Supplemental Alternatives Analyses for the Proposed Holcim (US) Inc. Lee Island Project

Submitted to:
U.S. Army Corps of Engineers – St. Louis District

On behalf of:
Holcim (US) Inc.

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List of Abbreviations and Acronyms

MDNR	Missouri Department of Natural Resources
MMT	million tons
NO_x	nitrogen oxides
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
VOC	volatile organic compound

1.0 Introduction

On August 8, 2000, Holcim (US) Inc. (Holcim)[1] submitted a Section 404/401 and Section 10 Permit Application to the U.S. Army Corps of Engineers (USACE) for Holcim's proposed Lee Island project. With the 404/401/10 Permit Application, Holcim submitted a Companion Report (ESE, 2000a). The Companion Report discussed the project site selection process and facility design alternatives. This report incorporates and supplements the various alternatives analyses that were presented in the Companion Report.

On November 6, 2000, the USACE issued a joint USACE-Missouri Department of Natural Resources (MDNR) public notice for the Lee Island project. On January 24, 2001, a public workshop was held. The public notice comment period was extended until February 5, 2001. Comments regarding the project were submitted to the USACE by federal and state agencies and the public. A number of commenters requested further information about certain alternatives, including (1) analysis of "off-site" alternatives – i.e., alternative locations for the project site, and (2) analysis of alternatives relating to the quarry.

As a result of the comments and an inter-agency coordination meeting on February 15, 2001, the USACE requested the following additional information from Holcim: (1) analysis of off-site areas that were considered as alternative project locations, including Holcim's Clarksville, Missouri plant, (2) expanded analysis of underground mining alternatives, (3) analysis of whether Wolf Hollow can be avoided, and (4) analysis of alternatives for disposal of overburden and dredged material (fill material). This report addresses these issues in the following sections:

- Project site alternatives (Section 2.0)
- Quarry plan alternatives (Section 3.0)
- Fill disposal area alternatives (section 4.0)

[1] Holnam Inc. changed its name to Holcim (US) Inc. on December 12, 2001.

2.0 Project Site Alternatives

2.1 Overall Project Purpose

The overall purpose of the Lee Island project is to construct a 4 million ton[2] (MMT) per year portland cement plant facility, including a limestone quarry, harbor and barge fleeting area, at a central location on the Mississippi River. As requested by various agency and public comments, this section analyzes alternative site locations for the Lee Island project.

2.2 Summary of Basic Project Purposes and Needs

Alternative project site locations must be evaluated in light of basic project purposes and needs. The basic purposes and needs for the Lee Island project are to:

- Develop additional low-cost portland cement production capacity to maintain and expand Holcim's market share in the River market (the area served by the Mississippi River system, as further defined in Section 2.3.1 below);
- Ensure consistent supply to customers in the River market by displacing Holcim's current reliance on imported cement;
- Enable transportation by water to Holcim's distribution terminals in the River market – which requires access to a major navigable river;
- Achieve a central strategic location, below any locks and dams on the Mississippi or Ohio Rivers;
- Provide adequate access for truck and rail transportation – where water transportation is not possible or practical;
- Obtain limestone – in sufficient quantity and quality – from an on-site quarry; and
- Acquire a contiguous tract of land large enough to accommodate a cement plant, quarry, harbor, barge fleeting area, and significant buffer.

Each of these requirements will be discussed in greater detail in the next section.

2.3 Discussion of Basic Project Purposes and Needs

As background for the following discussion, it is necessary to understand the nature of the cement industry. Portland cement is a relatively low-cost, heavy, bulk commodity, marketed aggressively in a very competitive industry. Competition within the industry results from both domestic production and imported cement.

[2] All tonnage references are in metric units.

In addition, cement plants are major facilities requiring significant capital investment. For example, construction of the proposed Lee Island project will cost approximately $600 million, take 3 years, and require approximately 3 million work-hours. Many years of production and sales are required to recoup the investment in a new cement plant. Because of the significant investment required and the competition within the industry, economic feasibility is a crucial factor in the selection of plant size and location.

In particular, two of the most important factors in determining the economic viability of a project are: (1) unit cost of production – i.e., the ability to produce low-cost cement, and (2) the cost of transportation – i.e., the cost associated with delivering cement to the customers.

2.3.1 Develop Additional Low-Cost Production Capacity for River Market

The River market consists of those parts of the United States accessible by navigation on the Mississippi River system. The Mississippi River system includes seven major rivers (most notably the Mississippi River, the Ohio River, the Missouri River, and the Illinois River), and six smaller tributaries, all interconnected. The Mississippi River system extends through the United States' mid-section, including most of the Midwestern states and a large section of the South. A number of major cities are served by the Mississippi River system, including Chicago, St. Louis, Minneapolis, Cincinnati, Memphis, and New Orleans. Low-cost river transport binds the many individual large- and small-city markets on the Mississippi River system into a single, inter-linked River market. Within the River market, cement and other bulk products are principally transported by barge, which is a far less expensive and an environmentally cleaner means of transport than either rail or truck.

Utilizing the Mississippi River system, Holcim has for many years supplied portland cement to the River market via distribution terminals in such major cities as Chicago, St. Louis, Minneapolis, Cincinnati, Memphis, and New Orleans (Figure 2-1, Holcim Illustrative Distribution Pattern). From these terminals, Holcim supplies cement to customers in Alabama, Arkansas, Iowa, Illinois, Indiana, Kentucky, Louisiana, Minnesota, Missouri, Mississippi, Ohio, Tennessee, and Wisconsin.

Annual U.S. demand (consumption) for portland cement has steadily increased during the 1990s (Figure 2-2, data from the U.S. Geological Survey (USGS) and the Portland Cement Association). For example, in 1990, total consumption of portland cement in the United States was 77.8 MMT. By 2000, total consumption of portland cement had increased to 105.1 MMT. The River market, which accounts for approximately 27 percent of total US cement consumption, has likewise expanded. Total portland cement consumption in the River market increased from 24 MMT in 1990 to 28 MMT in 2000.

The U.S. portland cement market, including the River market, is expected to continue to grow. The Portland Cement Association is projecting that after a downturn in 2002, total U.S. portland cement consumption will increase from 105.1 MMT in 2000 to over 110 MMT by the year 2005 (Figure 2-2).

The Portland Cement Association projects future demand for portland cement based on trends in the construction industry, including the residential, commercial, and public works sectors. These elements of the construction industry experienced sustained growth through the 1990s. Various factors, such as increased usage of concrete in road construction, and greater concrete penetration in other types of construction, are expected to sustain the strength of the cement industry. This projection is supported by the historical upward national trend in per capita consumption of portland cement, which has increased from approximately .275 tons in 1953 to approximately .38 tons in 2001.

In 2000, Holcim supplied 5.2 MMT of portland cement to the River market. This is approximately 18.5 percent of the total River market. To maintain and potentially expand Holcim's River market share in the face of aggressive competition within the cement industry, Holcim needs additional low-cost cement production capacity. A central purpose of the Lee Island project is to meet this need.

The cement plant must be of sufficient size to serve the River market now and in the years ahead – considering anticipated future growth. In addition, to justify the significant investment, the plant must be sufficiently large to create economies of scale that will reduce investment and production costs. Holcim has determined that a cement plant capable of producing 4 MMT per year of low-cost cement is necessary to fulfill these requirements. The 4 MMT per year production capacity requirement is based on current and projected future demand in the River market, and production cost considerations.

2.3.2 Ensure Consistent Supply by Displacing Imported Cement

Historically, the U.S. demand for portland cement has been met primarily by domestic production, but in recent years there has been increasing reliance on imported portland cement. For example, in 1990, domestic production[3] of portland cement was 71.5 MMT per year, and total imports of portland cement were 10.3 MMT, or 13 percent of total production. By 2000, domestic production of portland cement had increased to 88.8 MMT, and total imports of portland cement had increased to 21.2 MMT, or 20.2 percent of total production (see Figure 2-2).[4]

In 1990, less than 1 MMT of portland cement was imported to fulfill overall demand in the River market. The total amount of portland cement imported into the River market has increased during the 1990s, peaking at 5.8 MMT in 1999. In 1999, Holcim imported 2.9 MMT of portland cement per year into the Mississippi River system, or approximately 50 percent of the total.

Historically, Holcim's reliance on imported portland cement from overseas locations has disrupted reliable and consistent supply to customers in the River market and negatively impacted the company

[3] The production figures are greater than the consumption figures presented in Section 2.3.1 – the difference is accounted for by cement placed in storage.

[4] These figures do not include masonry cement.

economically. Due to the lack of portland cement production capacity on the Mississippi River system, Holcim has been, and would continue to be, forced to rely on imported portland cement to meet customer needs and maintain market share in the River market. For several reasons, continued reliance on imported portland cement creates significant business risk.

First, reliance on overseas imported portland cement means Holcim is less able to respond to increased demand. Customers expect timely delivery, but with overseas imports there is typically a 90- to 120-day delay between customer order and delivery. In contrast, deliveries from the proposed Lee Island plant could be made in 5 to 15 days. Delivery from overseas is also subject to an increased potential for interruption due to weather and other events.

Second, reliance on imported portland cement from overseas jeopardizes Holcim's ability to provide customers a consistent product. Customers demand uniform product characteristics, which are typically assured by consistently filling a customer's order from the same plant. With imports, Holcim must continually negotiate for product with overseas suppliers, and availability can change depending on overseas market conditions. Changes in geographic sources of portland cement can therefore result in changes in the characteristics of cement provided to River market customers. This constitutes unacceptable product variability.

Third, the profitability of overseas imported portland cement is variable and susceptible to disruption. At times, Holcim has had to market imported portland cement at a near-zero profit margin in order to provide customers with an uninterrupted supply and maintain market share. Importation of cement is also subject to the risk of trade and tariff policies that could significantly increase costs. In addition, the cost to import cement, as well as delivery times, can be affected by availability of shipping capacity, which varies depending on overseas supply and demand.

In summary, reliance on imported portland cement greatly increases the business risk of not being able to supply customers in a timely manner with a consistent quality product. A basic purpose and need of the Lee Island project is to ensure a consistent and low-cost supply of cement to River market customers by displacing the current reliance on imported cement. This can only be achieved by constructing new capacity to produce low-cost cement in the River market.

2.3.3 Enable Water Transportation – Major River Access

The economic viability of any new cement plant serving the River market is dependent on access to a major navigable river. Access means the plant must be located adjacent to a major navigable river where a harbor and fleeting area can be constructed for barge transportation.

Access to a major navigable river is necessary to enable low-cost out-bound shipment of finished product, and provide the capability to receive in-bound secondary raw materials and fuel (coal) by water. The cost effectiveness and overall energy efficiency derived from water-borne transportation of raw materials and product is well established in the industry [U.S. Department of Transportation (USDOT), Environmental Advantages of Barge Transportation, 1994]. Without river access for water transportation, the Lee Island project is not economically viable.

For the Lee Island project, Holcim is expecting to ship approximately 80 percent of its finished product by barge. The remainder would be shipped by rail and truck. In addition, Holcim would receive most of its secondary raw materials and its coal by barge.

Although Holcim has cement plants at other locations in the United States, only two (Clarksville, Missouri and Theodore, Alabama) are located on navigable waterways. The Holcim plants that are not located on navigable waterways are designed to serve relatively nearby markets, with truck and rail as the method of transportation to the customer. For example, the Midlothian plant near Dallas, Texas primarily serves the Dallas–Ft. Worth market by truck, and supplies product by rail to relatively nearby markets such as Lubbock and Houston, Texas.

In the River market, barge shipment is by far the most cost-efficient means of transportation (Figure 2-3). For example, a standard barge used to transport portland cement on the Mississippi River system can carry an amount of cement equivalent to fifteen (15) rail cars or fifty-two (52) 25-ton trucks. Further, a single barge tow, typically consisting of fifteen (15) barges, can carry the equivalent of 225 rail cars or 780 trucks. Based on Holcim's logistics experience, rail transportation can cost three to four times as much as barge transportation, depending on distance and season, and truck transportation 10 to 12 times more than barging.

Comparing these modes of transportation on a fuel economy basis also highlights the environmental benefits of barge transportation (USDOT, Environmental Advantages of Barge Transportation, 1994). For example, if all of the proposed Lee Island plant's annual production were shipped 500 miles, it would require 40.5 million gallons of diesel fuel by truck or almost 12 million gallons by rail, compared to only 4.7 million gallons by barge. This equates to 15,240 tons per year of air pollutants hydrocarbons, carbon monoxide, and nitrogen oxides (NO_x) generated by truck transportation, compared to over 3,500 tons per year from rail, and only 982 tons per year from barge shipment (see Figure 2-3). These estimates do not consider the spin-off impacts of additional congestion caused by increased highway traffic.

From a safety perspective, barge transport is also preferable. According to the USDOT, the accident rate for large trucks was one accident per 16 million ton-miles. Rail transport's accident rate was one per

257 million ton-miles, while the accident rate for barges was only one per 600 million ton-miles (USDOT, Environmental Advantages of Barge Transportation, 1994; see Figure 2-3).

Based on all these factors, barge transport has many clear advantages over the other two primary modes of transportation. Without the ability to ship by water, the proposed Lee Island plant would not be competitive in the River market. Water transportation requires that the plant have immediate access (be located adjacent) to the Mississippi River system for a harbor and barge fleeting area. Therefore, a fundamental purpose and need of the Lee Island project is to be located on a major river in the Mississippi River system.

It should also be noted that river access requires that the cement plant be located within an economic distance from the harbor. An economic distance is determined on a site-specific basis, and depends primarily on the cost of technology to move finished product from the manufacturing area to the barge loading point. Mechanical conveyance systems such as belt conveyors or air gravity conveyors, which are mounted on supports, have significant infrastructure costs. Moving finished product from plant to harbor by truck or rail is not economical due to the double handling costs that would be incurred. The determination of an economic distance is also affected by requirements to move secondary raw materials and coal from the harbor to the plant, as well as the cost of acquiring the land or rights of way for the conveyance system.

2.3.4 Central Strategic Location Below Locks and Dams on Mississippi and Ohio Rivers

At the outset, Holcim determined that a fundamental requirement for this project is a central strategic location below (downstream of) any locks and dams on the Mississippi or Ohio Rivers.

A central strategic location means a site that is well positioned to economically serve the entire River market. Locations on the smaller tributaries of the Mississippi River system, such as the Arkansas or Tombigbee Rivers, are not strategic locations for several reasons. First, while these tributaries may be closer to a few cities, they are further away than a central location would be from most of the cities in the River market. Overall transportation distances and costs would increase to the point that a plant on a smaller tributary would not be economical. Second, the smaller tributaries do not have the industrial development that would enable Holcim to make use of “backhaul” transportation. Holcim relies on the common carrier transportation system to ship its finished product, where costs are reduced by the carrier’s ability to schedule return shipments for other companies, so that the barge, truck or railcar is used both ways. On the smaller tributaries, barges would be more likely to return empty, increasing costs beyond the economic point. Third, the smaller tributaries do not always accommodate the full-size barge traffic necessary to minimize transportation costs.

A central strategic location also means a location below any locks and dams on the Mississippi or Ohio Rivers. Such a location is necessary to minimize risk of river closure so that Holcim can ship product and receive fuel and secondary raw materials year-round. Year-round barge transportation capability is especially important to enable Holcim to provide uninterrupted customer service to the lower River market (i.e., New Orleans and other Southern cities). Based on favorable weather and other factors, the lower River market typically has demand for cement year-round.

In the past, Holcim has encountered problems shipping cement year-round from its existing cement plant on the Mississippi River at Clarksville, Missouri. The Clarksville plant is located about 60 miles north of St. Louis. There are four locks and dams on the Mississippi River between St. Louis and Clarksville. These locks and dams are subject to closure for repairs or due to flooding or cold weather. Lock and dam closure by maintenance or weather can prevent shipment of product by barge from Clarksville to the south during the winter. Similarly, accidents or disasters could force closure of locks and dams. To minimize the risk of river closure, Holcim determined that it would not build this project unless it was located below (downstream of) any locks and dams on the Mississippi or Ohio Rivers.

The requirement for a central strategic location below any locks and dams excludes alternative sites on the Mississippi River north of St. Louis. It also excludes alternative sites on the Missouri and Illinois Rivers, because these rivers flow into the Mississippi River above (upstream of) the southernmost lock and dam. In addition, alternative sites on the Ohio River are excluded because there are locks and dams on the Ohio River between its confluence with the Mississippi River at Cairo, Illinois, and Cave-in-Rock, Illinois. Cave-in-Rock is the area where the first suitable limestone for cement production occurs along the Ohio River.

Based on this requirement, the only suitable geographic area for the cement plant was determined to be a central location on the Mississippi River, south of St. Louis.

2.3.5 Access to Rail and Truck Transportation

In addition to being located on a navigable river, a new plant would need access to a railroad line and an interstate or divided highway. Where barge shipment is not possible or practical, Holcim must have the capability to ship finished product to customers by truck or rail. Truck or rail is also necessary to receive supplies and some secondary raw materials. Typically, truck or rail would be used for transportation over shorter distances.

2.3.6 Adequate Quantity and Quality of Limestone For On-Site Quarry

The Lee Island project requires a limestone quarry on-site. Holcim would not undertake this project at a site that did not have adequate limestone reserves for an on-site quarry.

In the cement industry, efficient operations and long-term economic viability are dependent upon the availability of primary and secondary raw materials close to plant manufacturing facilities. The main ingredients of portland cement are calcium, alumina, iron, and silica. The raw materials used to satisfy these ingredients are limestone (the primary raw material containing calcium and silica), shale and/or clay (containing aluminum, iron, and silica), and other minor mineral compounds. Finding all these constituents, in the proper composition and in close proximity to the cement plant, is a challenging task. An ideal site would be one that contains adequate reserves of both limestone and secondary raw materials. However, it is reasonable and typical to expect that some secondary raw materials must be provided from off-site sources.

Holcim has determined that the only economically viable locations for a 4 MMT per year cement plant are those that contain limestone that can be quarried on-site (and which can obtain secondary raw materials on-site, or can economically obtain them from nearby off-site locations). Holcim's experience at its Theodore, Alabama plant demonstrates that this project would not be economically viable with an off-site quarry. Transportation of limestone from Theodore's off-site quarry in Crystal River, Florida to the Theodore plant adds significant cost to the unit production cost. It would not be economically feasible for the Lee Island project to serve the River market with such an additional production cost.

The on-site reserves for the limestone quarry must be adequate, which means they must be sufficient in quantity and quality. In terms of quantity, there must be enough limestone to supply a 4 MMT per year plant for 100+ years. In terms of quality, the limestone must be suitable for the efficient manufacture of portland cement (i.e., high in calcium and low in alkali, hydrocarbons and magnesium). The chemical composition of the limestone has a direct effect on the plant design specifications, and the resulting air/water/solid waste production. High calcium content is the primary requirement. Low alkali, low sulfur, and low hydrocarbon content results in reduced waste production and lower air emissions. Low magnesium content prevents the formation of periclase, a mineral that causes premature failure of concrete.

Therefore, a basic purpose and need of the Lee Island project is to obtain a quarry on-site that can produce cement-quality limestone in sufficient quantity for a 100+ year quarry life, with secondary raw materials available on-site, or economically available from nearby off-site locations.

2.3.7 Adequate Available Land

Finally, the project requires an available tract of land large enough to accommodate a cement plant, quarry, harbor, and significant buffer. Depending on the thickness of the mineral reserves, a rough estimate of the total land area required would be 1,000 – 2,000 acres, not including a buffer. Contiguous tracts of undeveloped land this size are limited. In addition, the land – preferably owned by one or a few landowners – must be available for purchase. Land owned by many small landowners or competitors was not considered reasonably available. Numerous small parcels owned by numerous different individuals would unduly complicate and frustrate the land acquisition process. Because of the highly competitive nature of the cement industry, existing cement plants owned by other cement manufacturers, existing limestone quarries, and other sites where the mineral rights were owned by competitors were not considered viable prospective candidates for alternative site locations.

2.4 Summary of Alternatives Considered

In light of overall project purposes and needs, Holcim evaluated the following alternatives:

- No Action
- Expand Holcim's Clarksville plant
- Expand other Holcim plants
- Construct a new cement plant at a different location
- Construct a smaller plant.

2.5 No Action Alternative

The No Action alternative would not fulfill the project purpose of developing additional low-cost cement production capacity to serve the River market. The No Action alternative would result in continued importing of cement, which, as stated previously, creates serious business risk. The No Action alternative would unacceptably restrict Holcim's ability to remain competitive in the cement industry.

In addition, continued reliance on imports would entail global and regional environmental impacts in the form of greater ship and barge traffic, increased shipping fuel consumption, corresponding air emissions, and the increased potential for accidents. Most current imports involve transoceanic shipments, which would be reduced by a new cement plant located on the Mississippi River system. Further, overseas imports through New Orleans must travel significant distances on the Mississippi River to reach upper Midwest destinations such as Chicago and Minneapolis. A more centrally located plant on the Mississippi River system would shorten overall freight distances, and potentially lessen overall global and regional impacts on fuel usage and air quality.

Further, the No Action alternative would likely result in competitors expanding existing operations or constructing new plants in the River market area to produce low-cost cement to meet future expected customer demand and taking market share from Holcim. It can be expected that construction or expansion of plants by other companies would likely produce overall aquatic resource impacts – resulting from harbors, fleeting areas, quarries, roads, etc. – similar to or greater than Holcim's proposed Lee Island project.

Finally, the No Action alternative would likely result in other uses for the Lee Island project site than preservation. Because the site contains excellent quality limestone, it would be an attractive location for a limestone quarry operation. The site was previously the location of a limestone quarry from the 1960s through the mid-1980s. A new quarry operator could also seek a permit for a harbor or barge fleeting operation on the river.

Other potential uses of the project site could include farming and logging, both of which are historical uses of the property. The Lee Island and Isle du Bois Creek floodplain wetlands would likely continue to be farmed, resulting in a sustained degraded condition. Logging could be resumed by new landowners in much the same way the previous landowners logged the property.

The project site could also be used for residential development such as large estates. Subdivision development of the Lee Island site would likely entail environmental impacts from tree clearing, habitat fragmentation, and increased run-off, and would probably eliminate any prospect of preserving a significant amount of undisturbed buffer.

2.6 Expand Holcim's Clarksville, Missouri Plant

Holcim considered whether its existing Clarksville, Missouri plant – which is the only Holcim plant presently located on the Mississippi River system – could be used to fulfill project purposes. Because the Clarksville plant currently produces 1.3 MMT of cement per year, a 4.0 MMT per year capacity increase would require total production from Clarksville to expand to approximately 5.3 MMT per year.

In order for Clarksville to produce 5.3 MMT per year, Holcim considered several options:

- Upgrade the existing Clarksville plant to produce 5.3 MMT per year;
- Keep the existing Clarksville plant as is and build a second, 4 MMTplant at the site;
- Replace the existing Clarksville plant with a new 5.3 MMT per year plant.

If expansion were feasible at the Clarksville plant, it would have the following advantages:

- Holcim owns the raw materials (there is an existing quarry at the site);
- Holcim operates a harbor and barge loading operation (there is an existing harbor off the Mississippi River at the site);
- The workforce is trained and experienced; and
- The community would likely support a new plant.

However, expanding the Clarksville plant was determined not to be possible for the following reasons:

- First, one of the basic purposes of this project is to provide year-round water transportation, which requires a location that is not subject to river closure. Clarksville is above (upstream of) the southernmost locks and dams on the Mississippi River. These locks and dams are subject to winter closure by weather and/or repairs. The Clarksville plant cannot fulfill this basic project purpose.

- Second, expansion of the plant to 5.3 MMT per year would require expansion of the harbor. The Clarksville harbor was designed to accommodate the shipping and receiving requirements of the existing 1.3 MMT plant. A 5.3 MMT plant would require more loading and unloading capacity, and consequently more harbor area. Expansion of the Clarksville harbor is not possible due to land acquisition and environmental constraints. Directly to the north of the existing harbor are wetlands owned by the USACE and managed as a conservation area. The area directly to the south of the existing harbor also is wetlands and property of the USACE. The area to the west of the existing harbor is limited by a state highway and the railroad line serving the plant. The area to the east of the existing harbor is the Mississippi River.

- Third, due to design considerations, the existing Clarksville plant cannot be upgraded to produce the required 5.3 MMT per year. The existing plant was built in 1967 using "wet" process technology, which is not compatible with current (industry standard) "dry" process technology. Therefore, a retrofit of the existing plant to the required capacity is not economically or technically feasible. A new plant using "dry" process technology would have to be constructed at the site.

- Fourth, any large new "dry" process plant constructed at Clarksville would have other problems and limitations:
  - The raw material in Clarksville's existing quarry has a high hydrocarbon content. Addressing the manufacturing problems caused by the hydrocarbon content would require significant additional investment and increase operating costs, complicate operation of the kiln system, and create additional NO_x emissions because of the need to incinerate the excess hydrocarbon emissions with additional fuel combustion.
  - Some of the raw material in Clarksville's existing quarry has a high alkali content. High alkali raw material would complicate the manufacturing process and create a solid waste for the following reasons:
    - Currently, generally accepted specifications and buyer requirements in the U.S. for portland cement require low alkali portland cement. The proposed plant must have the capability of producing low alkali portland cement.
    - Low alkali portland cement could not be produced in a "dry" process plant at Clarksville without either using an alkali bypass system or obtaining low alkali raw materials from another off-site location.
    - An alkali bypass system would increase fuel usage, combustion emissions (NO_x), and electrical energy consumption.

  - An alkali bypass system would also generate cement kiln dust, a solid waste product.[5]
  - If low alkali raw materials were obtained from another location on the River, it would significantly increase costs (and make transportation riskier due to the locks and dams that may separate the plant from the off-site source). In addition to the basic cost of bringing the raw material to Clarksville, there would also be substantial "stripping" costs incurred at Clarksville. "Stripping" costs are the costs that would be associated with mining and then disposing of the existing high alkali raw materials in the Clarksville quarry that overlay the useable limestone.

- Fifth, for operational and managerial reasons, a large cement plant would have to use a single-line kiln design, but such a design has not been proven technically feasible for a 5.3 MMT per year plant. At present, 4 MMT per year is at the limit of the feasible size for existing single-line kiln design technology. Therefore, attempting to use such a design for a 5.3 MMT per year plant would be an unacceptable business risk.

- Finally, concentrating all of Holcim's River market capacity in one location would result in increased business risk. Historically, having only the Clarksville plant on the Mississippi River system has negatively impacted Holcim's ability to consistently supply markets. Cement plants can encounter operational problems, sometimes unexpectedly. By operating two cement plants on the Mississippi River, Holcim will be better able to manage any equipment downtime and minimize the impact to customers.

For all these reasons, Holcim determined that the Clarksville site could not be used to fulfill the purposes of the Lee Island project.

2.7 Expand Other Holcim Plants

Holcim considered whether the project purposes could be met by increasing capacity and production at one or more of Holcim's existing U.S. plants. Holcim has cement plants in the United States at the locations shown on the attached map (Figure 2-4). Based on their geographic location in or near the River market geographic area, the following plants were considered for expansion: Mason City, Iowa; Artesia, Mississippi; Dundee, Michigan; and Theodore, Alabama.

The Mason City, Iowa plant is not a potential expansion candidate because of its landlocked status and limited limestone reserves. The only modes of transportation available from central Iowa are truck and

[5] The existing Clarksville plant produces low alkali cement by wasting cement kiln dust as part of its "wet" process technology. The cement kiln dust is landfilled on site.

rail. Both modes of moving cement from plant-to-market are significantly more expensive than river-borne transport. Furthermore, Mason City's limestone reserves do not meet the 100+ year quarry life requirement for this project.

Similarly, the Artesia, Mississippi plant is not a potential expansion candidate. Like Mason City, it does not have the required access to the Mississippi River system, and has inadequate limestone reserves. While a navigable channel exists in the general vicinity of the Artesia Plant (within 10 miles), there is no way to economically access that waterway. The double handling costs that would be required to transport product to the navigable channel would make this option uneconomical. In addition, Artesia's limestone reserves do not meet the 100+ year quarry life requirement for this project.

The Dundee, Michigan plant, located near the Detroit metropolitan area, is not a candidate for expansion, either. The Dundee plant is in some ways similar to the Artesia plant. The plant is near, but not actually on a navigable waterway. While Lake Erie and the Detroit River are in the general vicinity (within 15 miles), there is no economic way to access those waterways for shipping to the Mississippi River System markets. Also, Dundee's limestone reserves do not meet the 100+ year quarry life requirement for this project. In addition, the raw material in Dundee's existing quarry has a high hydrocarbon content. With a "dry" process plant, the hydrocarbon content would require significant additional investment and increase operating costs, complicate operation of the kiln system, and create additional NO_x emissions from the need to incinerate the excess hydrocarbon emissions with additional fuel combustion. The alkali content of Dundee's raw materials is also too high for production of low alkali cement.

The Theodore, Alabama plant is located on a deep-water harbor in Mobile Bay. It is possible to ship cement from the Theodore Plant via barge to the Mississippi River system. However, Theodore is not a strategic location, and the cost of supplying Theodore product to all the cities in the River market, including the northern cities, would be significantly higher than is economically feasible. The Theodore plant already incurs high transportation costs because it receives its raw material via barge from its off-site Florida quarry. Additionally, Theodore's limestone reserves do not meet the 100+ year quarry life requirement for this project.

In conclusion, for the reasons stated, Holcim determined that expanding other Holcim plants in or near the River market is not a viable alternative.

2.8 Construct A New Cement Plant At a Different Location

Holcim considered alternative locations not owned by the company. Based on project purposes, Holcim considered various sites on the Mississippi River between St. Louis, Missouri and Scott City, Missouri (which is just south of Cape Girardeau, Missouri). There were two main reasons this area was selected.

First, as previously stated, a basic project purpose is to obtain a central strategic location that minimizes risk of river closure, i.e., that is below any locks and dams on the Mississippi or Ohio Rivers. This requirement effectively excludes any alternative sites on the Mississippi River north of St. Louis, or on the Missouri or Illinois Rivers, which both join the Mississippi River above the southernmost lock and dam. Also as previously stated, the presence of locks and dams on the Ohio River just above its confluence with the Mississippi River effectively excludes any alternative sites on the Ohio River or its tributaries. Essentially, the only location that meets the requirement for a central strategic location below any locks or dams is the central portion of the Mississippi River below St. Louis.

Second, the need for adequate cement-quality limestone reserves excludes sites south of Scott City, Missouri. Over the years, the geology of the Mississippi River has been well explored for various purposes including the mapping of mineral reserves. United States and state geological survey maps show there are no outcroppings of limestone suitable for the production of cement on the Mississippi River from Scott City, Missouri to the Gulf of Mexico. This is due to geologic factors such as the widening of the river valley and deposition of sediment.

Thus, the only geographic area warranting consideration for alternative sites is limited to the Mississippi River between St. Louis, Missouri, and Scott City, Missouri. As discussed below, there are several potential sites for a large cement plant in this area. However, for various reasons, these sites are not practicable alternatives.[6]

In the area examined, many of the prospective sites identified by Holcim or the mineral rights at those sites were already owned by other cement producers or quarry operators who compete with Holcim, directly or indirectly, making these sites not reasonably available for acquisition by Holcim. This factor alone disqualified several alternative sites in Ste. Genevieve County and other locations.

Other sites on the Missouri side of the river were not practicable alternatives because they did not meet project purposes for one or more of the following reasons: insufficient limestone reserves, insufficient contiguous land area, too many small landowners, land not available for purchase, lack of access to road transportation, no area for a harbor, navigation and safety hazards, and major gas or electric lines. In addition, at the prospective sites where a harbor and quarry would have otherwise been feasible, the wetland and stream impacts would likely be similar to or greater than Lee Island.

The Illinois side of the Mississippi River from East St. Louis down to a point across from Scott City, Missouri, was generally found not to be a practicable alternative because it does not have limestone

[6] The following discussion is general. The specific information supporting this discussion is proprietary commercial information, which is privileged and confidential. The specific information will be voluntarily submitted separately to the USACE under Freedom of Information Act exemption (b)(4), 5 USC 552(b)(4).

outcroppings or cement plant sites within an economic distance of the river. Typically, the bluffs on the Illinois side that contain limestone outcroppings are separated from the river by three to five miles of floodplain (in contrast to the bluffs on the Missouri side, which are frequently very close to the river). Any cement plant built to use the limestone from these bluffs would also have to be located three to five miles from the river. Holcim would not construct a cement plant in the floodplain due to business risk, and location of a cement plant three to five miles from the harbor would make construction of a mechanical conveyance system uneconomical. In addition, acquiring the land or rights of way for the conveyance system and a road to access the harbor would be difficult over so great a distance. Moreover, development (harbor, road to harbor, and conveyor system) across this width of floodplain would likely result in wetland impacts similar to or greater than Lee Island. Finally, the Illinois side generally lacks access to an adequate rail and truck transportation infrastructure. There is no interstate or even four-lane highway serving the Illinois side, and although there is a rail line, it does not service the distribution terminals on the Mississippi River system that Holcim uses (instead, the BNSF rail line on the Missouri side of the river services those terminals).

One prospective site in Illinois was found with limestone deposits sufficiently close to the river to warrant evaluation. Upon further investigation, however, it was determined that a quarry was not possible at this location due to existing commercial and residential development over the mineral reserves.

Based on careful analysis of potential alternative locations, there were no practicable alternatives to the Lee Island site in light of project purposes.

2.9 Construct a Smaller Plant

Holcim considered building a smaller (2 or 3 MMT) plant at Lee Island or the alternative sites that were examined. However, a smaller plant would not provide sufficient capacity, and production costs would increase because economies of scale would be lost. Therefore, a smaller plant would not fulfill the project purposes of creating sufficient new low-cost capacity to maintain and expand Holcim's market share in the growing River market while enabling the company to reliably and effectively serve its customers.

2.10 Conclusion

As discussed above, alternative sites were eliminated for failing to meet one or more of the project purposes. The Lee Island site was determined to be the only reasonably available site that fulfills all the project purposes.

The Lee Island project site is located on the Mississippi River and has the land area next to the river that is necessary for construction of a harbor. In addition, the Lee Island project site is adjacent to a rail line and is near an interstate highway. The Lee Island site is of sufficient size (approximately 3,916 acres) for the plant, harbor, quarry, and a significant buffer area.

The Lee Island site contains limestone that can be quarried and is well suited to the manufacture of cement. The limestone at Lee Island consists of nearly pure calcium carbonate with low alkali, hydrocarbon, and magnesium levels. Also, all cement kiln dust generated at Lee Island will be used in the process so that none is landfilled. The necessary secondary materials can also be economically transported via river barge to the Lee Island site for incorporation into the cement process.

Finally, the Lee Island site is located just to the south of AmerenUE's Rush Island electric power generating plant on the Mississippi River. An active, frequently used main line of the Burlington Northern Santa Fe Railroad traverses the Lee Island site along the base of the Mississippi River bluff line. As stated, the Lee Island site is the location of two former limestone quarries: a now-abandoned limestone quarry was located in the area where the proposed cement plant would be constructed. A substantial amount of overburden and tailings from this former quarry was deposited in large piles near the location of the proposed harbor. A component of this previous operation included a loading operation on the Mississippi River in the vicinity of Holcim's proposed north fleeting area. Another abandoned quarry about 3-4 acres in size was operated in a hollow near the eastern boundary of the proposed quarry, just to the west of the railroad tracks. Thus, the Lee Island site is both located near other industrial development and has undergone previous development, at least in certain places on the property.

Based on all the above considerations and analysis, Holcim determined that the Lee Island site was the only practicable location for the proposed cement plant in light of project purposes. There have been no changes since Holcim's original evaluation or permit application that would affect this conclusion.

3.0 Quarry Plan Alternatives

In response to agency and public comments, Holcim has further studied two issues relating to the quarry plan. First, Holcim reviewed its previous analysis of underground mining. Second, Holcim evaluated the possibility of avoiding the Wolf Hollow area.

3.1 Characterization of Mineral Reserves

The quarry plan is dependent on characterization of the site mineral reserves. Therefore, a brief summary of those reserves is provided.

Models were created to determine the location and amount of minerals needed to manufacture cement. From these studies it was determined that approximately 75-80 percent of the minerals within the deposit areas on the project site can be used in the cement manufacturing process. This process also defined the proposed quarrying sequence, which focused on creating the greatest mineral resource extraction over the smallest possible surface area.

A geologic column showing the bedrock formations at the site is presented in Figure 3-1. The pertinent bedrock formations at the Lee Island site consist predominantly of limestone interbedded with thin (10 to 20 feet) shale beds. These formations are underlain by the Joachim Dolomite (approximately 200 feet), a regional confining unit. The bedrock formations that can be utilized in the manufacture of cement are the Bloomsdale Limestone (average 16 feet), the Plattin Limestone (average 210 feet), the Maquoketa Shale (average 26 feet), the Fern Glen Formation (average 27 feet), and the lower 67 feet (average) of the 127-foot thick (average) Burlington Limestone. The Plattin Limestone is the principal quarrying unit at the site. These pure, high calcium, low alkali, low magnesium mineral deposits have the necessary chemical composition for the manufacture of cement. In addition, the lower Burlington limestone has a high silica content that is needed for cement.

The geologic strata exhibit a 3-degree slope to the east. Consequently, site reserves are thickest in the areas closest to the river towards the east end of the proposed quarry, and thin out as the quarry proceeds west. The area available for a quarry on the project site is therefore limited by this geologic feature. At the point where the Joachim Dolomite outcrops on the project site (the location of the dolomite glades), all lithologic layers needed to manufacture cement are gone (due to erosion over time).

The formations that cannot be utilized in the manufacture of cement are the Decorah Shales (average 8 feet), the Kimmswick Limestone (average 40 feet) and the upper (average 60 feet) of the Burlington Limestone. The Decorah Shales is considered unusable in the process because of high alkali content. The upper 60 feet (average) of the Burlington stratum cannot be used due to excessively high silica content, while the Kimmswick Limestone cannot be used because of its high organic content that may increase volatile organic compound (VOC) emissions from the plant. These formations will be used in the quarry reclamation process.

The overlying rocky soils (overburden) averages about 22 feet, but many areas have exposed bedrock. The underlying Joachim Dolomite cannot be used due to high magnesium content. The Joachim Dolomite is a regional barrier to groundwater movement and separates the quarrying units from the underlying St. Peter Sandstone, which is a useable aquifer.

3.2 Underground Mining Alternative

In Section 4.6.1 of the Companion Report, Holcim originally determined that underground mining was not a viable option. In response to agency and public comments, Holcim reviewed its previous analysis. However, the previous analysis was determined to be valid. The following provides a summary of the reasons why underground mining is not possible at the Lee Island project site:

- There is insufficient supportable roof rock available to conduct underground mining. The topographic relief at the site is several hundred feet between the ridge tops and the intervening valley bottoms. An underground mine would be exposed to the surface at each valley. Therefore, a structurally sound underground mine is not possible.
- Approximately 75 to 80 percent of the material from the surface down to the Joachim Dolomite can be utilized for the manufacture of cement. It has been determined that the remaining 20 to 25 percent will be utilized for other purposes such as reclamation. Because the useable minerals at the proposed Lee Island site are near the surface, no rock can be left in place.
- The rock that is chemically correct for the cement process is on or close to the surface and the underlying rock is high in magnesium, which is not usable in the process.
- Quarrying allows the complete and efficient utilization of mineral resources.
- Holcim has determined that overburden can be placed within the quarry limits (in the Raddy Hollow fill disposal area – see Section 4.0) until its ultimate use in reclamation of the quarry.
- Safety, productivity, and utilization of natural resources all are optimized with quarrying. Energy consumption would be less with quarrying. Operating with 60 percent material removal efficiency in an underground mine for a plant of Lee Island's size would require nearly double the amount of land currently required for the quarry (Holcim does not own that amount of land, nor are there sufficient mineral reserves under such land).

Therefore, for technical, logistical and cost reasons, underground mining is not a viable alternative at the Lee Island site.

3.3 Avoid Wolf Hollow Alternative

As part of Holcim's 404/401/10 permit application, the Companion Report (Section 4.6.2 and Figures 4-17 and 4-18) set out the proposed quarry plan. Agency and public comments requested additional study regarding whether the quarry plan could be changed to avoid Wolf Hollow. The USACE requested that Holcim study this alternative. In response, Holcim conducted an additional study to evaluate the possibility of avoiding Wolf Hollow.

As a basis for understanding the additional study of Wolf Hollow, the following brief review of the proposed quarry plan is provided. Holcim has applied to the USACE for a Section 404/401/10 permit that would authorize impacts to 3.2 miles of jurisdictional streams within the 100+ year quarry boundary identified in Figure 3-2 (which is essentially the same diagram as Figure 4-18 in the Companion Report). The 100+ year quarry boundary extends to the outside line of the block marked "100+ years" in Figure 3-2. The total land area within the 100+ year quarry boundary is approximately 1,261 acres. Holcim has also identified the ultimate extent of the quarry, as shown on Figure 3-2. The total land area within the ultimate extent of the quarry is approximately 1,627 acres. If additional limestone reserves are ever required beyond the 100+ year quarry boundary, Holcim would have to apply to the USACE and MDNR for authorization to impact jurisdictional streams in the area between the 100+ year quarry boundary and the ultimate extent of the quarry.

The quarry plan consists of opening two quarry faces (west and east faces). The quarrying of the two faces will allow the extraction of raw materials to obtain the correct mixture for cement manufacture. The quarry sequence in 5-year and then 10-year increments for the 100+ year life of the quarry is presented in Figure 3-2.

The West Quarry initially will be approximately 1,000 feet in width, starting at the western valley wall of Raddy Hollow, and the face will advance to the southwest (see Figure 3-2). The primary quarry units in the West Quarry are the Bloomsdale and Plattin Limestones. Development of the East Quarry is then necessary because the West Quarry does not contain the entire lithologic sequence of raw materials (e.g., the Burlington limestone and the Fern Glen limestone) needed for the manufacture of cement.

The East Quarry face (approximately 800 feet long) will start on the eastern valley wall of Raddy Hollow and progress to the east, toward the bluffs along the Mississippi River (see Figure 3-2). Quarrying will proceed along the bluffs to a point near Old Quarry Hollow (Hollows D and E). At approximately 30 to 40 years, the East Quarry will then turn to the northwest in order to connect with the south flank of the West Quarry. After that point, the East Quarry will continue to expand as shown on Figure 3-2. Impacts to Wolf Hollow would not begin to occur until approximately 50 to 60 years.

A total of approximately 16,970 feet (3.2 miles) of jurisdictional streams, including approximately 5,137 feet (0.97 miles) of jurisdictional stream length in Wolf Hollow, will be impacted by the proposed quarry within the 100+ year boundary in Figure 3-2. However, the proposed quarry plan concentrates the quarrying operations into discrete sections and, therefore, limits the impacts to relatively small areas at any one time, especially in view of the reclamation that will occur. A large tract of undisturbed area on the southern part of the site will be maintained for many years. This undisturbed land will form a contiguous tract with the buffer and, therefore, benefit wildlife.

Within the 100+ year quarry boundary, there are 705 MMT of total mineable reserves. This quantity of reserves is necessary to supply the proposed 4 MMT per year cement plant with enough limestone for the 100+ year life of the project.

The 100+ year quarry boundary was developed based on the following criteria:

- utilizing existing raw materials in an efficient manner;
- obtaining the correct mixture of raw materials from the different quarrying units in order to meet the cement kiln chemical requirements while minimizing the creation of waste or overburden materials;
- maintaining sufficient raw material reserves to justify the initial project investment;
- quarrying in a systematic sequence that will facilitate reclamation activities; and
- avoiding impacts to the Mississippi River bluffs due to aesthetic and wildlife considerations.

In order to evaluate the possibility of avoiding Wolf Hollow, a computer block model was developed and analyzed to determine the quantity of mineable reserves that would be eliminated. It should be noted that avoidance of Wolf Hollow would also necessarily result in avoidance of Longs Hollow, which is adjacent to and south of Wolf Hollow (Longs Hollow could not be reached by the quarry unless Wolf Hollow was quarried first). Therefore, the model determined the mineable reserves in both Wolf and Longs Hollows up to the 100+ year quarry boundary in Figure 3-2.

The model showed that avoiding Wolf and Longs Hollows would reduce the mineable reserves within the 100+ year quarry boundary from 705 MMT to 553 MMT, a decrease of 152 MMT. A 152 MMT reduction in mineable reserves would reduce the life of the quarry by approximately 25 years, and in turn, reduce total cement plant production by 96 MMT, which translates into lost plant revenue of approximately $7.4 billion in today's dollars (based on the USGS-reported 2000 average mill cement price of $77.50). The project is not economically viable with a revenue loss of that magnitude.

These figures do not include the additional reserves in Wolf and Longs Hollows between the 100+ year boundary and the ultimate extent of the quarry. There are an additional 196 MMT of mineable reserves in the area between the 100+ year boundary and the ultimate extent of the quarry. This area must remain potentially available to Holcim to justify the significant investment in this project should additional limestone be needed in the long-term.

In addition, avoiding Wolf and Longs Hollows would further reduce the availability of some secondary raw materials (e.g., silica from Burlington Limestone) and require obtaining these materials from off-site. Bringing raw materials from off-site will increase production costs by more than $1 per ton of clinker (the intermediate product in the cement manufacturing process), which is a substantial increase in cost of production that would not be offset by market pricing. Other resulting effects would be increased barge, rail or truck traffic and reduced overall energy efficiency.

Based upon the above analysis, the project would not be economically or logistically viable if Wolf Hollow could not be quarried. The mineral reserves in Wolf Hollow (and by necessity Longs Hollow) are critical to enable Holcim to fulfill the project purposes, and therefore, these areas cannot be avoided. However, Wolf and Longs Hollows will not be impacted by the quarry for many years, and will remain part of the contiguous undisturbed area until then. After quarrying, the area will be reclaimed as required by the MDNR Land Reclamation Program.

4.0 Analysis of Fill Disposal Area Alternatives

This section supplements Holcim's May 8, 2001 and June 29, 2001 letters to the USACE. In those letters, Holcim committed to disposing of "fill material" (quarry overburden and harbor excavation material) in the quarry instead of North and Hickory Hollows. Holcim then withdrew North and Hickory Hollows from its 404/401/10 permit application. This section provides additional information about the analysis supporting that change.

Fill material will be generated by two different project activities: (1) quarry operation, and (2) harbor excavation. The material requiring disposal from operation of the quarry will consist of overburden (silty-clay with rock fragments) and bedrock that is not usable in the cement manufacturing process. The harbor excavation material requiring disposal will consist of silt, clay, and sand/gravel.

The alternatives analysis for the fill disposal areas considered the following factors:

- economics of material transportation from source area(s) to the fill disposal areas;
- direct and indirect impacts to wetlands, streams, and upland habitats;
- costs and impacts of moving the material twice, if placed in areas planned for quarrying;
- potential reuse of the material in quarry reclamation; and
- off-site disposal.

A total of three fill disposal area alternatives have been developed and analyzed (Figure 4-1):

- Head of Wolf Hollow (Alternative 1);
- North and Hickory Hollows (Alternative 2); and
- Old Quarry Hollow and Raddy Hollow (Alternative 3).

Alternative 1 was considered and rejected before the 404/401/10 permit application was submitted. Alternative 1 would have utilized an area at the head of Wolf Hollow (Hollow G; Figure 4-1). Alternative 1 was rejected because it increased the distance from the source areas and immediately impacted Wolf Hollow (Wolf Hollow will not otherwise be impacted by the quarry for many years).

Alternative 2 is the proposal in the Companion Report (Section 4.6.2). Alternative 2 would result in placement of quarry overburden and harbor excavation materials in two locations north of Isle du Bois Creek: North Hollow (93 acres) and Hickory Hollow (182 acres). Because no quarrying or other project activity is planned in either of these hollows, fill material placed there would not have to be moved again – a significant economic advantage. After disposal of the fill material, North and Hickory Hollows would be reclaimed (contoured and planted with native species).

Alternative 3 was developed in response to agency and public comments, and requests by the USACE and MDNR, to explore the possibility of avoiding impacts to both North and Hickory Hollows, and impacts to the Isle du Bois Creek floodplain and wetlands that would have resulted from the construction of the haul road for access to these areas.

Alternative 3 proposes the placement of the harbor excavation material in Old Quarry Hollow (approximately 110 acres), and the placement of overburden/unusable rock in Raddy Hollow (106 acres) (see Figure 4-1). Both of these areas are within 100+ year quarry boundary. Because these areas are in the defined quarry limits, and therefore will be quarried at some point, Alternative 3 will result in no additional environmental impacts. Alternative 3 does, however, increase operational effort and cost to Holcim because the fill materials must be moved a second time as the quarry advances to these areas. Ultimately, the fill material in both disposal sites will be used in the land reclamation program and/or the cement manufacturing process.

No topsoil will be placed in the Old Quarry Hollow or Raddy Hollow fill disposal sites. All topsoil from the harbor excavation, operation of the quarry, or clearing of the fill disposal sites will be removed and stockpiled for later use in the mitigation or reclamation programs. The topsoil stockpile will be protected from erosion by seeding of native grasses. The topsoil stockpile will be located in a ravine adjacent to Hollow L (see Figure 4-1).

Alternative 3 results in no direct impacts to Hickory and North Hollows or the Isle du Bois Creek floodplain/wetlands. Avoidance of these two hollows will result in a large (approximately 780 acres) contiguous tract of land to the north of Isle du Bois Creek that can be managed/enhanced for wildlife benefit as part of the project site buffer area. Alternative 3 will allow wildlife to move between the northern uplands and Isle du Bois Creek without barriers, helping meet commenters and the USACE's request for design of corridors to allow for the migration and refuge of flora and fauna.

For the reasons detailed in Holcim's May 8, 2001 and June 29, 2001 letters to the USACE, Alternative 3 was selected.