EXECUTIVE SUMMARY

DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE PROPOSED MODERNIZATION OF THE LAFARGE RAVENA CEMENT PLANT

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EXECUTIVE SUMMARY

1.0 OVERVIEW

Lafarge Building Materials, Inc. (Lafarge) proposes to modernize and expand its existing cement manufacturing facility in the Town of Coeymans in Albany County, New York (the "Ravena Plant") by constructing a state-of-the-art, energy efficient and economically and environmentally sustainable cement manufacturing plant. The proposed modernization ("the proposed project" or "Proposed Action") would replace the existing "wet" cement-making process at the Ravena Plant with a more energy efficient "dry" cement-making process. This would be accomplished by replacing the two existing long "wet" kilns with a new preheater/precalciner tower/stack structure, kiln and clinker cooler operation and providing for the future replacement or upgrade of the cement grinding mills, all of which are part of the Proposed Action. The capacity of the Ravena Plant would increase with the proposed project from its current baseline capacity of approximately 1.72 million short tons of clinker per year to approximately 2.81 million short tons of clinker per year with the Proposed Action.

1.1 Proposed Action

The proposed project entails replacing two existing wet kilns, currently in operation at the Ravena Plant, with a single dry preheater/precalciner kiln system and related equipment. In this dry process, crushed limestone and other raw materials (kiln feed) would be preheated in a dedicated tower with exhaust gas from the kiln. The preheated material would then enter a "precalciner" where it would be heated to a temperature of approximately 1800 degrees Fahrenheit (°F) before it enters the kiln. Preheating the kiln feed allows the kiln length to be substantially shortened, thereby lowering energy consumption. The material entering the kiln would be heated to a final temperature of approximately 2650°F (the temperature required to complete the conversion of kiln feed to clinker). The roughly one-inch-diameter clinker would be allowed to cool, after which it would be ground into a fine powder along with small amounts of gypsum and other materials to form cement. The finished material would be stored in on-site storage silos prior to being shipped by truck, rail or barge to locations within New York State and other locations along the Eastern Seaboard.

The Proposed Action includes the installation of new equipment and the replacement/upgrade and/or decommissioning of other existing equipment at the Ravena Plant. Specifically, the Proposed Action includes: (1) installation of a new secondary crusher, a new preblending system, new raw mill storage bins, a new scrubber, a new selective non-catalytic reduction (SNCR) system, new clinker storage silos, new finish mill additive storage bins, a new dewatering system, and a new power generation station that would generate electricity using the excess heat from the kiln system; (2) replacement of the two existing wet kilns, associated kiln drives and clinker coolers with a single dry preheater/precalciner kiln system and related equipment, including: a preheater/precalciner tower and a fiberglass reinforced stack attached to the tower, a dry process kiln and associated kiln drives, a new clinker cooler system, and new particulate matter (PM) emissions controls for the kiln system and alkali bypass system; (3) the decommissioning and replacement of most of the existing mills, including two raw (horizontal roller) mills, two finish (horizontal ball) mills, and two coal (ball) mills; (4) decommissioning of slurry basins; and (5) replacement and upgrade of certain conveyor systems, air handling equipment, and material transfer equipment.

The capacity of the proposed modernization would be approximately 2.81 million short tons of clinker per year. Although the existing kilns and certain related equipment would be replaced as part of the proposed project, the current capacities of the on-site cement storage silos, cement conveyor belt and barge loading facilities would be sufficient to meet and handle the increased capacity of the modernized facility. No modifications to the Hudson River barge loading system would be needed since the current Lafarge Hudson River dockside loading and marine barge transport system is capable of handling the anticipated future increases in the production of cement.

As allowed under the existing New York State Department of Environmental Conservation (NYSDEC) operating permits for the facility, it is anticipated that coal and petroleum coke would continue to be used as the principal fuels at the facility. Use of tire derived fuel (TDF) and fuel oil are also allowed under existing NYSDEC permits. Lafarge intends to evaluate the use of other non hazardous alternate solids fuels (ASF) as a substitute for coal and coke in the kiln system sometime in the future. The use of any ASF would be subject to environmental review under both solid waste and air permitting regulatory approval processes, and is not part of the Proposed Action.

Under the Proposed Action, no new facilities would be required at the adjacent quarry to process the additional amount of limestone extracted or for transportation of raw materials and finished products by barge or rail. The Proposed Action would result in an increase in trucks to transport raw materials and finished product. The physical improvements proposed as part of the modernization project would occur within the same geographic limits as the existing cement manufacturing plant, or the Project Site, entirely within the boundaries of the existing cement manufacturing facility. No additional land would be required for the proposed project. The amount of cement kiln dust (CKD) sent to the landfill located north of the Project Site within the boundaries of the existing Ravena Plant would decrease from approximately 124,000 short tons per year to less than 86,000 short tons per year as a result of the proposed project. Future operation of the Callanan Industries (Callanan) aggregate manufacturing facility at the Lafarge property is independent from the Proposed Action and subject to renegotiation of its existing contract with Lafarge, which expires on December 31, 2010.

Construction of the proposed project is anticipated to occur in two phases. The majority of the new equipment would be installed at the Ravena Plant during the first phase of construction, which is anticipated to be completed in 42 months. The second phase of construction is to include the installation of the new clinker storage silos, new finish mill storage bins, a new finish (vertical roller) mill and raw material pre-blending system.

Design and construction of the first phase of the proposed modernization would require approximately 42 months to complete. Decommissioning of the existing equipment, which is not included it the 42-month period, would occur once the proposed plant modifications are constructed. The duration of active on-site construction activities, exclusive of project commissioning, is expected to require approximately 24 months.

1.2 Purpose and Need of the Proposed Action

The Ravena Plant manufactures Portland cement, the most common type of cement in general use and a basic ingredient of concrete, mortar and grout. The Ravena Plant was originally constructed by the Atlantic Cement Company in 1962. The existing facility, while fully compliant with state and federal

law and related regulations, is not efficient by today's cement manufacturing standards. The evaporation of water from a "water-limestone slurry" (limestone and other raw materials mixed with water) used in the existing process, and the relatively poor heat transfer in this process requires considerable energy and fuel, making the process energy inefficient and costly to operate. This inefficient process adversely affects the economic viability of the Ravena Plant, a facility important to the regional and state economy.

The current baseline capacity of the Ravena Plant is approximately 1.72 million short tons of Portland cement and masonry products. Product from the Ravena Plant is shipped to locations in New York State, New England, and other locations along the East Coast of the United States. Product from the Ravena Plant is also shipped from its on-site barge loading facility on the Hudson River to other Lafarge terminals in New Haven, Connecticut, Brooklyn, New York, Bayonne, New Jersey, and Baltimore, Maryland, from where it is distributed to locations along the Eastern Seaboard between New Hampshire and North Carolina.

The Ravena Plant often competes with cement manufactured at foreign locations. This is particularly true in the New York City and Virginia markets. These products come from Asia, South America, and Europe. Products from the Ravena Plant have been used in high profile projects, such as the new Giants Stadium in East Rutherford, New Jersey and the foundation of the World Trade Center Memorial in lower Manhattan. The proposed project would allow the Ravena Plant to consolidate its leading position in its current markets and allow it to support projected growth in demand over the coming decades.

While demand for cement has experienced a decrease due to the current economic downturn, it is anticipated that demand will start to recover in 2010 and that it would reach the full capacity of the Ravena Plant by 2012/2013. It is projected that demand will continue to grow to respond to observed and projected population growth and future infrastructure needs of the region served by the facility. Traditionally, excess demand in the Northeast markets has been met by imports. In 2006, the Northeast markets imported approximately 2.9 millions tons of cement, or 20% of consumption. It is expected that the cost of imported cement will remain competitive with domestic production because of low manufacturing costs, less stringent environmental controls in other countries of the world, and relatively low transportation costs. It is anticipated that, without the proposed modernization of the Ravena Plant, projected increased demand for cement in the future would continue to be met with imports from other regions of the world.

The purpose of the proposed project is to transform and expand the existing cement manufacturing operation at the Ravena Plant into an environmentally and economically sustainable, energy efficient, state-of-the-art cement manufacturing facility adjacent to the source of its raw material in the Hudson Valley. The modernized facility would replace the existing operation with a more energy efficient operation that would result in reduced rates of most air pollutant emissions.

1.3 Local, State and Federal Permits and Approvals

Implementation of the proposed project would require discretionary actions and approvals from federal, state and local agencies. These actions and approvals include: (1) federal: United States Environmental Protection Agency (USEPA) Prevention of Significant Deterioration (PSD) and New Source Review (NSR), and Federal Aviation Administration (FAA) Standards in 49 CFR Part 77; (2) state: NYSDEC Title V Permit and State Pollutant Discharge Elimination System (SPDES) Permit Modifications, Petroleum Bulk Storage Registration (PBS) and Chemical Bulk Storage Registration (CBS); New York State Department of Transportation (NYSDOT) authorization for any modifications to the roadways serving the plant that would be necessary during or post construction; New York State Department of State (NYSDOS) consistency assessment; and (3) local: Town of Coeymans Building Permit, Town of Coeymans Planning Board Site Plan Approval, and Albany County Planning Board Planning Board Review.

1.4 Environmental Review

Pursuant to the New York State Environmental Quality Review Act (SEQRA) (N.Y. ECL§§ (8-0101 to -0117), and its implementing regulations (6 NYCRR Part 617), state and local government agencies must determine whether their discretionary approvals may result in a significant adverse impact on the environment.

NYSDEC, acting as SEQRA "Lead Agency" for this review, reviewed the proposed project and determined that it may result in one or more significant adverse impacts. This Draft Environmental Impact Statement (DEIS) has been prepared by the Lead Agency pursuant to the requirements of SEQRA and examines a full range of potential environmental impacts from the Proposed Action, including potential effects on land use, zoning and public policy, socioeconomic conditions,

environmental justice, open space resources, cultural resources, visual resources, natural resources, hazardous materials, surface water quality, surface water biology, groundwater resources, coastal resources, infrastructure, energy use, municipal solid waste management systems, traffic and safety, air quality, (GHG) emissions, noise, and public health.

As summarized below, and described further in this DEIS, the Proposed Action would not result in significant adverse environmental impacts. Any temporary effects during construction would be mitigated through implementation of best management practices (BMPs) for the control of air pollution, erosion and sedimentation, noise reduction measures, and the use of shuttle buses to carry construction staff from remote interceptor parking facilities to the Project Site.

1.5 Alternatives

This DEIS considers a range of alternatives to the Proposed Action, including:

- Alternatives to the proposed size and capacity of the proposed facility;
- Alternatives to the proposed schedule for constructing and implementing the proposed project;
- Alternative modifications to the proposed layout of the project on the Project Site or modifications to the orientation of facilities on the Project Site to decrease the visual effects of the proposed project;
- Alternative locations at which the proposed facility could be developed;
- Alternative design and technologies, including potential alternatives to the proposed preheater/precalciner process to improve energy efficiency and decrease air pollutant emissions;
- Alternative treatments to enhance the visual appearance of the facility;
- Alternative pollution controls to reduce air pollutant emissions;
- Alternative fuels and other options to decrease GHG emissions;
- Alternative uses that could be developed at the Project Site; and
- The SEQRA-mandated "No Action" alternative.

Each alternative was assessed to determine whether it:

- Would have the potential to meet the overall purpose and need of the Proposed Action.
- Would result in the same or greater level of cost savings as compared to the cost savings that would accrue with the Proposed Action.
- Is within the control of the Project Sponsor.
- Could be implemented within the time period projected to meet the future level of demand for cement.
- Would avoid or reduce identified significant adverse environmental effects that would occur with the Proposed Action or result in substantial additional environmental benefits beyond those that would accrue with the Proposed Action.

As documented in this DEIS, the No Action alternative would not meet the goals and objectives of the Proposed Action.

2.0 PROJECT DESCRIPTION

2.1 Description of the Existing Ravena Plant

The cement-making operation at the existing Ravena Plant consists of three functional components: a limestone mining operation, a main cement-manufacturing operation and a finished product distribution system. A description of each of these three functional components is provided below. The current production capacity of the existing plant is approximately 1.72 million short tons of clinker per year. This is the average yearly amount of clinker produced between August 2004 and July 2006, which is the "baseline period" used in the air permit application for the proposed project.

2.1.1 Limestone Mining and Primary Crushing

Limestone, the primary raw material used in the existing Ravena Plant, is mined in a 2,274-acre limestone quarry owned and operated by Lafarge located approximately 1 mile west of the main cement manufacturing facility. Mining activities at the existing quarry are conducted in accordance with a NYSDEC Mined Land Reclamation Permit, which details the boundaries, mining methods, and long term reclamation plan for the quarry. Mining is accomplished through: stripping vegetation and soil to

expose underlying rock formations, controlled blasting, and removing material in 85-ton haul trucks. The timing of quarrying activities depends on a number of factors including the depth and chemical properties of the limestone, haul distance to the primary crusher and demand for cement and aggregate.

The rock formations found in the quarry include the Coeymans-Manlius, Kalkberg, Becraft, and New Scotland formations, in addition to a layer of shale. The composition of each of these formations varies as to their calcium content and, consequently, their utility in the cement-making process. The amount of material taken from each formation varies depending on the type of cement being produced, ease of extraction and other factors.

A portion of the excavated material is sold to Callanan, which operates an aggregate facility on property leased to them by Lafarge on the Ravena Plant site. The leasehold is scheduled to terminate at the end of 2010.

Material suitable for use in cement-making is sent to a primary crusher located at the quarry. The primary crusher is a gyratory type crusher that reduces the desk-size boulders to less than 8 inches in diameter. A conveyor belt transports the crushed rock from the primary crusher to the Ravena Plant where it is stockpiled.

2.1.2 Cement Manufacturing Operation

2.1.2.1 Secondary Crushing and Raw Grinding

A "reclaim" system consisting of vibrating feeders and belt conveyors transports the crushed rock from the on-site stockpiles to a secondary crusher where it is further crushed and transported to raw material silos.

The crushed rock is withdrawn from the silos, combined with iron ore and/or bauxite additive and transported to two raw horizontal roller mills where it is ground and mixed with water to form a fine paste or slurry (kiln feed) with a moisture content of approximately 30%. This material is then pumped to large slurry storage and blending basins.

2.1.2.2 Pyroprocessing and Calcination

The kiln feed is pumped from the slurry basins to two 580-foot long rotary cement kilns in which water is evaporated and carbon dioxide (CO_2) is driven off from the limestone. As the kiln feed passes through the kiln, its temperature increases to approximately 2600 F or greater at which point the slurry is transformed into clinker. After passing under the flame at the end of the kiln, the clinker drops into an air cooler ("clinker cooler") where large fans reduce its temperature to less than 500°F. The clinker cooler is located in the clinker storage hall, located within the existing Kiln Discharge End Building.

2.1.2.3 Finish Grinding

The cooled clinker is reclaimed from the existing clinker storage hall and transported to an adjacent mill building. Within the mill building, gypsum is added and the blended material is ground into a very fine powder by one or more of four finish horizontal ball mills to produce cement. The cement is pumped by pneumatic pumps to on-site cement storage silos prior to being shipped to locations within New York State and along the Eastern Seaboard.

2.1.3 Finished Product Distribution System

The finished product is transported either from the cement silos to trucks or rail cars, on-site, or by conveyor to barges at a barge loading facility on the Hudson River for final distribution to market. A much smaller amount is sent to an on-site bagging facility, where it is bagged prior to being transported to trucks for final distribution. The bulk or bagged Portland cement or masonry products are transported from the Ravena Plant by truck, rail or barge to locations within New York State and other locations along the Eastern Seaboard. A small percentage of the cement is shipped out from the silos by truck to the local market. A greater percentage of the cement is shipped in rail cars to distribution terminals further away from the plant. However, the largest percentage of cement is transported to the dock at the Hudson River through a conveyor system and loaded on large barges for transportation on the Inter-coastal Waterway to terminals located along the East Coast.

2.2 Description of the Proposed Project

The Proposed Action consists of the modernization of the Ravena Plant through the replacement of the existing "wet" cement-making process with a "dry" cement-making process. Major elements of the proposed project include:

- Installation of a new secondary crusher;
- Installation of a new preblending system;
- Installation of new raw mill storage bins;
- Replacement of the two existing wet kilns, associated kiln drives and clinker coolers with a single dry preheater/precalciner kiln system and related equipment, including:
  - A preheater/precalciner tower;
  - A dry process kiln and associated kiln drives;
  - A new clinker cooler system;
  - A new kiln PM emissions control system;
  - A new raw mill and coal mill;
  - An alkali bypass system; and
  - A new stack.
- Decommissioning and replacement of most of the existing mills, including two raw (horizontal rod) mills, two finish (horizontal ball) mills, and two coal (bowl) mills;
- Installation of a new scrubber and dewatering system;
- Decommissioning of slurry basins;
- Installation of a new SNCR air pollution control system;
- Installation of new clinker storage silos;
- Installation of new finish mill additive storage bins;
- Installation of a new power generation (cogeneration) station;
- Replacement and upgrade of certain conveyor systems;
- Replacement and upgrade of certain air handling equipment; and
- Replacement and upgrade of certain material transfer equipment.

The Proposed Action would occur within an approximately 170-acre Project Site located entirely within the boundaries of the existing 735-acre Ravena Plant. Limestone would continue to be mined from the existing Lafarge owned and operated quarry as with the existing Ravena Plant under the requirements of a NYSDEC Mined Land Reclamation Permit. Although the capacity of the existing Ravena Plant would increase with the Proposed Action, the amount of limestone that would be extracted from the quarry would not increase proportionately to the increase in capacity of the Ravena Plant since the dry cement-making process would allow for use of material from the quarry that is not suitable for use with the current wet cement-making process. The quarry would employ the same mining methods and techniques as those currently employed at the existing Ravena Plant.

3.0 ANALYTICAL FRAMEWORK

The process used to evaluate the potential impacts of the Proposed Action consists of identifying existing conditions within the specified study area, identifying an analysis year when the Proposed Action would be in place, predicting the future conditions that would occur in the study area in the analysis year without the Proposed Action taking into account planned future changes independent from the Proposed Action, projecting the future conditions that would occur in the study area in the analysis year with the Proposed Action, assessing whether the changes in conditions in the study area in the analysis year that would occur with the Proposed Action would result in significant adverse environmental impacts, and, in the event that significant adverse environmental impacts are projected, developing measures to avoid or mitigate such impacts. In addition, a range of alternatives to the Proposed Action are evaluated, including a No Action Alternative against which the impacts of the Proposed Action are evaluated.

3.1 Study Areas

For each technical analysis area examined in this DEIS, a study area was defined for the specific impact category of concern. The study areas are those geographic areas likely to be affected by the Proposed Action, and differ in aerial extent depending on the type of effect being analyzed. Study areas are described throughout this DEIS and range between the area encompassed within a 1/4-mile from the boundary of the Project Site for most technical areas, to 20 miles or greater from the Project Site for the assessment of air quality, visual and environmental justice impacts.

3.2 Analysis Years

Operational Analysis

Phase 1 of the proposed modernization would require approximately 42 months to implement, including the time required for final engineering and design, and the manufacture and procurement of required materials and equipment. Decommissioning of the existing equipment, which is not included in the 42-month period, would occur as needed once the proposed plant modifications are constructed. Given this schedule, the Analysis Year selected for assessing the potential impacts of the Proposed Action was 2015, which would be the first full year of operation of the new facility.

In the future without the Proposed Action, cement manufacturing and maintenance operations at the Ravena Plant would continue as currently permitted. Several improvements to the Ravena Plant would occur without the Proposed Action. These include modifications to expand the landfill capacity and the addition of new equipment necessary to comply with air quality requirements. Potential air quality control technology upgrades would be required as a consequence of a number of existing and proposed regulatory programs, including application of Regional Haze/Best Available Retrofit Technology (BART), the September 9, 2010 revised National Emission Standards for Hazardous Air Pollutants (NESHAPS) for Portland Cement Plants, and NYSDEC NO_X Reasonable Available Control Technology for cement plants.

A federal Clean Air Act Consent Decree between Lafarge, the USEPA, and 13 states was entered by the United States District Court for the Southern District of Illinois on March 18, 2010. Among other things, the Consent Decree specifies new control technology requirements, emission limitations, and monitoring requirements for nitrogen oxide (NO_X) and sulfur dioxide (SO_2) for the two existing kilns at the Ravena Plant or, as an alternative, the replacement of the existing kilns with a state-of-the-art kiln and associated emission control technologies. However, the proposed modernization at the Ravena Plant would satisfy the requirements of the Consent Decree relative to the construction of a state-of-the-art kiln and associated emission control technologies.

It is projected that the current landfill at the Ravena Plant would reach full capacity as early as 2019, with or without the Proposed Action. To address this need, it is anticipated that a permit application, pursuant to 6 NYCRR Part 360, to permit a new on-site landfill unit will be submitted to the NYSDEC as early as 2015. The need for the increase in landfill capacity is independent and unrelated to the proposed modernization.

A Callanan aggregate facility is located on a 65-acre parcel of land leased from Lafarge along Route 9W immediately west of and adjacent to the existing cement manufacturing operation. The current lease is scheduled to expire at the end of 2010. An approximately 30-acre portion of the Project Site is located within the boundaries of this leasehold. Callanan's future operation at the Lafarge property after 2010 would be subject to a re-negotiation of the contract taking several factors into consideration, including new contract business terms and material availability. Use of Lafarge property for Callanan operations would also depend on an evaluation, by Lafarge, of business terms and the availability of material suitable for use as aggregate from the Lafarge-owned quarry after 2010. A final determination of whether to continue the existing business relationship between Lafarge and Callanan will ultimately depend on economic and other considerations by Lafarge and Callanan independent from the needs of the Proposed Action.

Construction Analysis

The duration of active on-site construction activities for Phase 1, exclusive of project commissioning, is expected to require approximately 24 months. The construction of the proposed project would consist of the following stages: earthwork, foundation work, erection of steel, placement of machinery, electrical work, and construction of various support buildings. The majority of the new equipment would be installed at the Ravena Plant during the first phase of construction. During the most intensive construction period, which is anticipated to last approximately 12 months, it is expected that there would be one construction shift between 7:00 AM and 3:30 PM during which approximately 800 construction workers would be on-site. Up to three remote locations, as described in Chapter 19 of this DEIS, would be used for construction employee vehicle parking. A second shift, between 3:30 PM and 12:00 AM and, although less likely, a third shift, between 12:00 AM and 7:00 AM, may also be required during this most intensive period of construction activity. The second and third shifts would consist of a maximum of 20 to 30 employees per shift and would only last a few weeks.

3.3 Alternatives

In conformance with SEQRA requirements, a broad range of reasonable options with the potential to meet the purpose and need and related goals of the Proposed Action were evaluated in the DEIS on the basis of its potential to transform the existing Ravena Plant into a modern and energy efficient facility

that meets all federal and state mandated environmental requirements and that could successfully compete against other domestic and international manufacturers of cement. Reasonable alternatives evaluated in the DEIS include:

- Alternatives to the proposed size and capacity of the proposed facility;
- Alternatives to the proposed schedule for constructing and implementing the proposed project;
- Alternative modifications to the proposed layout of the Project Site or modifications to the orientation of facilities on the Project Site to decrease the visual effects of the proposed project;
- Alternative locations at which the proposed facility could be developed;
- Alternative design and technologies, including potential alternatives to the proposed preheater/precalciner process to improve energy efficiency and decrease air pollutant emissions;
- Alternative treatments to enhance the visual appearance of the facility;
- Alternative pollution controls to reduce air pollutant emissions;
- Alternative fuels and other options to decrease GHG emissions;
- Alternative uses that could be developed at the Project Site; and
- The SEQRA-mandated "No Action" alternative.

3.3.1 Alternative Project Size and Capacity

The proposed capacity of the proposed project of 2.81 million short tons per year is required to meet projected demand for cement over the expected life of the plant (i.e., at least 50 years based on the estimated amount of material available at the existing quarry) and would position the plant to effectively compete against other domestic and foreign competitors.

The proposed capacity of the Proposed Action is required to meet future anticipated demand. A smaller production line would still require a significant capital investment comparable to that of the Proposed Action and higher operating costs than with the Proposed Action. The cost per ton of clinker would be higher and the return on the investment would be smaller for a smaller production line. The new line would result in significant economic and strategic benefits over the existing line that justifies the investment of several hundreds of millions of dollars.

3.3.2 Alternative Schedules for Implementing the Proposed Project

The proposed schedule for implementing the proposed project is based on an analysis of the projected demand for cement in the market currently served by the Ravena Plant; the need to effectively compete against less costly cement manufactured in other locations, including foreign venues, that do not have to meet the stringent environmental controls within New York State; and the need to reduce the rate of GHG emissions and air pollutant emissions associated with the existing facility. The ability to advance the overall schedule for construction of the facility is constrained by the time required to complete the project environmental review process, the time required to select a qualified engineering firm to design the facility, and a 42-month facility design through construction period.

3.3.3 Alternative Site Layout and Orientation

Alternative locations within the plant property were analyzed for the construction of the new processing line, including the existing quarry west of the Ravena Plant and alternate locations within the Ravena Plant boundaries. Other areas within the boundaries of the existing Ravena Plant were determined to be infeasible because of lack of room needed to develop the new facilities, interference with existing rail facilities not in the control of Lafarge, interference with other equipment that would force the existing line to cease operation before the new line is completely commissioned, and the need to tie into existing infrastructure that would be retained after the modernization. None of these options would substantially affect views of the proposed project, including views of the preheater/precalciner tower, the most prominent visible feature at the site.

3.3.4 Alternative Locations

Alternative locations to build a new kiln system to serve the existing Ravena Plant markets were evaluated on the basis of:

- Proximity to known limestone reserves, under the control of the Project Sponsor, of sufficient quality and quantity to meet projected market demand;

- Proximity to the markets served by the existing Ravena Plant;
- Proximity to existing rail, highway and barge facilities needed to transport raw materials, fuel and finished product;
- Proximity to available sources of electric power and water needed for operation of the facility;
- Available land held by the Project Sponsor that is of sufficient size to house the proposed project, including land at existing Lafarge cement manufacturing facility sites; and
- Available land held by the Project Sponsor that was appropriately zoned to allow for the proposed use as a cement manufacturing facility.

The results of this assessment indicated that the only properly zoned sites of sufficient size to house the proposed project that are currently owned by the Project Sponsor and proximate to known limestone reserves of sufficient quality and quantity to meet projected market demands were the current Ravena Plant site and the existing limestone quarry currently serving the Ravena Plant. Constructing the new processing line at the site of the existing limestone quarry would require a significant investment beyond that needed to develop the Proposed Action at the existing Ravena Plant with little or no discernible benefits, since it would require extensive land preparation, development of new site access and product distribution facilities, and development of new sources of electricity and potable and process water to meet facility requirements. The site would also be susceptible to the risk of flooding and would result in a substantial increase in traffic on the local roadways providing access to the site.

3.3.5 Alternative Technologies

There are three principal cement manufacturing processes currently in use in the United States:

- A wet process, a version of which is currently in use at the Ravena Plant. In this process, limestone and other raw materials are fed into a long inclined rotating kiln in the form of a wet slurry where, under very high temperatures, they are transformed into clinker. The clinker is then ground together with gypsum to form Portland cement. This process is detailed in Chapter 2 of this DEIS.
- A long kiln dry process, in which limestone and other raw materials are fed into a long inclined rotating kiln in their dry form where, under very high temperatures, they are transformed into clinker. As with the wet process, the clinker is then ground with gypsum to form Portland cement.
- A preheater/precalciner process, in which limestone and other raw materials are fed into a relatively short inclined rotating kiln and preheater/precalciner where, under very high temperatures, they are transformed into clinker. As with the wet process and the long kiln

dry process, the clinker is then ground with gypsum to form Portland cement. This is the process that is proposed as part of the Proposed Action, and is detailed in Chapter 2 of this DEIS.

Based on a review of alternative production options, including the cement-making facilities in place at the 12 other Lafarge cement plants currently in operation in the United States, the preheater/precalciner process has been demonstrated to be the most energy efficient and cost effective method to produce cement currently available.

3.3.6 Alternative Treatments to Enhance the Visual Appearance of the Facility

As described in Chapter 9, the proposed project would consist of industrial facilities similar in overall character, bulk, form, size, scale, and use to those that currently exist on the Project Site. In addition, many of the existing manufacturing, storage and other facilities would be retained for use and remain in place after completion of the proposed project. As a consequence, the overall visual character of the Ravena Plant would remain as that of an industrial facility.

Although the overall visual character of the Ravena Plant would remain industrial, based on coordination between Lafarge and NYSDEC, a number of alternative aesthetic treatments have been identified to soften the industrial appearance of the proposed project and reduce its potential impacts on nearby visually-sensitive resources. These options focused on potential visual enhancements to the tower/stack structure, the most visually dominant element included in the proposed project, and on options that have the potential to reduce the potential for adverse visual impacts during nighttime. Viable options were limited to treatments that either did not enclose or only partially enclosed the tower/stack structure. Fully enclosing the tower/stack structure was not considered viable given the intense heat emitted from within the structure and the need to provide substantially unobstructed access to the structure for needed maintenance.

Potentially viable alternatives include:

1. A base option, in which the tower/stack structure would incorporate the same minimum level of aesthetic treatment as that of the existing Ravena Plant;

2. A partially enclosed tower/stack option, in which the tower/stack structure would be partially enclosed through the use of cladding;

3. A substantially enclosed tower/stack structure option, in which the tower/stack structure would be substantially enclosed through the use of cladding; and

4. A visually enhanced tower/stack structure option, in which the tower/stack structure is partially enclosed through the use of cladding and a number of types of materials and decorative lighting is provided during nighttime periods.

Each of these options was evaluated on the basis of their respective cost, maintenance requirements, effect on access to the tower/stack structure, effects on nighttime views of the facility, potential to soften the industrial appearance of the proposed project, and its potential to reduce impacts on nearby visually sensitive resources.

As described in Chapter 9 – Visual Resources, each of the options would have their unique benefits and disadvantages based on anticipated costs, maintenance requirements, degree of access, potential to result in elevated temperatures where the work force may be affected, overall visual presence, including being observable during nighttime hours, and the lessening of the industrial visual character of the proposed project. Based on a review of these advantages and disadvantages, the Partially Enclosed Tower/Stack Structure alternative is proposed as the preferred alternative to enhance the appearance of the tower/stack structure, since, of the potentially viable options that would enhance the visual character of the tower/stack structure, it would require the least degree of maintenance, allow for unobstructed access to the tower/stack structure, have the least potential to result in elevated temperatures at locations where the facility work force would be present, and have the most reasonable capital costs of the potentially viable options under consideration.

However, given the potential increased benefit of the Visually Enhanced Tower/Stack Structure Alternative, assessments of both the Partially Enclosed Tower/Stack Structure and the Visually Enhanced Tower Stack Structure Alternatives are provided in Chapter 9 – Visual Resources of this DEIS.

The Base Alternative was not selected since it would not result in substantial visual benefits compared to the other alternatives. The Substantially Enclosed Tower/Stack Structure Alternative, while providing some visual benefits and reducing the amount of Mine Safety and Health Administration (MSHA)-required lighting that would be seen from visually sensitive resources, would be substantially more costly, require a higher level of maintenance, yet have comparable benefits to the selected Alternative, but not the potential greater benefits of the Visually Enhanced Tower/Stack Structure Alternative.

3.3.7 Alternative Air Pollutant Controls

As described in Chapter 20 of this DEIS, the Proposed Action will incorporate air pollutant controls to reduce emissions of PM, SO_2, NO_X, volatile organic compounds (VOCs), mercury (Hg), and carbon monoxide (CO). Implementation of these controls will meet all New York State and federal emissions controls requirements.

3.3.8 Alternative Fuels and Other Alternatives to Decrease GHG Emissions

Coal is the predominant fuel currently used at the existing facility and would continue to be the predominant fuel that would be used with the Proposed Action. Other fuels are permitted for use under existing NYSDEC operating permits, including petroleum coke, fuel oil and TDF. The Ravena Plant does not use any hazardous waste as a fuel nor would it be used with the Proposed Action. Approximately 94% of the energy required to heat the limestone and water slurry is currently derived from coal as a fuel source. An additional 4% is derived from petroleum coke, while the remaining 2% is derived from diesel fuel to start the kiln. A similar distribution of fuels is anticipated to be used in the future with the Proposed Action.

As described in Chapter 21 of this DEIS, a number of alternative fuels, raw materials, process and technology applications have been identified with the potential to decrease GHG emissions from the project. These include:

- Alternative Fuels (Natural Gas and Biomass)
- Reducing Clinker Content of Cement

- Carbon Capture and Sequestration Systems
- Use of Alternate Low Carbonate Raw Materials

A detailed assessment of these options is provided in Chapter 21.

3.3.9 Alternative Uses of the Proposed Site

As described in Chapter 3 of this DEIS, the proposed Project Site is zoned Planned Industrial (I-3P), which permits research/development laboratories, light and heavy manufacture and assembly plants, transportation terminals, and industrial parks on lots measuring 40,000 square feet or more in area, subject to site plan review and approval by the Town of Coeymans Planning Board. As indicated in that chapter, the existing cement manufacturing facility use of the Project Site and the proposed project both conform to the I-3P zoning district. Although the current zoning for the site would allow for a range of manufacturing, laboratory, research, and industrial uses, none of these would meet the purpose and need of the proposed project. In addition, as the largest diversified supplier of construction materials in the United States and Canada, in particular cement and cement-based materials, Lafarge is dedicated to the manufacture and marketing of cost competitive building materials to the North American construction market and has no plans to develop the Project Site for any other use. Consequently, use of the Project Site for other purposes would require the sale or lease of the property to others. Sale or lease of the property for such uses is not currently contemplated by Lafarge.

3.3.10 No Build Alternative

In the future without the Proposed Action, cement manufacturing and maintenance operations at the Ravena Plant would continue as currently permitted. Several improvements to the Ravena Plant would occur without the Proposed Action. These include modifications to expand the landfill capacity and the addition of new equipment necessary to comply with air quality requirements. Potential air quality control technology upgrades would be required as a consequence of a number of ongoing regulatory programs, including application of Regional Haze/BART, the September 9, 2010 revised NESHAPS for Portland Cement Plants, and NYSDEC's NO_x Reasonably Available Control Technology for cement plants.

A federal Clean Air Act Consent Decree between Lafarge, the USEPA, and 13 states was entered by the United States District Court for the Southern District of Illinois on March 18, 2010. Among other things, the Consent Degree specifies new control technology requirements, emission limitations, and monitoring requirements for NO_x and SO_2 for the two existing kilns at the Ravena Plant or, as an alternative, the replacement of the existing kilns, with a state-of-the-art kiln and associated emission control technologies. However, the proposed modernization at the Ravena Plant would satisfy the requirements of the Consent Decree relative to the construction of a state-of-the-art kiln and associated emission control technologies.

It is projected that the current landfill at the Ravena Plant would reach full capacity as early as 2019, with or without the Proposed Action. To address this need, it is anticipated that a permit application, pursuant to 6 NYCRR Part 360, to permit a new on-site landfill unit will be submitted to the NYSDEC as early as 2015. The need for the increase in landfill capacity is independent and unrelated to the proposed modernization.

A Callanan aggregate facility is located on a 65-acre parcel of land leased from Lafarge along Route 9W immediately west of and adjacent to the existing cement manufacturing operation. The current lease is scheduled to expire at the end of 2010. An approximately 30-acre portion of the Project Site is located within the boundaries of this leasehold. Callanan's future operation at the Lafarge property after 2010 would be subject to a re-negotiation of the contract taking several factors into consideration, including new contract business terms and material availability. Use of Lafarge property for Callanan operations would also depend on an evaluation, by Lafarge, of business terms and the availability of material suitable for use as aggregate from the Lafarge-owned quarry after 2010. A final determination of whether to continue the existing business relationship between Lafarge and Callanan will ultimately depend on economic and other considerations by Lafarge and Callanan independent from the needs of the Proposed Action.

4.0 SUMMARY OF ENVIRONMENTAL ANALYSES

A summary of the results of the analysis of potential impacts of the Proposed Action on each of the impact categories evaluated in this DEIS is presented below. Detailed descriptions of the analyses are presented in Chapters 3 through 28 of this DEIS.

4.1 Land Use, Zoning, and Public Policy

The proposed project would be built entirely within the boundaries of the existing Ravena Plant on land owned by Lafarge, and, as a consequence, would not directly displace any existing land use in the Study Area. A portion of the Project Site includes Lafarge owned land currently leased to Callanan as an aggregate manufacturing facility. However, that lease ends in 2010 and would be subject to renewal at the discretion of Lafarge. That renewal is an independent action from the Proposed Action. Consequently the proposed project would not result in a direct displacement of that facility.

Land uses on the Project Site consist of the major components of the existing Ravena Plant related to cement manufacturing operations, including: the centrally located mill building; the clinker storage hall and workshop; and the rotary kilns, stack, slurry tanks, pack house, buffer silos, and the coal and raw material stockpiles. Land uses within the ½-mile radius Study Area comprise a mix of vacant land and industrial, residential, agricultural, and commercial uses. Since the proposed project constitutes a continuation of the same land use that currently exists on the Project Site, it would not result in any increased potential for indirect displacement of these adjacent land uses as a consequence of its implementation.

The Project Site is currently located within the I-3P zoning district, which allows building material plants by special permit. Proposed modifications to the Town of Coeymans Zoning Code independent of the Proposed Action could result in new zoning designations that would allow for commercial uses along Route 9W, extending west to County Route 101. While the Project Site could potentially be rezoned along with all other parcels currently within industrial zoning districts into one consolidated industrial district, it would remain within an industrial zoning district. Any buffering requirements accompanying the consolidated industrial zoning district are unlikely to be applicable to the Project Site since it is not immediately adjacent to residential or commercial uses. The Proposed Action would also be consistent with the relevant recommendations and goals outlined within the *Town of Coeymans Comprehensive Plan*, and goals of the *Draft Coeymans Economic Development Strategy*.

Based on this assessment, the proposed project would not result in any significant impacts related to land use, zoning, or public policy.

4.2 Socioeconomic Conditions

As described under Land Use, Zoning and Public Policy, the proposed project would neither directly or indirectly displace any existing land use since it would not introduce any new land use within the Study Area, accelerate an existing trend in the change in land use in the Study Area, or require land currently occupied by any existing land use in the Study Area.

The construction and operation of the proposed project would result in economic benefits within two Study Areas analyzed for the assessment of socioeconomic impacts (the primary Study Area, defined as within ½-mile radius from the Ravena Plant boundary and a larger secondary Study Area, that consists of the six New York State counties in the vicinity of the Project Site, and in which 167, or 92.7%, of the 180 Ravena Plant employees currently reside.)

As stated in the previous paragraph, the Ravena Plant currently employs 180 workers. No net change in employment is expected with the proposed project. Therefore, no significant changes are anticipated in the demographic and workforce profile that could be attributed to the proposed project, in both the primary and secondary Study Areas. The proposed modernization project would occur entirely within the boundaries of the existing Ravena Plant. The proposed project would not result in the direct or indirect displacement of existing residences or businesses, nor would it alter existing socioeconomic trends in the Study Areas. It is anticipated that, during the peak construction period, 800 construction workers would be active at the Project Site. It is anticipated that these workers would be drawn largely from the local labor force, except in cases where contractors require specialized skills not immediately available locally. The 800 jobs directly created during the construction phase would generate an additional 800 jobs in the regional economy. The temporary increase in regional jobs generated from the proposed project would have a corresponding beneficial effect on household earnings.

Overall, the proposed project would not result in any significant adverse impacts to socioeconomic conditions.

4.3 Environmental Justice

There are no potential environmental justice (PEJ) areas within a 5-mile radius of the Project Site. The analyses performed for all potential impact categories indicate that there would be no significant adverse impacts in any PEJ areas that would result from the proposed project during either the construction or operational phases, including no significant adverse impacts on environmental justice populations regarding Land Use, Zoning and Public Policy; Socioeconomic Conditions; Community Facilities and Services; Open Space; Cultural Resources; Visual Resources; Natural Resources; Hazardous Materials; Surface Water Quality; Surface Water Biology; Groundwater Resources; Coastal Resources; Infrastructure; Energy; Solid Waste; Traffic and Safety; Greenhouse Gas Emissions; and Noise. Therefore, based on these analyses, no disproportionate adverse impacts are predicted to minority or low-income communities, as defined in the environmental justice policy.

4.4 Community Facilities and Services

The proposed project would not result in any direct or indirect displacement of any community facility. The Town of Coeymans Police Department headquarters is located approximately 2½ miles from the Project Site, allowing for rapid response to incidents at the Project Site. Lafarge has initiated steps to minimize effects on local traffic conditions during the construction period, which in turn would limit the need for additional traffic enforcement. Based on coordination with the Town of Coeymans Police Department, operation of the proposed project would not result in any increase in demand on police services. No increase in demand on fire services is currently anticipated, and the Coeymans Fire Department has indicated that access to the site is sufficient for response to alarms from the site. On-site staffing would not increase due to the facility modernization; therefore, no long-term increase in demand on emergency medical service is anticipated. During the construction period, there may be a temporary increase in demand for emergency medical services or traffic enforcement due to the presence of construction workers.

The proposed project would not result in an increase in the number of students attending Ravena-Coeymans-Selkirk (RCS) Central School District schools, the number of users served by the RCS community library, or the number of children using existing day care facilities. There would be no anticipated significant adverse impacts on community facility services with the Proposed Action. However, there would be a temporary effect on traffic conditions during times of construction in

proximity to the RCS Middle and High School, which is located directly west of the Ravena Plant site, across Route 9W. Chapter 19 of this DEIS describes the proposed measures to be used to ensure safe traffic flows during construction.

4.5 Open Space

The proposed project would be built entirely within the boundaries of the existing Ravena Plant and would not result in any direct or indirect use of public parkland, recreation area or open space, nor would the operation of the proposed project affect the continuation and functioning of public open space resources within the ½-mile Study Area. The number of residents and workers would not increase as a result of the proposed project, and, as a consequence, the proposed project would not increase the burden on existing public open spaces.

Construction effects of the proposed project would be temporary and are discussed throughout this DEIS. Potential effects on air quality and noise are discussed in Chapters 20 and 22, respectively, and would not significantly affect public open space. While the use of the property would remain the same and would not have a significant adverse impact on surrounding open space lands within the Study Area, the construction of the proposed tower/stack structure would change views of the site, as detailed in Chapter 9 of this DEIS.

4.6 Cultural Resources

Given the extent of ground disturbance that occurred during construction of the existing plant in the 1960s and plant improvements that have occurred since that time, there is little or no potential for the presence of existing archaeological resources in the Project Site. As a consequence, construction and operation of the Proposed Action would not result in a significant adverse impact on any archaeological resources. New York State's Historic Preservation Office (SHPO) has indicated its concurrence with this conclusion. In addition, the Proposed Action would not require demolition or alteration of any significant historic resources on the Project Site as identified by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) and in the Town of Coeymans Comprehensive Plan. SHPO has reviewed the Proposed Action in accordance with Section 106 of the National Historic

Preservation Act of 1966 and has concluded that the Proposed Action would not affect any cultural resource listed on or eligible for listing on the State or National Registers of Historic Resources, and, as a consequence, the Proposed Action would not have any significant adverse impacts on cultural resources.

4.7 Visual Resources

Views of a number of the components of the existing facility, particularly the 350-foot stack, from sites in the immediate vicinity of the Project Site clearly denote, and visually establish the presence of the Ravena Plant as an industrial facility. The presence of the Callanan aggregate facility that extends along the western perimeter of the Project Site currently restricts views of the existing facility from locations to the west of Route 9W. As indicated in Chapter 3, the continued operation of the Callanan facility will be based on a number of factors separate from the Proposed Action. Termination of the Callanan operation would result in more extensive views of the Ravena Plant from locations to the west. Views of the Project Site from other locations would not be affected regardless of the presence of the Callanan facility. However, with or without the Callanan facility, the overall visual character of the Project Site would continue to be that of an industrial facility.

The majority of structures included in the proposed project would consist of industrial facilities similar in overall character, bulk, form, size, scale, and use to those that currently exist on the Project Site. However, a new preheater/precalciner tower/stack structure would be greater in height than any of the structures that currently exist on the Project Site. As documented in Chapter 9 – Visual Resources of this DEIS, this structure would be visible from a number of publicly accessible vantage points with visual sensitivity, including from a number of historic districts, historic and architectural landmarks, public open spaces, and the Hudson River. Therefore, Chapter 9 includes an assessment of whether the increased visibility of the Ravena Plant that would occur with the proposed project would result in significant adverse effects on visually sensitive resources. Included in that assessment is an evaluation of the visual effects of vapor plume from the new tower/stack structure, and the increased level of lighting that would be required for the new structure to meet MSHA and FAA requirements during nighttime.

The assessment included completion of a comprehensive inventory of all significant historic districts, historic and architectural landmarks, public open spaces and parks, major arterials, and other visually sensitive areas, including the Hudson River, within a 25-mile radius of the Project Site. Field observations were then undertaken to determine whether the Project Site could be viewed from these locations. Based on this assessment it was determined that views of the Ravena Plant would be visible from nine representative vantage points. These include:

- Schodack Landing Historic District
- Fletcher Blaisdell Farm Complex
- First Reformed Church of Bethlehem
- Taconic State Parkway
- Ravena-Coeymans-Selkirk Middle/High School
- New York State Thruway
- Interstate 90, Berkshire Spur
- The Hudson River
- Schodack Island State Park

Digital photographs were taken of views of the existing Ravena Plant from each of these locations. Scaled images of the proposed project were then overlaid on these photographs using digital photographic techniques to depict views of the proposed project from each potentially affected resource. These simulations were then assessed to determine whether views from each site would be substantially different with the proposed project compared to views without the proposed project, and whether these changes would represent a significant adverse visual impact. As described in Chapter 25 – Alternatives, assessments were completed for two design options: a partially enclosed tower/stack option, in which the tower/stack structure would be partially enclosed through the use of cladding, and a visually enhanced tower/stack structure option, in which the tower/stack structure is partially enclosed through the use cladding and a number of types of materials and decorative lighting is provided during nighttime periods. Measures were then identified, as necessary, to mitigate potential adverse impacts of the proposed project.

The evaluation was completed for both daytime and nighttime periods during times of the year when deciduous vegetation was without leaves. Views of the Project Site would be greatest during these periods and would have the greatest potential to result in significant adverse visual impacts.

As documented in Chapter 9 – Visual Resources, these simulations indicate that the Proposed Action would result in a noticeable difference in views of the Ravena Plant from some of the visually sensitive locations assessed in Chapter 9. However, these would not represent significant adverse impacts on visual resources since the proposed project would include industrial facilities similar in overall character, bulk, form, size, scale, and use to those that currently exist on the Project Site, and since, as described below, the proposed project would incorporate the following measures to reduce its effects on visual resources:

- Finishes, materials and colors will be incorporated into the design of the tower/stack structure to diminish the industrial character of the facility.
- To the extent permitted under MSHA requirements, lighting fixtures will be designed to shield and direct lighting toward the ground and away from visually sensitive resources.
- To the extent permitted under MSHA requirements, lighting will be activated by manually-operated switches and motion-detectors to minimize the amount of lighting at the facility during nighttime hours
- Plantings and other visual barriers will be placed along the perimeter of the Project Site to partially shield the facility from nearby locations and to provide additional aesthetic relief from the industrial nature of the facility.
- The existing stack will be removed from the Ravena Plant in accordance with the overall project schedule provided in Chapter 1, reducing the overall visual presence of the facility. It is currently anticipated that the existing stack will be removed during the second phase of the proposed project, approximately four years after completion of the first phase of the project, to minimize overall disruption to facility operations and minimize cost. However, removal of the stack could occur as early as approximately two years after start-up of the first phase of the proposed project and the related facility "shake down" period.

An assessment was also completed of the potential changes in the visibility of the exhaust plume from the tower/stack structure. A predictive model was run to estimate the opacity of the plume from the new kiln stack in the absence of moisture condensation. The results of the modeling indicated that the opacity of the plume at the new kiln stack would be approximately 2.75%, which is visually

indistinguishable from zero (i.e., invisible to the naked eye). This indicates that the plume from the new kiln stack would not be visible except, as discussed below, during times when condensed water vapor is present in the plume.

As with the plume from the existing facility, under certain atmospheric conditions water vapor exhausted from the new kiln stack with the Proposed Action would create a vapor plume visible from substantial distances from the Project Site. However, as detailed in Chapter 9 – Visual Resources, this would occur less frequently with the new facility than with the existing facility.

Calculations were also made to determine the ambient temperatures and relative humidity under which a condensation plume would form with the new process. The results of these calculations indicate that a visible water vapor plume with the new facility would not form at temperatures above 65°F, and that a visible water vapor plume would form under all atmospheric humidity conditions at temperatures below approximately 35°F. Between the temperatures of 35°F and 65°F, the formation of a visible plume would depend on atmospheric humidity, with a visible plume being created at a higher temperature with an increase in atmospheric humidity.

The length of the visible (condensation) plume would vary substantially depending on the temperature and humidity conditions that exist on any given day, the direction and speed of wind, and the "stability" of the atmosphere. In general, higher wind speeds will tend to dissipate a plume more quickly than with low wind speeds. Stability is a measure of the temperature gradient in the atmosphere that causes a plume released from a source to change vertically after it is released. Under "unstable" atmospheric conditions, for example, a plume will tend to rise vertically in the atmosphere, while under more stable conditions the plume will remain relatively parallel to the surface of the earth. The visibility of the plume will also vary depending on the background against which it is viewed. A plume viewed against clear, partly cloudy and cloudy backgrounds will be noticeably different to the viewer. In all cases, views of the plume from the proposed project will not vary substantially from that of the existing facility.

Lighting at the proposed facility would also have the potential to affect nighttime views of the proposed project. As is the case with the existing facility, the proposed project will incorporate lighting necessary to meet MSHA and FAA requirements to protect workers at the plant and to prevent aircraft from

accidentally hitting the facility, particularly the tower/stack structure. As required by FAA for the existing 350-foot stack, it is anticipated that red flashing lights along the face of the tower/stack structure will be used to warn aircraft of its presence. Additional lighting would be required on the proposed tower/stack structure and other elements of the proposed project to meet MSHA requirements.

The final design of the proposed project, including the detailed design of tower/stack structure has not been completed As described in Chapter 25 – Alternatives, a number of alternative treatments have been identified to soften the industrial appearance of the proposed project and reduce its potential to result in adverse visual impacts on nearby visually-sensitive resources. These options focused on potential visual enhancements to the tower/stack structure, the most visually dominant element included in the proposed project, and on options that have the ability to reduce the potential for adverse visual impacts during nighttime. Viable options were limited to treatments that either did not enclose or only partially enclosed the tower/stack structure. Fully enclosing the tower/stack structure was not considered viable given the intense heat emitted from within the structure and the need to provide substantially unobstructed access to the structure for needed maintenance. Of these, a partially enclosed tower/stack option, in which the tower/stack structure would be partially enclosed through the use of cladding, has been identified as the preferred option to enhance the visual character of the proposed project since, of the potentially viable options that would enhance the visual character of the tower/stack structure, it would require the least degree of maintenance, allow for unobstructed access to the tower/stack structure, have the least potential to result in elevated temperatures at locations where the facility work force would be present, and have the most reasonable capital costs of the potentially viable options under consideration.\

4.8 Natural Resources

As detailed in Chapter 10 – Natural Resources of this DEIS, an assessment was completed of the potential effects of construction and operation of the proposed project on natural resources, including potential effects on terrestrial and avian species (including threatened, endangered and species of special concern), surface waters, and wetlands. As documented in that assessment, the proposed project would be located entirely within the boundaries of the existing Ravena Plant, which was extensively disturbed during construction of the existing facility, substantially reducing the available habitat for many

terrestrial and avian species. Operation of the Ravena Plant during the 48 years since it was constructed in 1962, and use of a portion of the Ravena Plant site by Callanan as an aggregate processing and storage facility has further reduced available habitat on the site.

The Proposed Action would principally affect only those portions of the Project Site that are already developed for use in cement manufacturing (i.e., communities characterized as rural structure exterior and roadways). Disturbance of other land would be limited to an approximately 0.9-acre area of successional northern hardwoods located in the central portion of the Project Site. This relatively small area (about 4.7% of existing successional northern hardwood forested area found on the Project Site) would be converted to industrial use associated with the Proposed Action. Much of the area that would be disturbed during the construction of the proposed project had been previously disturbed and is in early successional stages with the exception of a few oak trees with a diameter at breast height (DBH) of 10 to 24 inches located to the west of the proposed location of the preheater/precalciner tower/stack structure.

The reduction in the size of this community would not have a significant effect on the ecology of the Project Site since it represents a small fraction of the 19.2 acres of successional northern hardwood habitat currently found on the Project Site. The natural communities found in the northern hardwood habitat that would be displaced by the Proposed Action are typical of those found in the Project Site as well as in the surrounding Hudson Valley.

No impacts to endangered, threatened or wildlife species of concern are anticipated as a result of the construction of the proposed project, since there is limited potential for the occurrence of these species on the Project Site. The potential for temporary construction period impacts on existing wildlife would be limited to the clearing of the approximately 0.9 acre of successional northern hardwoods for use in the development of the preheater/precalciner tower/stack structure included as part of the Proposed Action. The clearing of existing land would result in the loss of less than one acre of natural habitat for species. The area of forest that would be cleared represents a small fraction of available forest within the Project Site and in the surrounding undeveloped land. Overall, construction activities would be substantially restricted to areas with existing buildings and roadways that are not suitable habitat for most species, and provide only marginal habitat for others. Temporary impacts would not be significant because construction activities would be focused in areas that are already developed and do not support a variety of species.

4.8.1 Potential for Increased Incidence of Bird Strikes

Factors Affecting the Incidence of Bird Strikes. It is well documented that collisions of birds with tall structures is a major cause of bird mortality. Since the Project Site is located near the Hudson River along a known avian migratory flyway, and since the proposed modernization would include the installation of a new preheater/precalciner tower/stack structure, it would have the potential to increase the frequency of bird strikes and bird mortality rates, particularly during migration seasons. Bird strikes also occur as birds move between their roosts and foraging areas, but at a much lower rate than during the spring and autumn bird migration seasons since the density of birds in the air is much greater during the spring and autumn migratory seasons than during the winter and summer periods.

Of the anthropogenic causes of bird mortality, collisions with windows on buildings have been estimated to be responsible for approximately 58% of the reported bird fatalities. Birds are especially attracted to the lower levels of buildings where reflections of vegetation and water appear in the glass windows or walls. Estimates of bird mortality due to building window strikes vary between 97 million and 976 million deaths per year (Klem 1990, USFWS 2002, Hager et al. 2008).

Of anthropogenic sources of bird mortality evaluated by Erickson et al. (2005), the nearest analog to the proposed tower/stack structure appears to be communication towers. Bird mortality due to this source has been estimated at approximately 4.5 million annual deaths. On an individual per tower basis, the estimated mean number of annual collisions per tower range from approximately 82 birds per year at an 825-foot (250-meter) tall television tower in Alabama (Bierly 1968, 1969, 1972; Remy 1974, 1975; Cooley 1977) to 3,199 birds per year at a 1,000-foot (305-meter) tower in Eau Claire, Wisconsin (Kemper 1996). Bird fatalities have been reported at structures ranging in height between approximately 30 feet (9 meters) and approximately 1,988 feet (606 meters).

Avian nighttime collisions with buildings and towers are more common than daytime collisions since the majority of bird species migrate predominantly at night, using the stars to navigate. The majority of neo-tropical migratory birds fly at altitudes between 500 and 6,000 feet during migration, while shorebirds generally migrate at altitudes of between 1,000 and 13,000 feet. However, bird fatalities

have been reported at structures as low as 30 feet high. Towers that are stayed by guy wires are a major source of bird fatalities (OAP 2002) since the guy wires are thin and are substantially invisible to nocturnal migrants.

Brightly lit buildings and broadcast towers can attract birds during nighttime, particularly when poor weather conditions cause birds to fly at lower altitudes. This is especially true on overcast or foggy nights, since fog, rain and snow decrease visibility and can cause birds to become disoriented when they encounter lights. Birds appear to show different degrees of attraction to different types of lighting. Several studies have suggested that birds are more attracted to red lights than white lights, but others report that these studies are inconclusive (Drewitt and Langston 2008), and it has been reported that buildings with fixed, white stationary sources of light, such as lighthouses, may cause increased levels of bird strikes (USFW, Lincoln, Peterson, Zimmerman 1998). The type of lighting source appears to be a significant factor influencing collision risk, in that lower intensity lights are less likely to attract birds than high intensity lighting. Observations indicate that birds are less attracted to strobe lighting than to continual lighting: bird strikes are less likely with the longer the period between flashes. The risk of collision also appears to be correlated with the orientation of the lighting, in that it has been reported that birds are less attracted to lights when the lights are directed downwards (Drewitt and Langston 2008).

Environmental factors, including seasonality and weather conditions, also influence the rate of bird collisions with structures. Typically, mortality levels are highest during migratory seasons when the movement and density of birds at a given location are at their greatest. During poor weather, migrating birds can descend to lower altitudes, making them more likely to encounter structures (Drewitt and Langston 2008).

Bird Strikes at the Existing Ravena Plant. The existing Ravena Plant includes a number of elevated structures that could result in bird strikes, particularly during the spring and autumn bird migration seasons when the density of birds in the air is much greater during the spring and autumn migratory seasons than during the winter and summer periods. The tallest of these structures is the 350-foot tall, 40-foot diameter (at its base) stack, which presents a 2,513-square-foot cross-section to the principal (north/south) bird migration route along the Hudson Valley. No comprehensive statistically valid survey of bird strikes against the stack or other structures has been completed at the Ravena Plant. However, anecdotal evidence indicates that there are not a substantial number of bird strikes at the Ravena Plant, in that few dead or injured birds are found at or near the base of the stack or other structures at the

Ravena Plant regardless of time of year. A visual reconnaissance of the Project Site taken between May 20, 2010 and June 14, 2010 (the spring migration season) failed to reveal any dead or injured birds at the base of the stack or other structures at the Project Site.

Potential for Bird Strikes with the proposed project. The dimensions of the proposed preheater/precalciner structure are approximately 109 feet wide by 155 feet long by 462 feet high. A 23.3-foot diameter stack (at its top) would extend an additional 64 feet above the top of the tower, resulting in a combined height of the tower and stack of 526 feet. The tower would be a free-standing structure without guy wires, reducing the potential for bird strikes. The largest (approximately 72,000 square feet) face of the tower would be oriented roughly perpendicular to the principal direction of the bird migration pathway. The tower would be lit throughout its form during nighttime hours to conform to MSHA requirements. The orientation of the lighting would be downward to illuminate walking paths and stairways along the face of the tower, ameliorating its potential to induce bird strikes. The tower would not include windows or other reflective surfaces, the dominant source of bird strikes. These design features conform to United States Fish & Wildlife *Interim Guidelines for Recommendations on Communication Tower Siting, Construction, Operation, and Decommissioning*, which call for down-shielding of lighting to keep light within the boundaries of the site, construction without the use of guy wires, and the minimum application of workplace and FAA-required aviation safety lighting.

Since the tower/stack structure would be the tallest and bulkiest structure lit at night as part of the Proposed Action, and within known routes of bird migration, it would have the potential to result in an increased number of bird strikes compared to conditions at the existing Ravena Plant. As a consequence, a detailed study was completed of whether the presence of the preheater/precalciner tower/stack structure would result in a significant increase in bird strikes and bird mortality rates during the spring and fall bird migratory seasons. A summary of the study is provided below.

As described above, factors that influence the rate at which birds strike elevated structures include:

- The presence of reflective sources, such as windows;
- Nighttime lighting, including upward facing lighting and fixed white stationary sources of light such as found on lighthouses;

- The presence of supporting guy wires;
- The season of the year, since the maximum number of bird strikes occurs during the spring and autumn bird migration periods;
- The location, dimensions and orientation of the structure relative to migratory flyways, since the number of bird strikes are directly related to proximity to these flyways, the height of the structure and the surface area of the structure, particularly that facing the principal direction of migration; and
- Cloud cover ceiling heights, since birds tend to fly closer to the earth and may become disoriented and attracted to illuminated structures under lower ceiling heights and in the presence of precipitation.

As discussed previously, the preheater/precalciner tower/stack structure would not include any reflective surfaces, would not be supported by guy wires and would incorporate downward facing lights, thereby reducing the potential for bird strikes. However, the contribution of lighted and free-standing towers without guy wires to avian mortality is not well known. (See Erickson et al. 2005, who summarized the results of studies on bird mortality caused by numerous anthropogenic sources).

The Hudson River Valley serves as a migration corridor for large numbers of Neotropical migrants (e.g., thrushes, vireos, tanagers, warblers, cuckoos, flycatchers, etc.) during the spring and fall. It is recognized that migration habits may vary widely between bird species. It is generally recognized that, in the Hudson River Valley, the annual spring migration begins on approximately April 15th and ends by about June 15th; while the annual fall migration begins on approximately September 1st and ends by approximately October 31st.

Most migratory movements occur at night, especially during periods without strong headwinds. During these nights, birds typically fly at high elevations through the Hudson Valley. The results of two nearby radar studies at Jordanville and Moresville, New York (approximately 80 miles from the Project Site) indicate that the mean elevation of birds during the fall migration period at these two sites was 1,443 feet and 1,621 feet, respectively above ground level. Approximately 3% to 6% of the birds monitored during these studies were flying below 410 feet. This is consistent with the results of studies of bird migration in other areas of New York State. Based on studies of the effect of 23 wind powered turbans across the state, the average flight altitude was estimated at approximately 1,253 feet, well above the proposed tower. Approximately 12% occurred below 492 feet, while 8.6% occurred below 410 feet.

At the Jordanville and Moresville, New York sites during the spring migration period, the average flight elevation was 1,217 feet and 1,414 feet, respectively, above ground level. During the spring, 21% of the birds at Jordanville and 8% of the birds at Moresville that were monitored were flying at elevations lower than 410 feet (NYSDEC 2008). On a state-wide basis, similar elevations were observed. Based on 20 wind sites from across the state, the average flight altitude was 1,311 feet, well above the proposed preheater/precalciner tower/stack structure. Based on these same stations, approximately 15% occurred at or below approximately 410 feet.

Local weather conditions can alter the migration altitude and whether or not migration will occurs (Kerlinger 1995, Drewitt and Langston 2008). Migrating birds generally avoid flying through cloud cover, preferring to fly below the cloud ceiling height. Previous studies in the New York region, particularly ABR Inc. 2006, indicate that ceiling height was associated negatively with migration, and that passage rates significantly decrease when ceiling heights are lower than 1,640 feet (500 meters) above ground level.

An analysis of weather data from Albany, New York was conducted to determine the percentage of time that nighttime weather conditions could cause birds to migrate at low elevations. Cloud elevation data from the last five spring and fall migration periods were evaluated to determine the frequency of events when the elevation of the cloud ceilings could potentially cause birds to migrate at low elevations (< 1,500 feet). Nighttime data (between sunset and sunrise) from April 15th through June 15th and from September 15th through October 15th from the last five years were evaluated. The results indicate that during the spring migration period, cloud ceilings were at 1,500 feet or less 11% of the time, and were at or below 500 feet only 3% of the time. During the fall migration period, cloud ceilings were at or below 1,500 feet 16% of the time and at or below 500 feet 7% of the time. These results suggest that during most of the spring and fall migration periods, birds will pass well above the proposed tower height.

Analysis of NEXRAD radar data from the KENX site, located approximately 14 miles from the proposed tower, suggests that the number of birds using the Hudson River corridor during the spring and fall is likely equivalent to those throughout New York State. Two spring dates that were examined (May 21 and 24, 2009) indicated an average density of 21.0 birds per cubic mile (birds/mi^3) and approximately 6.7 birds/mi^3, respectively. Assuming a typical target velocity (≈ wind speed) of 20 knots (23 miles per hour [mi/hr]) during migration (based on hourly wind speeds from six dates during the

2005 migration period), the average number of birds would be 69.5 to 83.2 birds/mi/hr. Based on 20 sites throughout New York State, the mean spring passage rate is 157.7 birds/mi/hr (ranging from 25.5 to 316 birds/mi/hr) (NYSDEC 2008).

Fall migrations rates are also comparable. Based on two dates examined in the study for this DEIS (September 24, 2009 and October 4, 2009), the average densities were 102.2 and 35.7 birds/mi^3, respectively. Assuming a typical speed of bird flight of 20 knots during migration, the average number of birds would be 121.7 to 172.6 birds/mi/hr. Based on 23 sites throughout New York State, the mean fall passage rate is 201.6 birds/mi/hr (ranging from 103.1 to 454.5 birds/mi/hr) (NYSDEC 2008). Both spring and fall passage rates appear to be within range observed statewide.

As a consequence of their nocturnal migrations, avian collisions with buildings and towers are more common during nighttime hours than during daytime hours. Birds typically use the stars to navigate at night, and brightly illuminated buildings and towers can attract and/or disorient them. This is especially true on overcast or foggy nights (Drewitt and Langston 2008). Birds appear to show different degrees of attraction to different types of lighting. Several studies have suggested that birds are more attracted to red lights than white lights, but other studies report that these results are inconclusive (Drewitt and Langston 2008). The type of lighting source appears to be a more influential factor relating to collision risk. Lower intensity lights are less likely to attract birds than high intensity lighting. Birds are also less attracted to strobe lighting than to continual lighting, with the longer the period between flashes, the less likelihood for bird attraction. The risk of collision also appears to be correlated with the orientation of the lighting, in that birds are less attracted to lights that are directed downwards (Drewitt and Langston 2008).

Although it will be lit throughout its form to conform to MSHA requirements, the proposed tower would not include upward-directed nighttime lighting that could disorient migrating birds and increase the potential for bird strikes. The new tower would not include windows or other reflective surfaces, a major factor in the potential for bird strikes. The tower would be relatively short when compared to the elevation of common bird flyways, and, unlike communications towers, would not have guy wires, which is a major contributor to bird strikes. Towers that are stayed by guy wires are reported to cause the greatest numbers of bird fatalities (OAP 2002).

The results of this study indicate that:

- Documented assessments of wind turbines in New York State and other studies indicate that although migrating birds generally fly well above the elevation of the tower/stack structure, as many as 12% of birds fly below 492 feet, an elevation at which they would potentially encounter the proposed tower/stack structure.
- Nighttime weather conditions could exist between 3% and 7% of the time when cloud ceiling heights are less than 500 feet that would cause birds to fly at elevations during the spring and fall migration seasons to potentially encounter the tower/stack structure, and that cloud ceiling heights less than 1,500 feet occur between 11% and 16% of the time.
- Although the flight path of migrating birds varies, there is the potential that migrating birds could pass over the Project Site.
- The density of migrating birds within their migrating pathways can vary widely, and range between approximately 7 birds/mi^3 and 102 birds/ mi^3.

There is no generally accepted method to accurately estimate the number of birds that would potentially strike the tower/stack structure or other structures that are part of the proposed modernization. The broad range in the number and density of migrating birds (between 7 and 102 birds/mi^3) that could potentially pass over the Project Site during the spring and fall migration seasons make it particularly difficult to make a precise estimate of the number of bird strikes. Bird strikes would be most likely to occur against the 155-foot by 462-foot (approximately 72,000-square-foot surface area) tower structure. Bird strikes would be less likely to occur against the relatively small diameter (approximately 23 feet at its top) 64-foot tall stack that would rise from the top of the tower. However, there would be a greater chance of bird strikes with the Proposed Action compared to existing conditions, in which the 350-foot tall, 24-foot diameter (at its top) stack is the principal elevated structure with the potential to cause bird strikes. The existing stack would be removed as part of the Proposed Action, eliminating it as a potential cause of bird strikes.

Overall, the chances of a significant number of bird strikes would be expected to be relatively small given the relatively low observed frequency (12%) of birds flying at elevations at which they would encounter the tower/stack structure and low frequency (3% to 7%) of meteorological conditions (ceiling heights below 500 feet) that would potentially cause birds to fly at elevations at which there would be an increased chance for birds to encounter the tower/stack structure. However, as noted previously, the height and bulk of the tower/stack structure would be greater than the existing stack, thereby increasing

the chance for bird strikes compared to the existing condition at the Ravena Plant. The lack of guy wires, lack of reflective surfaces such as windows, and lack of upward-facing lighting would reduce the likelihood of bird strikes. However, since the densities of migrating birds and their flight paths vary widely, the likelihood of bird strikes cannot be considered as inconsequential.

In addition to the proposed use of low intensity lighting and the shielding and downward facing design of the facility lighting system, the risk of bird strikes could be further reduced through decreasing the height and bulk of the tower/stack structure, through further modification of the MSHA- and FAA-required lighting of the proposed structures during nighttime hours, or by incorporating a range of materials and colors to visibly differentiate between elements of the structure (NYCAS 2007, City of Toronto 2007).

As described in Chapter 25 – Alternatives, the height of the tower/stack structure is dictated by the goal of providing a design that would result in the lowest fuel use and energy costs, thereby reducing the amount of GHG emissions and air pollutants emitted from the proposed facility. Further engineering studies during the final design of the facility may allow for a shorter tower/stack structure. The estimate of potential bird strike, therefore, provides an assessment of the maximum number of potential bird strikes.

In addition to the application of low-intensity, downward orientated lighting, and the development of a lighting protocol that would specify locations within the facility at which lights would only be lit on-demand when access was needed, the potential for nighttime bird strikes could be potentially further reduced by fully enclosing or partially enclosing the tower/stack structure. Fully enclosing the tower/stack structure to either fully or partially eliminate the potential for birds to become disoriented, thereby striking the structure, would be cost-prohibitive given the increased wind load on the structure and other safety and operational considerations, and is not considered to be a reasonable option, given the relatively low probability of bird strikes.

The current design of the structure includes a number of features that will create a range of textures and colors that will reduce the likelihood of bird strikes. These will include the use of a range of concrete, steel, and other materials in the construction of the tower/stack structure and its associated walkways, ladders, piping, and other equipment. Colors and the quality of lighting will also vary throughout the

structure, further increasing the "visual noise" of the tower/stack structure further reducing the potential for bird strikes. These design features conform to United States Fish & Wildlife *Interim Guidelines for Recommendations on Communication Tower Siting, Construction, Operation, and Decommissioning*, which call for down-shielding of lighting to keep light within the boundaries of the site, construction without the use of guy wires, and the minimum application of workplace and FAA-required aviation safety lighting.

4.9 Hazardous Materials

With the Proposed Action, excavation would be undertaken on the Project Site in connection with the development of required foundations that would necessitate dewatering and removal of soil. Soil and groundwater samples would be collected prior to excavation to characterize the area to be cleared and to define the methods to be used to properly handle and dispose of the material in accordance with applicable state and federal requirements. It is anticipated that the excavated material would include petroleum contaminated soil, non-hazardous urban fill, and soil that may potentially exceed the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 guidance for determining clean-up requirements. Water withdrawn from the Project Site during dewatering activities would be analyzed to determine the presence of contaminants and treated as necessary to meet requirements for discharge through a permitted outfall.

All construction activities would be completed in accordance with a site-specific Health and Safety Plan (HASP), which would detail the procedures and methods to be implemented to protect the health and safety of workers and the general public. The HASP would include procedures for the safe handling of site soils and groundwater, including any water from dewatering activities.

4.10 Surface Water Quality

In the future without the proposed project, water quality and flows in all on-site or nearby water bodies would not change significantly from current conditions. The existing discharges would continue and the SPDES permit for the Ravena Plant would continue to be in effect. The current floodplains of Coeymans Creek and the Hudson River in the vicinity of the Project Site would remain essentially unaltered, other than small potential changes due to causes extraneous to the proposed project.

In the future with the proposed project, the new dry manufacturing process would use less water per ton of clinker produced than the existing system, although the total production capacity of the Ravena Plant would increase from approximately 1.72 million tons of clinker per year to approximately 2.81 million tons of clinker per year. The primary water sources for the proposed modernized plant would be quarry pumpout water and site groundwater. Hudson River water would be used as needed to supplement or replace quarry and groundwater supplies when their availability is insufficient or limited by quality or quantity. These three sources combined would provide the proposed modernized plant with an adequately assured water supply and redundancy to assure uninterrupted operation of the facility.

It is estimated that the quarry can supply between 0.5 and 1.0 million gallons per day (MGD) to the plant process system but would be seasonally and precipitation pattern limited. For the groundwater supply wells, current hydrogeological analyses indicate that the aquifer beneath the site can reliably yield up to 1.0 MGD without impacting surrounding groundwater levels or other well water supplies or inflow to surface water bodies.

The Hudson River would be the third source and would provide supplemental flow as well as full redundancy to the combined supplies of the quarry water and the groundwater wells. The Hudson River intake and delivery system would be capable of providing up to 2.0 MGD to the proposed modernized plant.

As discussed below, the modernized plant would no longer have cooling water discharges and therefore, 6 NYCRR §704.5 and Section 316b would no longer be applicable. However, under SEQRA and the Hudson River Estuary Action Plan: 2010-2014 (HREAP), the proposed modernized plant is required to minimize impacts of water withdrawals to the Hudson River fisheries. As indicated above, the Ravena Plant will be required to minimize impacts of the current withdrawal of water under the Department Initiated Modification SPDES permit.

The intake facility and operating modifications that are appropriate to achieve minimization of the impacts of water withdrawal were summarized in a Best Technology Available (BTA) analysis as requested by the NYSDEC. The report addressed at least eight technologies and operational measures designed to minimize cooling water withdrawal impacts. The proposed modifications to the intake

structure, which will be evaluated under the Department Initiated Modification permit, will include the proposed installation of 0.5 millimeter (mm) wedge wire screens on the offshore intake structure, and modifications to the intake pumps and controls to limit the intake capacity to 2.0 MGD.

The impacts would be further minimized by the prioritized use of the primary water supplies from the quarry pumpout and the additional groundwater supply wells. These primary supplies would minimize the frequency and flow volumes drawn from the Hudson River.

This would ensure that the water withdrawal rates from the Hudson River would be limited to only what is needed to supplement the primary sources. Since the Hudson River intake will be modified to meet the NYSDEC's BTA requirements for minimization of impact under the current modified SPDES permit, the Proposed Action, which would use the same intake, would also meet the HREAP requirements for impact minimization. Therefore, minimization of impacts to the Hudson River fisheries would be achieved.

Stormwater runoff is currently conveyed by surface ditches, unnamed Tributary 1 to Coeymans Creek, culverts and subsurface piping to a settling pond located in the southern portion of the site upstream of Outfall 003. As requested by NYSDEC, the operator of the Ravena Plant completed a preliminary Stormwater Pollution Prevention Plan (SWPPP) since the Proposed Action would disturb greater than one acre. The preliminary SWPPP evaluated the impacts to the receiving stream from the proposed project's construction activities and identified permanent control measures for addressing water quality and quantity requirements for the proposed project. The total disturbed area for the Project Site is approximately 170 acres. Under the Proposed Action, the developed area (roads, buildings, and other surfaces) would increase from 27.59 acres to 36.1 acres. As presented in the preliminary SWPPP, the drainage from the disturbed area would be collected by a new on-site stormwater detention pond. The outlet from this new on-site stormwater detention pond would be permitted under the Ravena Plant's SPDES permit and it would discharge to unnamed Tributary 1.

The existing once-through non-contact cooling water (NCCW) operations would be replaced with new closed-looped glycol cooling water systems which would eliminate approximately 0.8 MGD of NCCW currently being discharged to surface waters. The NCCW represents the highest wastewater

temperatures discharged from the cement manufacturing operations. The proposed modernized facility would also include a new 6 megawatt (MW) waste heat recovery cogeneration unit with an associated new cooling tower. To eliminate the thermal discharge to Coeymans Creek associated with the cooling tower blowdown, under the Proposed Action, the blowdown would be recycled as makeup water for the proposed flue gas desulfurization (FGD) wet scrubber system. With the replacement of the present once-through cooling water system to a closed loop system and the internal recycling of the cooling tower blowdown, the proposed modernized plant would have no cooling water thermal discharges and therefore, 6 NYCRR §704.2 (b)(2) and Section 316b would not be applicable to the Proposed Action.

In addition to the removal of cooling waters, the Proposed Action would also incorporate the complete recycle (i.e., "zero discharge") of all process wastewaters. The two wastewater streams created by the Proposed Action would be flue gas wet scrubber blowdown and the waste heat recovery cogeneration unit's demineralization plant wastewater.

Under the Proposed Action, a FGD wet scrubber or an equivalent alternative system for the control of sulfur oxides (SO_X) and mercury flue gas emissions combined with a SNCR technology system to control NO_X would be installed. As gas emissions pass through the FGD, contaminants in the gas stream would be concentrated in the liquid limestone slurry. As the sulfur concentration increases in the liquid stream, a portion of the stream would be purged as blowdown waste. The blowdown waste would be recycled to process cooling units.

The demineralization (DM) plant would support the operations of the new waste heat recovery cogeneration unit. The influent water source to the DM plant include: the quarry water, current and new groundwater supply wells and, when necessary, the Hudson River. Wastewater would be generated from reverse osmosis (RO) reject which generally consists of concentrated salts. Under the Proposed Action, this source would be recycled back into the process supply water system where it again would be recycled internally and would not be discharged to surface waters.

The SPDES permit for the Proposed Action would continue to permit only currently permitted non-process site discharges such as stormwater, excess quarry water, treated sanitary effluent and cement kiln dust (CKD) leachate. All existing process and cooling water discharges would be eliminated under the Proposed Action.

Under the Proposed Action, four current surface discharges would be modified. The truck wash station would be converted to a recycle and/or air vacuum system and would no longer have a discharge to surface water. Two outfalls, 03A (sanitary) and 03B (CKD leachate – note currently proposed in draft Department Initiated Modification permit), would be removed from Outfall 003 and would discharge directly into unnamed Tributary 1 to Coeymans Creek.

Outfall 03A is the existing wastewater treatment plant on-site to process human waste. Sufficient treatment capacity exists at the treatment facility to maintain the existing effluent water quality. Thus, the water quality of unnamed Tributary 1 to Coeymans Creek would not be affected.

Under the Department Initiated Modification permit, the Ravena Plant will monitor and evaluate the existing CKD leachate (03B) and a report will be submitted to the NYSDEC upon completion of this evaluation. The report will summarize all monitoring results and address the future actions required by the Ravena Plant in complying with permit limits. Currently the Ravena Plant is proposing an upgrade to the leachate pump station and a new wastewater treatment system. As agreed with NYSDEC, the details, including required engineering reports and/or compliance schedules will be finalized under the Department Initiated Modification permit. Based on these requirements the Proposed Action assumes that the CKD leachate would be treated to meet applicable discharge requirements under the Department Initiated Modification permit.

Under the Proposed Action Outfall 003 would also be eliminated. With the elimination of process discharges and the individual permitting of the remaining outfalls, the treatment systems that currently regulate these effluents at Outfall 003 are unnecessary and would be taken out of service. Since the only flows continuing in unnamed Tributary 1 to Coeymans Creek would be natural stream flows and overland stormwater runoff, the tributary would flow directly to Coeyman's Creek via the existing culvert connections. Overland stormwater flows to the tributary would be controlled by implementation of stormwater BMPs under the final Department Initiated Modification permit.

Therefore, wastewater discharges from the Ravena Plant under the Proposed Action include excess quarry water, stormwater, treated sanitary effluent and CKD leachate. These discharges are not new discharges but essentially are the same as the current discharges or the discharges as they will exist under the modified permit for the current plant prior to construction of the new facility. Further, these discharges are not related to the new manufacturing facility but rather are associated with the surrounding site.

Therefore, the Proposed Action would not result in significant adverse effects to surface water quality during construction or operation.

4.11 Hudson River Water Withdrawals

An assessment was completed of the potential for impacts of the Proposed Action on surface water biology, including potential effects of entrainment and impingement of aquatic life as a result of the use of Hudson River water in the proposed project

Due to the use of cooling towers and alternative on-site water sources, the Hudson River withdrawals would, on average, be less than those for the existing facility. As a result, entrainment and impingement losses would also be less than those predicted in the preceding section.

With withdrawal rates limited to 2.0 MGD and the installation of 0.5 millimeter (mm) wedge-wire screens, the impacts of the proposed project on aquatic biota due to the withdrawal of Hudson River water would be minimized. The design capacity of the pumps at the existing facility is 8 MGD, therefore limiting the flow to 2 MGD represents a reduction of 75% in potential withdrawal volume with an equivalent reduction in numbers of passive organisms exposed to entrainment. The installation of 0.5 mm screens is predicted to reduce losses by an additional 90%, bringing the total reduction as compared to design capacity to more than 97%. The draft NYSDEC policy on cooling water withdrawals proposes that losses in freshwater would be reduced by 86% to 88% from baseline levels. The Proposed Action, as proposed, would exceed this guideline.

In the future with the proposed project, the Ravena Plant would incorporate the complete recycle (i.e., "zero discharge") of all process wastewaters and cooling waters to be generated by the modernized dry kiln cement-making plant. These wastewaters include the flue gas wet scrubber blowdown, waste heat recovery cooling tower blowdown, and waste heat recovery demineralization plant wastewaters. The SPDES permit for the proposed modernized plant would continue to allow only currently permitted non-process site discharges such as stormwater, excess quarry water, treated sanitary effluent and CKD leachate.

The existing once-through NCCW operations would be replaced with a new closed-looped glycol cooling water system which would eliminate approximately 0.8 MGD of NCCW currently being discharged to surface waters. The NCCW represents the highest source wastewater temperatures discharged from the cement manufacturing operations. The proposed modernized facility would also include a new 6 MW waste heat recovery cogeneration unit with an associated new cooling tower. To eliminate the thermal discharge to Coeymans Creek associated with the cooling tower blowdown, under the Proposed Action, the blowdown would be recycled as makeup water for the proposed flue gas desulfurization wet scrubber system. With the replacement of the present once-through cooling water system to a closed loop system, and the internal recycling of the cooling tower blowdown, the proposed modernized plant would have no cooling water thermal discharges and therefore, 6 NYCRR §704.2 (b)(2) and Section 316b would no longer be applicable to the Proposed Action.

The proposed modernized facility would meet all criteria for minimization of the potential impacts of the withdrawal of Hudson River water. The minimization would be achieved by the combination of: 1) technology improvements to the intake structure which would be accomplished under the requirements of the existing facility SPDES Permit, 2) reductions of water usage by the dry cement process, and 3) minimization of Hudson River water requirements by the use of on-site sources and complete recycling of all process water for reuse.

4.12 Groundwater Resources

In the future with the Proposed Action, the existing once-through NCCW operations would be replaced with a new closed-looped glycol cooling water system and process cooling units, which may consist of evaporative sprays, and would have no impact to groundwater quality. The makeup water to these cooling systems would be supplied from the internal recycling of process wastewater discharge (i.e., FGD wet scrubber blowdown) supplemented by the sources identified below.

A waste heat recovery cogeneration unit, including a preheater boiler, deaerator, steam turbine generator, condenser and associated cooling tower, is proposed as part of Phase 2 of the Proposed Action. The demineralization plant associated with the unit and the cooling tower makeup would also be supplied from the sources listed below. However, as indicated in the hydrogeological report, adequate supply of groundwater is available to support this new process. Demineralization plant

wastewater would be returned to the process water supply thereby reducing demands on groundwater resources. Cooling tower blowdown would be recycled as makeup water to the new FGD wet scrubber as discussed below.

A new FGD wet scrubber would be used for removal of airborne contaminants (SO_X). The makeup water to the system would be supplied primarily from the recycling of cooling tower blowdown, and supplemented by the sources listed below.

The process-related groundwater needs described above would be met from three sources:

- Approximately 0.5 to 1.0 MGD from quarry "pump-out" water, depending on the amount of precipitation that occurs during the year;
- Approximately 1.0 MGD from on-site groundwater wells (i.e., from two existing wells that are currently used for the cooling of water before it is discharged into the on-site surface water body and new wells); and
- Up to a maximum of 2.0 MGD from the Hudson River.

Hudson River water would only be used to supplement or replace quarry and groundwater supplies when the availability of each is insufficient to meet needs. Together, these three sources would be sufficient to meet the total need for process water, estimated to be approximately 1.6 MGD.

The Ravena Plant currently uses a total of approximately 5,000 gallons per day (gpd) of potable water supplied by the Village of Ravena municipal water supply system. The Village of Ravena supply source is the Alcove Reservoir which stores surface water runoff from the watershed of the Helderberg Mountains west of the Project Site (Village of Ravena, 2006). No changes in the demand or source of potable water would occur with the Proposed Action.

The proposed project would potentially increase the net discharge to Coeymans Creek through unnamed Tributary 1 to Coeymans Creek through stormwater runoff. However, the potential impacts of this would be minimal since the hydraulic connection between the stream and underlying deposits and bedrock is poor. The stream flow in Coeymans Creek cuts across the lacustrine silt and clay deposits that were part of glacial Lake Albany. Below the quarternary alluvium of Coeymans Creek is a significant thickness of these silts and clays, effectively forming a barrier preventing significant transmission of water between the stream and deeper water bearing units. Secondly, the potential

recharge input from Coeymans Creek to deeper units is insignificant relative to the important recharge zone and elevation differential (driving groundwater flow regionally toward the Hudson Valley) represented by the highlands of the Helderberg Escarpment west of the glacial Lake Albany plain on which the site is located.

No significant adverse impacts to groundwater resources are anticipated to occur as a result of the Proposed Action.

4.13 Coastal Resources

The Coastal Zone Management Act (CZMA) of 1972 was enacted by Congress to balance the competing demands of growth and development with the need to protect sensitive natural and manmade resources within the coastal zone of the United States. In response to the CZMA, New York State adopted a Coastal Zone Management Program administered by the NYSDOS. As part of this Program, New York State adopted a number of Coastal Policies used to guide the State's efforts to create and maintain clean, accessible and prosperous coastal areas and inland waterways for present and future generations.

New York Coastal Policies are grouped in the following categories: Development, Fish and Wildlife, Flooding and Erosion, General Safeguards, Public Access, Recreation, Historic and Scenic Resources, Agricultural Lands, Energy and Ice Management, Air and Water Resources, and Wetlands. Two the State Policies (Policies Numbers 24 and 7) have been given greater specificity of areas of statewide significance. In the Hudson Valley, five areas along the Hudson River have been designated as Scenic Areas of Statewide Significance, one of which (the Columbia/Greene North Scenic Area of Statewide Significance) is located immediately east of the Project Site. In addition, 250 important coastal habitats have been designated as Significant Coastal Fish and Wildlife Habitats, two of which (the Coeymans Creek and Hannacroix Creek Coastal Fish and Wildlife Habitats) are in the vicinity of the Project Site.

Although the Project Site is not within the designated coastal zone, a federal Coastal Zone Consistency Assessment Form was completed for the proposed project to determine where the proposed project would conflict with any Coastal Policy. Based on this assessment, the NYSDOS confirmed that the

proposed project would not be within the designated Coastal Zone and that concerns related to coastal zone policy consistency were limited to the potential effect of the proposed project on significant visually sensitive resources, including from points within the Columbia/Greene North Scenic Area of Statewide Significance and other areas within the established Coastal Zone along the Hudson River. As described in Chapter 9 - Visual Resources of this DEIS, a detailed assessment was completed to determine whether the proposed project would result in a significant adverse impact on visually sensitive resources. As documented in Chapter 9, the results of this assessment indicate that the proposed project would not result in any significant adverse impact on views from visually sensitive resources within the designated Coastal Zone, including views from the Hudson River. The principal ship channel, which is located along the west shore of the River, limits the visibility of the proposed project from most of the marine traffic passing by the Project Site.

4.14 Infrastructure

With the Proposed Action, a dry cement production process would replace the existing wet process. This process would not increase industrial water use. The anticipated water demand of the modernized Ravena Plant under the Proposed Action is estimated to be up to 2.0 MGD. The 5,000-gpd water demand for potable water would continue to be supplied at the same rate as currently exists by the Ravena Water District, as the number of employees for the proposed project would remain the same as at the current facility.

The quarry and site groundwater would be used, to the extent possible, as the first priority sources. Hudson River water would be used as needed to supplement or replace quarry and groundwater supplies when their availability is insufficient or limited by quality or quantity. These three sources combined would provide the proposed modernized plant with an adequately assured water supply and redundancy to ensure uninterrupted operation of the facility.

The Hudson River intake and delivery system would be capable of providing up to 2.0 MGD to the proposed modernized plant. The Ravena Plant will be required to minimize impacts of the current withdrawal of water under the final Department Initiated Modification of the existing SPDES permit. The intake facility and operating modifications that are appropriate to achieve minimization impacts of water withdrawal are summarized in a BTA analysis as requested by the NYSDEC. The Cooling Water

Intake Structure report addresses at least eight technologies and operational measures designed to minimize cooling water withdrawal impacts. This report is an attachment to this DEIS. The proposed modifications to the intake structure, which will be evaluated under the Department Initiated Modification permit, will include the proposed installation of 0.5 mm wedge wire screens on the offshore intake structure, modifications to the intake pumps, and controls to limit the intake pumps to 2.0 MGD.

The impacts would be further minimized by the availability of the primary water supplies from the quarry pumpout and the additional groundwater supply wells. These alternate supplies would minimize the frequency and flow volumes drawn from the Hudson River.

This would ensure that the water withdrawal rates from the Hudson River would be limited to only what is needed to supplement the primary sources. Since the Hudson River intake will be modified to meet the NYSDEC's BTA requirements under the current Department Initiated Modification permit, the Proposed Action would also meet the HREAP impact minimization requirements. Therefore, minimization of impacts to the Hudson River fisheries would be achieved.

A number of construction- and operation-related measures would be incorporated into the methods used to construct the proposed project and to avoid and minimize operation-related effects on surface water quality. These measures are described, as requested by NYSDEC, in the preliminary SWPPP, which is discussed in Section 4.10, above.

In the future with the proposed project, the Ravena Plant would incorporate the complete recycle (i.e., "zero discharge") of all process wastewaters and cooling waters to be generated by the modernized dry kiln cement-making plant. These wastewaters include the flue gas wet scrubber blowdown; waste heat regeneration cooling tower blowdown; and waste heat regenration demineralization plant wastewaters. The SPDES permit for the proposed modernized plant would continue to permit only currently permitted non-process site discharges, such as stormwater, excess quarry water, treated sanitary effluent and CKD leachate.

In the future with the Proposed Action, the existing water supply, wastewater treatment and stormwater management systems are expected to support the Proposed Action without incurring significant adverse impacts.

4.15 Energy

The proposed modernization would be more energy efficient compared to the existing Ravena Plant. As a result of the replacement of the wet cement-making process with the more energy efficient dry process, it is estimated that the Proposed Action would operate at an improved energy consumption efficiency of 2.74 million British thermal units (Btu) of fuel per short ton of clinker with the proposed project compared to the current rate of 4.62 million Btu of fuel per short ton of clinker with the existing facility. The total amount of energy from fuel required would be reduced by 3% from existing levels. In terms of electricity use, the consumption per short ton of clinker is also expected to be reduced as a result of the Proposed Action. However, the total electricity use is expected to increase to approximately 262,400 megawatt hours (MWH), which would be a 21% increase compared to existing electrical demand at the Ravena Plant. National Grid, which is the source of electricity for the Ravena Plant, has the installed capacity to meet the overall increase in electricity use under the Proposed Action.

The improvements that are proposed to modernize the Ravena Plant would not conflict with or temporarily disrupt the energy transmission infrastructure that traverses or is adjacent to the Project Site.

Therefore, the Proposed Action would not result in any significant adverse impacts related to energy use.

4.16 Solid Waste

The Proposed Action would not result in any change to the waste management practices as the existing facility. The volume of CKD requiring disposal in the on-site landfill would dramatically decrease. With the installation of an "alkali bypass," CKD requiring disposal would decrease from 143,500 tons to less than 86,000 tons per year. Depending on the final mix design of the raw materials for the new kiln system, the alkali bypass may not be required and any wasted CKD dust would be prioritized for off-site recycling and use via an approved Beneficial Use Determination. Should that be the case, disposal of any CKD to the landfill would be minimal. The volume of kiln refractory that would be disposed of each year in the on-site landfill is expected to decrease by about 50% as a result of the Proposed Action. Approximately 1,250 tons of kiln refractory would be disposed of each year in the on-site landfill. The Proposed Action would not result in increased volumes of office waste, worn mechanical equipment parts, and used motor oil, hydraulic fluids and gear oils.

Therefore, the Proposed Action would not have any significant adverse impacts on solid waste management.

4.17 Traffic and Safety

The Proposed Action would not result in any long-term impacts on traffic levels of the transportation systems serving the Ravena Plant or to related safety conditions within the Study Area. The improvements would not change the markets served by the Ravena Plant or the modes of transport used to distribute product to those markets. As a consequence, there would no significant change in proportionate amounts of product transported by truck, rail or barge to market. Fuel delivery to the Ravena Plant would continue to be principally by rail, but at a reduced rate as a consequence of the improvement in energy efficiency that would result from the Proposed Action. The slight increase in trucks delivering raw material and transporting final product would result in a small increase in delay at one intersection in the vicinity of the Project Site, and the operation at all of the key intersections studied within the Study Area would continue to operate at acceptable levels of service (LOS).

During the active 24-month construction period, there would be a short-term change in traffic operations in the immediate vicinity of the Project Site, due to the presence of construction worker vehicles, heavy equipment delivery trucks, and shuttle buses travelling between the interceptor parking facilities and the Project Site during construction peak periods. These construction-related vehicles would result in a temporary increase in traffic within the Study Area. Therefore, the Proposed Action would not have any significant adverse impacts on traffic and safety.

Although the results of the traffic impact assessment indicate that no significant adverse traffic or safety impacts would occur during construction of the facility, a number of measures would be implemented to further reduce the potential for adverse traffic and safety effects during construction of the proposed project. These measures would be documented in a project-specific maintenance and protection of traffic (MPT) plan. The MPT plan would include driving instructions for project deliveries, a parking strategy for construction workers and a communications plan for the school district and Town of Coeymans.

Lafarge would provide driving instructions to vendors delivering equipment and materials to the Project Site. The instructions will include a map of the required route of truck travel to the site. Truck deliveries would be limited to the extent practical to non-peak hours. Truck delivery instructions would be incorporated into the contract of vendors delivering materials to the site.

As discussed in Chapter 19, in an effort to minimize potential construction impacts, Lafarge has initiated the development of a construction worker carpool program and has identified a list of suitable remote locations for off-site parking. Up to three of these sites would be used for remote off-site parking locations during construction. These potential remote sites may include, but are not limited, to the following locations:

- CSX-Selkirk, Speeder Road Automotive Distribution Facility, Selkirk, New York (> 1,000 parking spaces);
- Marshall's Garage, 2369 Route 9W, (~ 200 parking spaces);
- Bethlehem Industrial Park, 3 miles north of Lafarge on Route 9W (~ 200 parking spaces);
- South Albany Airport, South Bethlehem, New York (50 to 100 parking spaces);
- Church of Saint Patrick, 21 Mail Street, Ravena, New York (8 acres of property);
- F&M Farms, 450 County Route 101 (South Road), Coeymans, New York; and
- Port of Coeymans (across from Plant), south of Wharf Road, Ravena, New York.

The construction workers would use a shuttle service to and from the Project Site. The off-site locations would be suitable to access major roadways, such as Interstate 87 (I-87), and would be in appropriately zoned areas. Many of the off-site locations would provide parking for approximately 150 to 200 construction workers.

Lafarge will communicate anticipated traffic with the RCS Central School District and Village of Ravena and Town of Coeymans governments and will work with these organizations to minimize impacts of traffic. Lafarge will prepare a weekly traffic report during the peak construction period and will provide the report to: RCS Central School District, Town of Coeymans, Town of Coeymans Police Department and the Village of Ravena. The traffic report will contain an estimate of the traffic volume anticipated during the upcoming week and any special circumstances that may require additional traffic control measures. The MPT plan would include provisions for the stationing of traffic control and enforcement agents, if determined to be necessary by the Town of Coeymans Police Department.

The MPT plan, which to be developed in close coordination with the Town of Coeymans and the RCS Central School District, would also detail the measures to be used to keep the public informed concerning the status of the construction activities and the measures to be applied to safeguard the public during the construction period. Specific measures will be included in the weekly traffic report These measures will include public information for posting on the RCS Central School District web site, the Town of Coeymans web site and for distribution at Town of Coeymans Board meetings.

4.18 Air Quality

The proposed project would, under established federal and New York State rules, be considered a "major" source of air pollution requiring permits for its construction and operation. Consequently, the proposed project will require review and approval under a number of New York State and federal air quality regulations and guidelines, including review under federal PSD, 40 CFR 52.21, New York State PSD and Non-Attainment New Source Review (PSD/NNSR, 6 NYCRR Part 231), NESHAPS, 40 CFR Part 63 requirements, *NYSDEC Guidelines for Control of Toxic Ambient Air Contaminants* (TAACs, 6 NYCRR Part 212), and SEQRA. The methodologies and air quality modeling procedures and protocols used to assess the air quality effects of the proposed project were developed through coordination between Lafarge, NYSDEC and USEPA and included assessment of the major new stationary air pollutant emissions sources from the proposed facility, including emissions from the kiln system and a new finish mill. A separate air permit application was prepared by Lafarge and submitted to USEPA and NYSDEC for review. Air Quality assessments included in this DEIS are based on information developed as part of the air permitting process. These assessments included evaluation of both long-term (operation-related) effects and short-term (construction-related) effects of the Proposed Action. An assessment of best available control technology (BACT) to reduce GHG emissions under the Clean Air Act has been completed for the proposed project (see Appendix L "Greenhouse Gas Best Available Control Technology Analysis for Ravena Plant Modernization Project").

The impact assessment focused on the potential effect of stationary sources that would be included as part of the proposed project. Since operation of the proposed project would generate motor vehicle traffic, including motor vehicles used by employees traveling to and from the Project Site, trucks delivering materials to the Project Site and trucks hauling finished material from the Project Site, the assessment also included a qualitative assessment of the air quality impacts of these mobile sources.

In addition to the estimation of the maximum impacts of the proposed project on ambient levels of air quality, the analysis also included estimation of the potential impact of the proposed project on ambient levels of air quality at NYSDEC-identified PEJ areas and at the Pieter B. Coeymans Elementary School, the Ravena-Coeymans-Selkirk High School and the A. W. Becker Elementary School.

In conformance with Federal and New York State requirements, the proposed project includes a number of air pollution control measures that will assure compliance with USEPA and NYSDEC emissions limitations for Portland cement manufacturing facilities. The assessment of potential air quality effects was based on the incorporation of these measures into the design of the proposed project. These proposed controls are described below.

- **Particulate Matter (PM) Controls.** The proposed project would incorporate PM emission controls that would meet a proposed PM emission limit for the kiln and clinker cooler of 0.01 pound per ton (lb/ton) of clinker (each) as measured by a PM continuous emissions monitoring system (CEMS). This limit would be met by incorporating either a fabric filter(s) (FF) or electrostatic precipitator(s) (ESP) or a hybrid combination of both systems. The decision whether to use FF or ESP technology would be based on both technical and economic considerations consistent with regulatory requirements. A final decision on which option would be implemented has not been determined at this stage.

  The revised NESHAP limits were based on membrane filter technology; Lafarge may use this technology to these limits if the FF option is chosen. FFs would additionally be used to control PM emissions from other process sources (raw material, clinker and cement handling and transfer; finish mills, etc.).

- **Sulfur Dioxide Controls.** Per the September 9, 2010, USEPA final changes to the New Source Performance Standards (NSPS) for Portland Cement Plants, the proposed project would incorporate SO_2 emission controls that would meet an emission limit for the kiln system of 0.4 lb of SO_2/ton of clinker, 30-day rolling average, as measured by a continuous emission rate monitoring system (CERMS). This would result in an emission reduction of 11,261 tons per year (tons/yr) relative to the current baseline emissions. This emission limit would be met using a wet scrubber to control combustion gases from the system (kiln and raw mill, coal mill and alkali bypass).

The clinker cooler exhaust would not go through the scrubber, because it does not contain SO_2 or any combustion gases, and PM would have already been removed by the more efficient new PM control device. Adding the cooler exhaust to the scrubber would impose significant cost, energy, and water usage penalties with no additional pollutant removal benefit. The current design mixes the clinker cooler exhaust gases with the exhaust from the wet scrubber, raising the gas temperature and lowering the moisture content of the combined stack exhaust, which results in positive benefits of reducing the visible moisture plume and improving stack dispersion characteristics.

The proposed spray scrubber design would be similar to those installed on cement plants in the United States and Europe. Kiln gases would be cooled and saturated with moisture using quench sprays prior to entering the scrubber body. SO_2 is absorbed in spray water droplets forming sulfurous acid (H_2SO_3) which reacts with a basic reagent (i.e., calcium hydroxide [$Ca(OH)_2$], calcium carbonate [$CaCO_3$], or CKD) forming calcium sulfite ($CaSO_3$), which is oxidized to gypsum ($CaSO_4$) by forced air oxidation.

The scrubber slurry would be recirculated increasing the concentration of gypsum in the solution forming a super-saturated solution of $CaSO_4 \cdot 1½$ water (H_2O) that precipitates to gypsum crystals. A portion of the solution would be removed and gypsum would be separated by centrifuge, thickener, and/or filter press. The supernate would be returned to the scrubber sump.

The dissolved solids in the recirculated slurry increase during operation due to the presence of alkali salts in the flue gas stream (i.e., potassium chloride [KCl], sodium chloride [NaCl], sodium sulfate [Na_2SO_4], potassium sulfate [K_2SO_4], etc.) and a blow down is maintained to remove the salts. Blow down would be discharged to in-process water uses that are currently using clean water. These may include finish mill spray cooling, CKD pugmill, and/or dust suppression systems.

The final cleaned gases from the scrubber would be combined with hotter waste gases from the clinker cooler, producing a final gas stream that is hotter and less saturated with moisture.

SO_2 removal of the system is limited by the low SO_2 inlet concentration and the need to operate at a solution pH which would not remove a significant amount of CO_2 from the gas stream. Removal of CO_2 forms $CaCO_3$ which scales the piping, demister, and nozzles of the scrubber. Reagent feed rates would be variable depending on the inlet SO_2 concentration. The actual feed rate would be controlled via the SO_2 CEMS to meet the requested emission limit.

- **Nitrogen Oxides Controls.** Per the September 9, 2010, USEPA final changes to the NSPS for Portland Cement Plants, the proposed project would incorporate NO_X emission controls that would meet a proposed emission rate from the kiln system of 1.5 lb/ton of clinker, 30-day rolling average. This would result in an emission reduction of 3,115 tons/yr relative to the current baseline emissions. NO_X emissions from the preheater would be reduced using a low-NO_x kiln burner and a low-NO_X calciner that destroys kiln NO_X. SNCR would also be applied to control NO_X emissions for the new kiln system.

  For a well operating modern kiln, the range of uncontrolled NO_X emissions are as follows:

Position	Expected NO_X	Contribution to Total NO_X
Kiln Gas Outlet	900 – 1500 parts per million (ppm)	10%
Preheater Outlet	450 – 600 ppm	100%

  Therefore, the total uncontrolled NO_X with 10% kiln gas by-pass would range between 540 ppm and 750 ppm. The SNCR system would be designed with 1:1 molar ratio of NO_X and ammonia for estimated uncontrolled emissions.

  It is proposed to use 19% ammonia solution for SNCR. The designed maximum flow rates for 19% ammonia would be 7 gallons per minute (gpm). The actual rate would be controlled by the NO_X CEMS.

  Ammonia solution would be injected into the calciner upper section where the temperature is 900 degrees Celsius (ºC) to 1050ºC and favorable conditions exist for NO_X reduction.

Provisions would be made to install the ammonia injection nozzles for optimum NO_X destruction.

Lafarge has installed a similar SNCR NO_X control system on its Roberta Plant, located in Calera, Alabama. That system has been in operation for 2 years, and also uses 19% ammonia, with the injection nozzles strategically located at the top of the preheater tower. Emissions are monitored and recorded by a NO_X CEMS. Based upon that experience, Lafarge is confident that it would meet the new NSPS NO_X emission limit.

- **Volatile Organic Compound Controls.** The proposed project would incorporate VOC emissions controls that would meet a proposed VOC emission limit of 254.4 tons of VOC/yr, rolling 12-month average using a CERM. Based on expulsion testing on anticipated kiln feed mixes, Lafarge has confirmed that this emission limit could be met through application of the proposed emissions controls.

  The proposed project must also comply with the revised THC limits for the new kiln under the applicable NESHAP (i.e., 24 parts per million volume [ppmv]). The VOC and THC limits are independently derived and are not directly related. USEPA has included an option in the final rule to limit emissions based on a selected group of organic HAPs (in this case the 24 ppmv THC limit would not apply). Compliance with the THC limit would not reduce VOC emissions below the requested limit.

  A range of different control options including incorporating Regenerative Thermal Oxidizer (RTO) into the design of the proposed project have been reviewed to meet the THC emissions limits promulgated for new kiln systems. Only two plants in the U.S. have employed RTO's (only one of which is currently operating) and both have experienced significant operational problems, including heat exchanger fouling, poor heat recovery, high fuel costs, and significant maintenance problems. Based on current technologies available and process review, the prescribed emission limits would be met through process operating controls.

- **Mercury Controls.** Per the September 9, 2010, USEPA revised Portland cement NESHAP, the proposed project would incorporate Hg emission controls that would meet an Hg emission limit from the kiln system of 21 pounds per million tons of clinker produced, which would limit the annual mercury emissions from the new kiln at the Ravena Plant to approximately 59 pounds per year.

  The proposed control system for the new preheater/precalciner kiln system is a wet scrubber. Based on the comprehensive Hg mass balance testing program conducted at the Ravena Plant in 2008, the input Hg from raw materials and fuels would be approximately 250 lbs/yr at the proposed clinker rate of 2.81 million tons/yr. The removal efficiency of the scrubber would be dependent on the oxidation rate of elemental Hg (Hg°) to oxidized species (Hg^{+1} and Hg^{+2}). The oxidation rate of Hg with the new raw mix and process is expected to be in the range of 30% to 70%. Normally, the scrubber removal rate is in the same range, but depending on the level of Hg oxidation, the Hg removal rate from the scrubber could also vary significantly.

  As an option for complying with the revised NESHAP, the industry is considering using an activated carbon injection system with baghouse control to remove Hg emissions from the gas stream. Use/reuse of the carbon and operation of such a system would be optimized to meet final regulatory emission limits once they are known.

  A number of other new Hg emission control system technologies are under development. They range from being able to remove Hg from coal before it is fired to collecting Hg on specially treated baghouse filter materials to adding additives to ensure oxidation of the Hg so that scrubber collection and control is enhanced. The proposed project would incorporate BTA to ensure compliance with the revised NESHAPS regulation for Portland cement plants.

The results of these analyses indicate that the Proposed Action would conform to all regulatory requirements and would not result in any significant adverse impact on air quality.

4.19 Greenhouse Gas Emissions

The modernized Ravena Plant has been designed to reduce the rate of GHG emissions per short ton of "clinker" (an intermediate product in the cement manufacturing process consisting of various fused compounds of calcium, silicon, aluminum and iron). The cement manufacturing process is GHG-intensive. It is estimated that the proposed project would achieve a kiln emissions rate of 0.92 short tons of CO_2-e per short ton of clinker, compared to the cement industry average of 0.98 short tons of CO_2-e per short ton of clinker in 2006 per the U.S. Environmental Protection Agency (EPA). An assessment of BACT to reduce GHG emissions under the Clean Air Act has been completed for the proposed project (see Appendix L "Greenhouse Gas Best Available Control Technology Analysis for Ravena Plant Modernization Project").

GHGs are widely considered to be a major factor affecting climate cycles worldwide. Common GHGs in the Earth's atmosphere include water vapor, CO_2, methane (CH_4), nitrous oxide (N_2O), ozone, and chlorofluorocarbons. Since CO_2 is the single largest anthropogenic source of GHGs, emissions of other GHGs are presented as CO_2 equivalent (CO_2-e) emissions.

Cement is manufactured through a chemical process during which limestone, a sedimentary rock composed largely of calcite (calcium carbonate or $CaCO_3$) is converted to "clinker" (an intermediate product consisting of various fused compounds of calcium, silicon, aluminum and iron) by heating the limestone to extremely high temperatures (approximately 2600°F). CO_2 is a byproduct of the cement-making process. Heating limestone to the temperature needed to produce cement requires the burning of fuel, most commonly, as in the case of the Ravena Plant, coal and petroleum coke. CO_2 is also one of the byproducts from the burning of coal and petroleum coke. In addition, as with the existing Ravena Plant, the proposed project would also emit much smaller quantities of other GHGs.

An assessment is included in Chapter 21 – Greenhouse Gas Emissions of the effect of the Proposed Action on GHGs. The assessment was conducted in conformance with NYSDEC policy guidance on the methods to be used in EISs in which the NYSDEC is lead agency (*Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements* – July 14, 2009).

In conformance with this guidance, the chapter provides assessments of:

- "Direct" GHG emissions, including emissions from on-site combustion sources and industrial processes, and from fleet vehicles owned (or leased) and operated by Lafarge and associated with the proposed project. This assessment focuses on CO_2 emissions since the quantities of non-CO_2 GHG emissions from cement kilns are insignificant compared to the evaluation of CO_2 emitted during cement manufacturing.[1]
- "Indirect" GHG emissions, including emissions generated by off-site sources supplying electricity used during the operation of the proposed project, and emissions from freight deliveries and employer commuting trips to or from the Project Site.
- GHG emissions from waste generation and disposal.
- GHG emissions generated during construction of the proposed project: Consistent with the NYSDEC policy, provided is a qualitative discussion of construction period GHG emissions, including a discussion of GHG emissions resulting from the manufacture and transport of the construction materials.
- GHG emissions associated with materials extraction related to the proposed project: Since GHG emissions as a consequence of materials extraction represent a small fraction of total project emissions, a qualitative discussion of these emissions is included in this chapter.
- Emissions of methane (CH_4) and N_2O from cement kilns: Emissions of CH_4 and N_2O will not represent a significant fraction of total project emissions since the high combustion temperatures in the kilns convert the overwhelming proportion of CH_4 and N_2O to fully oxidized compounds. (CH_4 emissions are typically about 0.01% of kiln CO_2 emissions on a CO_2–e basis.) Consequently, CH_4 and N_2O emissions will not be evaluated in this assessment.[2]

Since the proposed project would not result in the release of any hydrofluorocarbons (HFCs), PFCs or sulfur hexafluoride (SF_6), an assessment of the contribution of these sources by the proposed project was not included in the assessment. As required in the NYSDEC policy, the assessment also reviewed alternatives that could potentially be applied to reduce GHG emissions from the proposed project, including:

- Use of Alternative Fuels (Natural Gas and Biomass)
- Reducing Clinker Content of Cement
- Implementing Carbon Capture and Sequestration Systems
- Use of Alternate Low Carbonate Raw Materials

[1] CO_2 Accounting and Reporting Standard for the Cement Industry; World Business Council for Sustainable Development, July 2005.

[2] Ibid.

A description of these measures and an assessment of their potential application to the proposed project is also provided in Chapter 21 – Greenhouse Gas Emissions.

In the future without the Proposed Action, the demand for cement would increase between now and 2015 (the Analysis Year). However, the production of clinker at the Ravena Plant would remain at its existing level of 1.72 million short tons per year. While demand for cement has decreased during the last year as a consequence of the current economic downturn, it is anticipated that demand of cement would rebound to the point that, by 2015, the demand for cement would exceed the capacity of the Ravena Plant. As has historically been the case, this excess demand would be met through importing cement from locations in Latin America and the Middle East, where production costs are substantially lower than production costs in the United States. It is expected that the cost of imported cement in the future would remain competitive with domestic production because of relatively low manufacturing costs in locations outside of the United States, the less stringent environmental regulations in other countries, and relatively low shipping costs. As a consequence, in the future without the Proposed Action, it is assumed that the approximately 1.3 million tons/year of incremental demand beyond the current capacity of the Ravena Plant would be met by imports.[3]

Based on the assumption that incremental demand beyond the existing capacity of the Ravena Plant would be met by imports from the Middle East and Latin America, an estimate was completed of the incremental GHG emissions that would occur due to the increase in the length of travel of shipments to markets on the Eastern Seaboard of the United States from the Middle East and Latin America compared to the length of travel from the Ravena Plant to those same markets. In completing this analysis, it was assumed that the GHG emissions from all other components of cement production in the Middle East or Latin America, including the delivery of limestone and fuel to the facilities, the actual production of cement, off-site electricity generation, and disposal of waste products, would be the same as that of the modernized plant.

The results of this assessment are summarized in the accompanying table.

In summary, the proposed project would emit:

[3] CO_2 Accounting and Reporting Standard for the Cement Industry; World Business Council for Sustainable Development, July 2005..

- Approximately 2,579,000 short tons of CO_2-e per year from the rotary kiln process, which is a decrease from 1.04 short tons of CO_2-e per short ton of clinker to 0.96[4] short tons of CO_2-e per short ton of clinker;
- Approximately 62,450 short tons of CO_2-e per year as a result of the demand for electricity from National Grid - this represents a 20 % decrease of CO_2-e per short ton of clinker; and
- Approximately 66,620 short tons of CO_2-e per year from mobile sources. While this is less than the approximately 104,900 short tons or more of CO_2-e emitted per year predicted in the future without the Proposed Action, it is greater than the approximately 46,000 short tons per year of CO_2-e emitted under existing conditions since the Proposed Action would produce more cement and therefore require more trucks, barges, and railcars to transport greater amounts of raw and finished materials to and from the plant.

As under existing conditions, material would continue to be extracted and transported from the on-site quarry to the Ravena Plant generating additional GHGs. Waste generation would not increase with the proposed project relative to existing conditions. No existing forested areas would be affected, and, as a consequence, existing tree stands would continue to sequester and act as a sink for CO_2. Construction activities would result in a short-term increased in GHG emissions from the consumption of fossil fuel and electricity needed for construction equipment and deliveries.

Overall, approximately 2.7 million short tons of CO_2-e would be emitted annually with the proposed project to manufacture approximately 2.81 million short tons of clinker. This would be less than the approximately 3.1 million short tons of CO_2-e emissions that would be emitted in the future without the Proposed Action, but greater than the 1.9 million short tons of CO_2-e emissions under existing conditions. Total CO_2-e emissions per short ton of clinker manufactured would decrease from approximately 1.1 short tons under existing conditions to 0.96 short tons in future without the Proposed Action.

[4] Including all direct and indirect emission sources

Summary of GHG Emissions

GHG Emission Sources	Existing Conditions (short tons CO_2-e/year)	Future without the Proposed Action* (short tons CO_2-e/year)	Future without the Proposed Action – Ravena Plant Shutdown** (short tons CO_2-e/year)	Future with the Proposed Action (short tons CO_2-e/year)
Process Emissions:				
Ravena Plant	**1,799,000**	**1,799,000**	**0**	**2,579,200**
Other Location(s)	**N/A**	**1,167,000**	**2,579,200**	**N/A**
Off-Site Electricity	**48,070**	**51,500**$^{+}$	**62,450**	**62,450**
Waste Generation	**0**	**N/A**	**N/A**	**0**
Transportation:	**46,030**	**125,480 to 221,020**$^{++}$	**210,920 to 445,020**$^{++}$	**66,620**
Fleet Vehicles	33,340	33,340^{+}	N/A	42,300
Non-Fleet Vehicles				
Trains	3,030	3,030^{+}	N/A	7,320
Other non-fleet vehicles	9,660	9,630^{+}	N/A	17,000
Cement from other Source				
Shipping from Latin America	N/A	58,860	144,300	N/A
Shipping from Middle East	N/A	154,400	378,400	N/A
Total^{+++}	**1,893,100**	**3,154,000 to 3,249,000**$^{++}$	**2,853,000 to 3,087,000**$^{+}$	**2,708,000**
Total short tons of CO_2-e/ short ton of clinker (Ravena Plant only)	**1.10**	**1.10**	**N/A**	**0.96**

* *Future without the Proposed Action if cement production capacity at the Ravena Plant would be capped at existing levels and the incremental demand would be met by imports.*

** *Future without the Proposed Action if the Ravena Plant were to shut down and imports would exclusively provide for demand for cement for the market served by the Ravena Plant. For comparison purposes, overall GHG emissions from off-site electricity generation and from fleet and non-fleet vehicles associated with cement production at other locations are assumed to be similar to those related to the modernized Ravena Plant.*

$^{+}$ *GHG emissions related to the Ravena Plant only.*

$^{++}$ *GHG emissions from off-site electricity generation and from fleet and non-fleet vehicles associated with cement production at other locations are assumed to be similar to those related to the modernized Ravena Plant for comparison purposes and are reflected in the "Transportation" and "Total" rows. Transportation-related emissions presented here include GHG emissions related to the Ravena Plant (46,000 CO_2-e—see Table 21-8) plus shipping-related GHG emissions, and GHG emissions from fleet and non-fleet vehicles associated with cement production at other locations.*

$^{+++}$ *All numbers are rounded.*

4.20 Noise

The proposed project is a complex industrial facility with numerous noise sources that could potentially result in increased noise levels at nearby noise-sensitive land uses. In addition, construction of the proposed project could potentially result in short-term increases in noise levels in the vicinity of the proposed project. As a consequence, a detailed quantitative assessment was completed to determine whether construction and/or operation of the proposed project would result in significant adverse impacts on noise levels.

The results of this assessment indicated that operation of the Proposed Action would not result in a significant adverse noise impact based on NYSDEC noise guidance and standards, but that there would be occasions when noise from construction and/or operation of the Proposed Action would be perceptible at nearby noise-sensitive land uses.

While there would be occasions when the noise from the construction and/or operation of the Proposed Action would be perceptible at nearby noise-sensitive land uses, including residential uses in the vicinity of the proposed project and at the RCS Middle/High School along Route 9W, the operational phase noise sources of the Proposed Action would comply with the NYSDEC Program Policy and the NYSDEC Part 360 Noise Standards.

The use of construction equipment associated with the Proposed Action would generate noise. The increase in noise levels from on-site and off-site construction activities at the nearest noise-sensitive receptors identified within 1/4-mile Study Area would range between 0 and 5 dBA. A change in noise levels of 3 dBA or greater would be perceptible to the human ear. The increase in noise levels due to construction would be temporary in nature. The following measures would be applied to lessen or ameliorate construction noise levels, to the extent practicable: replace back-up beepers on machinery with strobe lights; modify machinery to reduce noise by using plastic liners, flexible noise control covers, and dampening plates and pads on large sheet metal surfaces; schedule work with high noise levels (including equipment and material deliveries) weekdays during daytime hours; use quieter electrical powered equipment; situate noisier equipment at locations that are removed and shielded from sensitive receptor locations; limit the idling of equipment and trucks; and require contractors and subcontractors to properly maintain equipment and have quality mufflers installed.

4.21 Public Health

The potential for an industrial facility to affect public health relates to the level of exposure of on-site workers and area residents to byproducts of the industrial processes associated with a facility. Exposure levels for workers in the facility are strictly regulated by occupational standards established by the MSHA, while the facility itself may affect environmental health by exposure to industrial chemicals that are transported by water or air. The DEIS analyses addressing these air and water media indicate that:

- The concentration of TAACs, including Hg, would be well below New York State guidelines and standards.
- The emission increases of all PSD-regulated pollutants (except CO), including $PM_{2.5}$, would be below de minimis thresholds under the PSD provisions of the Clean Air Act. Air quality modeling for CO shows that the modernized plant would have an insignificant impact on CO concentrations.
- The proposed modernization would meet all permit requirements pursuant to federal and State PSD and Non-Attainment Area New Source Review.
- The quality of water discharges from the Ravena Plant would not change. The proposed modernization would meet all permit requirements pursuant to the Clean Water Act including USEPA Categorical Effluent Standards and NYSDEC Division of Water SPDES permit requirements, including Hg limitations.

Based on these analyses, the Proposed Action would not result in significant adverse impacts on public health.

4.22 Unavoidable Adverse Impacts

Unavoidable adverse impacts are defined as those that meet either of the following two criteria:

- There are no reasonably practicable mitigation measures to eliminate the impact; or
- There are no reasonable alternatives to the proposed project that would meet the purpose and need of the action, eliminate the impact, and not cause other or similar significant adverse impacts.

The analyses predict that impacts identified during construction are temporary and could be minimized or mitigated. Measures to address these temporary impacts are described in Chapters 12 (Surface Water Quality), 19 (Traffic & Safety) and 22 (Noise). With the exception of impacts on visual resources and natural resources, no permanent unavoidable impacts have been identified due to the operation of the proposed project.

Regarding unavoidable impacts of the proposed project on visual resources, the proposed 526-foot tower/stack structure would permanently affect views of the Ravena Plant from the surrounding area, especially at night, including from visually sensitive resources in the vicinity of the Project Site. These effects are unavoidable since the tower/stack structure, at its projected height, is integral to the dry-kiln cement-making process and is required to be lighted to meet MSHA and FAA safety requirements. However, to the maximum practicable extent during the design phase, measures would be incorporated into the design of the proposed project to reduce the visual impact of the plant. These include:

- Finishes, materials and colors would be incorporated into the design of the tower/stack structure to diminish the industrial character of the facility.
- To the extent permitted under MSHA requirements, lighting fixtures would be designed to shield and direct lighting toward the ground and away from visually sensitive resources.
- To the extent permitted under MSHA requirements, lighting would be activated by manually-operated switches and motion-detectors to minimize the amount of lighting at the facility during nighttime hours.
- Plantings and other visual barriers would be placed around the perimeter of the Project Site to partially shield the facility from nearby locations and to provide additional aesthetic relief from the industrial nature of the facility.

The existing stack would be removed from the Ravena Plant in accordance with the overall project schedule provided in Chapter 1, reducing the overall visual presence of the facility. It is currently anticipated that the existing stack would be removed during the second phase of the proposed project, approximately four years after completion of the first phase of the project, in coordination with demolition of two kilns and on-site ESP to allow for construction of a new clinker silo and finish mill. Demolition of the kiln and ESP would provide improved access to the stack which is located in close proximity to a 115 kilovolt (KV) substation providing power

to the Ravena Plant. This would allow for a greater level of safety during demolition of the stack. Should Phase 2 be delayed from its current 2018 - 2019 projected construction, NYSDEC would be notified and the stack would be removed no later than the first quarter of 2018.

Regarding unavoidable impacts of the proposed project on natural resources, the 526-foot tower/stack structure would potentially result in an increase in the number of bird strikes as compared to existing conditions since the tower/stack structure is taller and has a greater cross section than the existing stack at the Ravena Plant. However, the potential for an increase in the number of bird strikes is not anticipated to be significant since:

- The orientation of the lighting would be downward to illuminate walking paths and stairways along the face of the tower, reducing its potential to induce bird strikes, and
- The tower/stack structure would not include windows or other reflective surfaces, a dominant cause of disorientation that results in an increased incidence in strikes against structures by bird.

In addition, a lighting protocol would be developed that would specify locations within the facility at which lights would only be lit on-demand when access was needed, further reducing the potential for nighttime bird strikes. Potential for bird strikes would be further reduced by partially enclosing the tower/stack structure. Fully enclosing the tower/stack structure is not feasible given the need to provide direct access to the tower/stack structure and the need to dissipate the high heats generated within the tower/stack structure.

The current design of the structure also includes a number of features that would create a range of textures and colors that would reduce the likelihood of bird strikes. These would include the use of a range of concrete, steel, and other materials in the construction of the tower and its associated walkways, ladders, piping, and other equipment. Colors and the quality of lighting would also vary throughout the structure, further increasing the "visual noise" of the tower/stack structure and reducing the potential for bird strikes.

4.23 Cumulative Impacts

An assessment was completed of whether the proposed project in combination with other projects that would be in place by the 2015 analysis year would have the potential to result in

significant adverse environmental impacts. Future actions that potentially may have an overlapping influence within the proposed project's study area were integrated into the conditions depicted in the No Action scenario used as the baseline for the analysis. In addition to the adjustments to include specific projects, elements of the baseline were modified to take into consideration regional changes for which trends can be demonstrated. The traffic network, for example, was adjusted to include a one percent per year growth in traffic volumes to taken into account the overall growth in the region. Other technical areas that use the traffic data were consequently adjusted to increase baseline levels. Based on this analysis, the Proposed Action would not result in cumulative impacts.

4.24 Public Outreach

Lafarge has established a public information program to allow for public participation, availability of project documents and to solicit feedback from the community. The public information program consists of public meetings, quarterly newsletters, project updates to stakeholders, on-line availability of project documents and a project email address.

Public outreach for the proposed modernization project began in June 2008 when Lafarge representatives met with community leaders to brief them on the proposed project prior to its public announcement on July 9, 2008. In August and September 2008, Lafarge presented overviews and briefings of the proposed project at several meetings, including two meetings in the Stuyvesant and Coeymans Town Halls, and through mailings and notices to surrounding communities and Ravena customers and vendors.

The Draft Scope of Work for the Ravena Plant Modernization Project Environmental Impact Statement was issued on October 7, 2008, followed by a NYSDEC public scoping meeting on October 29, 2008. Comments on the Draft Scope of Work were received during the public meeting by NYSDEC as Lead Agency. Written comments on the Draft Scope of Work were received until November 10, 2008. Subsequent to the comment period, four (4) meetings were held in November 2008, three with local and state government officials and one with the Community Liaison Panel. A Final Scope of Work was issued on January 29, 2009 with consideration given to comments received during the outreach and scoping process.

Lafarge also holds regular meetings with local and/or state government officials to provide updates and has consulted with groups such as Friends of the Hudson, Scenic Hudson, New York Public Interest Research Group (NYPIRG), Audubon Society of New York State, the Beacon Institute, Earthjustice, the Sierra Club, SCRAP and Environmental Advocates of New York. Lafarge has mailed newsletters (Around the Block) containing descriptions of progress related to the modernization project to neighboring communities since August 2008. In February 2009, the proposed project was also discussed at the Renssellaer County Town Hall Meeting.

Public documents related to the proposed project are available on line from two websites: http://lafargeravenafacts.com/ and http://bethlehemchamber.com/.

Questions or feedback on the proposed project may be sent to Lafarge via email at lafargeravenafacts@lafarge-na.com.

Hard copies of the project documents are available at thirteen document repositories (7 town halls and 6 libraries) throughout the region. The Notice of Completion of the DEIS, Notice of Public Hearing on the DEIS and this DEIS is also available at these repositories. The Notice of Completion of the Final Environmental Impact Statement (FEIS) will be placed in these repositories when issued.