit2k.dep.state.fl.us/nonrrv/0310583.002.AC.D.ZIP

Affected Boundaries:

<table>
<thead>
<tr>
<th>Boundary Type</th>
<th>Class 1 Area State</th>
<th>Boundary:</th>
<th>Distance:</th>
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</thead>
<tbody>
<tr>
<td>CLASS1</td>
<td>GA</td>
<td>Boundary:</td>
<td>Distance:</td>
</tr>
<tr>
<td>CLASS1</td>
<td>GA</td>
<td>Wolf Island</td>
<td>&lt; 1 km</td>
</tr>
</tbody>
</table>

Facility-wide Emissions Increase:

<table>
<thead>
<tr>
<th>Pollutant Name</th>
<th>Facility-wide Emissions Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>412.0000 (Tons/Year)</td>
</tr>
<tr>
<td>Nitrogen Oxides (NOx)</td>
<td>345.0000 (Tons/Year)</td>
</tr>
<tr>
<td>Particulate Matter (PM)</td>
<td>62.0000 (Tons/Year)</td>
</tr>
<tr>
<td>Sulfur Oxides (SOx)</td>
<td>157.0000 (Tons/Year)</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOC)</td>
<td>19.0000 (Tons/Year)</td>
</tr>
</tbody>
</table>
PROCESS: Two vertical lime kilns

NAME:

Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)

Primary Fuel: Natural gas

Throughput: 330.00 tons of lime per day

Process Notes: Fueled by natural gas, petcoke, coal, and wood chips. Nominal production rate of 330 tons of lime per day per kiln (maximum of 396 tons/day per kiln). Twin-shaft vertical parallel flow regenerative lime kilns (Cimprogetti – FS Design, or equivalent). Approx. 44 MMBtu/hr heat input per kiln

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Other

Other Test Method: NOx CEMS

Pollutant Group(s): (Inorganic Compounds, Oxides of Nitrogen (NOx), Particulate Matter (PM))

Emission Limit 1: 350.0000 MG/N CU METER 30-DAY ROLLING AVG, FOR COAL & PETCOKE

Emission Limit 2: 100.0000 MG/N CU METER 30-DAY ROLLING AVG, FOR NATURAL GAS

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Production capacity cap of 396 tons of lime per day per kiln. Operations, Maintenance and Monitoring (OM&M) Plan and Startup, Shutdown, and Malfunction (SSM) Plan required. Required to maintain low-temperature combustion to reduce thermal NOx emissions. Required to use efficient PFR kiln design to minimize fuel use and pollutant emissions.

Est. % Efficiency: 0%

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: NOx CEMS required. Compliance is based on 30-operating-day rolling average, based on the relative heat inputs of the four authorized fuels. Petcoke/coal: 350 milligrams per normal cubic meter (approx. 31.9 lb/hr) Natural gas: 100 milligrams per normal cubic meter (approx. 8.3 lb/hr) Wood chips: 500 milligrams per normal cubic meter (approx. 43.6 lb/hr) Permittee must maintain records of the use of the various permitted fuels.

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Other

Other Test Method: SO2 CEMS

Pollutant Group(s): (Inorganic Compounds, Oxides of Sulfur (SOx))

Emission Limit 1: 200.0000 MG/N CU METER 30-DAY ROLLING AVERAGE, PETCOKE & COAL

Emission Limit 2: 50.0000 MG/N CU METER 30-DAY ROLLING AVERAGE, NAT GAS & WOOD

Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:

Control Method: (P) - Inherent scrubbing of burning zone exhaust gases by hot lime and of kiln exhaust gases by incoming limestone to reduce SO2 and sulfuric acid mist (SAM); - Use of fabric filters (baghouses) to control emissions of PM, PM10 and PM2.5 and provide further control of SO2 and SAM on the filter cake. - Overall lime production cap

Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: SO2 CEMS required. Compliance based on 30-day rolling average and weighted 30-day fuel usage records. Petcoke & coal: 200 milligrams per normal cubic meter (approx. 18.2 lb/hr) Natural gas & wood: 50 milligrams per normal cubic meter (approx. 4.2 lb/hr) Record of fuel usage required.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (Inorganic Compounds)
Emission Limit 1: 400.0000 MG / N CU METER PETCOKE, COAL, WOOD
Emission Limit 2: 200.0000 MG / N CU METER NATURAL GAS
Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:

Control Method: (P) - Efficient, vertical twin shaft PFR kiln design to minimize fuel use and resulting emissions of all pollutants; - Thorough mixing and residence time through preheat section to complete burnout of CO and volatile organic compounds (VOC); - Lime production cap

Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Method 10 stack tests -- one compliance test for solid fuels, and one for natural gas.

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Other
Other Test Method: EPA Method 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 10.0000 MG / N CU METER
Emission Limit 2: 0.1000 LB / TON STONE FEED
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NESHAP
Control Method: (A) Baghouse for each kiln; Efficient, vertical twin shaft PFR kiln design to minimize fuel use and resulting emissions of all pollutants;
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 0.10 lb/ton of stone feed from NESHAP Subpart AAAAA 10 milligrams per normal standard cubic meter for BACT PM standard, may be demonstrated using any combination of fuels.

POLLUTANT NAME: Particulate matter, total < 2.5 μ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 
Emission Limit 2: 
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: 
Control Method: (A) Baghouse
Est. % Efficiency: 0 $/ton
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Compliance using the methods for BACT PM, SO2 and NOX shall indicate compliance with BACT for PM10 and PM2.5.

POLLUTANT NAME: Particulate matter, total < 10 μ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 
Emission Limit 2: 
Standard Emission:
Did factors, other than air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: