

**The Long Term
Land Reclamation Strategy
Of the
Proposed Holcim (US) Inc. Lee Island
Cement Manufacturing Facility
Located in
Ste. Genevieve and Jefferson Counties
Missouri**



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Revised - January 2002

EXHIBIT A

1. Introduction

Holcim (US) Inc. (formerly Holnam Inc.) is requesting a permit revision for Holcim’s Lee Island property as a proposed site for a portland cement plant. The Missouri department of Natural resources (MDNR) issued a short-term, 64 acre mining permit (Holnam, Inc. - Lee Island Reclamation Permit #0858) to reopen the abandoned Moline Consumers quarry in order for Holcim to construct an access road from the quarry to highway U.S. 61. Separately, permit applications have been submitted to the United States Army Corps of Engineers (USACE) for Holcim’s Lee Island project and to the MDNR Air Pollution Control Program for the proposed cement plant.

Included with this permit application is the reclamation strategy for the 1,627-acre more or less limestone quarry and overburden depositional areas associated with the cement plant. However, it should be noted that the abandoned quarry site might be used as the site for either the proposed cement plant or an alternative development should the company decide not to construct the plant.

2. Location

The legal description of the location of the quarry and overburden depositional sites is as follows:

Quarry and Temporary Depositional Permit Area T39W R07E Ste. Genevieve County, MO	SW ¼ SW ¼ Section 3 SE ¼ SE ¼ Section 4 NE ¼ Section 9 SE ¼ NW ¼ Section 9 S ½ Section 9 S ½ Section 10 NW ¼ Section 10 SW ¼ NE ¼ Section 10 N ½ Section 15 SW ¼ Section 15 NW ¼ SE ¼ Section 15 N ½ Section 16 SE ¼ Section 16 NE ¼ SW ¼ Section 16 E ½ NE ¼ Section 17 Fractional portion of the NE Spanish Land Grant in Ste Genevieve County, MO.
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3. Conceptual View of the Post-Project Lee Island Area

Of the 3,915.70 acres, of Holcim’s Lee Island property, it is proposed that by the time raw materials are depleted and the cement manufacturing ceases in approximately 100+ years, Holcim will have mined 1,554 acres, more or less, plus the 73 acres of the Old Moline Consumers quarry, for a total of approximately 1, 627 acres. The present topography of steep ridges of up to 400 feet in relief, with narrow ridge tops and valleys will be reclaimed into ridges and valleys of less topographic relief and the creation of a lake. (See Exhibit D – Cross Sections Across Permit Boundaries for a conceptual view of reclaimed topography.)

Isle du Bois Creek will continue its present undisturbed meandering course through the property to its mouth at the Mississippi River. (See the attached map – LCC – 1008, Mining Plan and Depositional Areas – Lee Island, MO for location)

A lake will cover the eastern one third (more or less) of the mined area. Maximum depth will be in excess of 100 feet, along the bluff paralleling the Mississippi River. There may be a wetland fringe constructed on the western edge of the lake.

During the first eight to ten years of mining, after topsoils are salvaged and placed in the topsoil stockpile area, any overburden and waste rock materials that cannot be used in the cement manufacturing process will be deposited in a temporary depositional area located at the head of Raddy Hollow in the western corner of the quarry (Head of Raddy Hollow Overburden Depositional Area). As soon as sufficient area is opened up to allow for deposition and reclamation, all other overburden and waste materials will be deposited in these areas and reclamation efforts will be initiated. Overburden placed in the temporary depositional areas will be re-mined and deposited in areas that are ready for reclamation, as the mining progresses in that area.

After topsoils are salvaged and placed in the topsoil stockpile area, material excavated from the harbor site will be deposited in the hollows adjacent to the Old Quarry site on the eastern boundary of the main quarry (Old Quarry Hollow Depositional Area). This area is considered a temporary depositional area, as the material will be re-mined in the future and utilized for reclamation purposes or in the cement making process. It is planned that part of the material will be dry excavated and hauled by truck and the remainder will be hydraulically dredged and transported via pipeline to the Old Quarry Hollow Depositional Area.

The principal objectives of the reclamation strategy will be to reconstruct the existing topography at a lower elevation and replace the intermittent streams with similar habitats. Stream restoration will be accomplished in accordance with the guidance provided by the document “Stream Corridor Restoration, Principles, Processes and Practices, authored the Federal Interagency Stream Restoration Working Group. The Land Reclamation Strategy will be integrated with the project’s approved final Wetland and Stream Mitigation Plan and conservation measures being developed as part of the Clean Water Act Section 404/401 permitting process overseen by the USACE, and with input from the MDNR and other agencies

The following are the conceptual reclamation objectives:

- The topography will be contoured to create rugged upland terrain and intermittent stream systems similar to the type that exists today. The reclamation plan will utilize state of the art sciences to reclaim the impacted ephemeral intermittent jurisdictional streams disturbed by mining. Impacts to jurisdictional streams will be mitigated on a 1:1 ratio in accordance with the project’s approved final Wetland and Stream Mitigation Plan. Sciences used will include fluvial geomorphology, mining engineering and hydrology.
- The mined areas will be replaced with a diverse topography and seeded with native vegetation species that will provide a range of wildlife habitats similar to those that exist today. Vegetation and restoration will occur in accordance with the projects final approved Wetlands and Stream Mitigation Plan.

- Upland aquatic habitats (small ponds) will be created during the reclamation process to provide wildlife water sources. These ponds will be approximately 0.001 acres in size and will be located along the reclaimed ridges in the wildlife area with approximately one pond per 50 acres.
- Reclamation efforts will begin after eight to ten years and will run concurrently with mine operations.
- The undisturbed areas will be integrated with reclaimed areas to provide the largest contiguous wildlife habitat possible. Some areas will not be mined for several decades. These areas will be managed to conserve the existing vegetation and enhance the wildlife habitat that currently exists until mined and then integrated with the undisturbed and/or reclaimed areas to provide contiguous wildlife habitats.
- An extensive “buffer” system (2200 acres, more or less, or approximately 56% of the site area); extends around the proposed mining and fill areas. These areas will be managed to conserve the natural condition and will provide a “seed bank” for the reclaimed areas.
- The only existing perennial stream at the site (Isle du Bois Creek) will not be adversely impacted by the proposed project. Instead, the Isle du Bois Creek riparian corridor and floodplain will be enhanced in accordance with the project’s approved final Wetlands and Stream Mitigation Plan.

The reclamation plan will consider substrate, flow regimes, gradient, and the planting/seeding to be done along the riparian corridors. Clearly, obtaining the surfacewater reclamation objectives will require the land surface to be shaped and contoured into topography of lower elevations that will, to the extent practicable, generate a similar hydrology and geomorphology.

It is anticipated that the general framework for the post-mining surface topography will consist of a series of “benches” increasing in elevation moving from east to west. Within this framework, the surface topography will be contoured to reflect, to the extent practicable, a similar rugged landscape but at a lower elevation.

The geologic formation underlying the minable reserves, and eventually under the reclaimed area is the Ordovician Joachim dolomite. The Joachim is an aquitard, impeding vertical groundwater infiltration to the underlying aquifer (St. Peter sandstone). This hydro-geologic setting, along with the placement of the overburden material, can be utilized to create an environment similar to what exists today.

See the attached maps:

Exhibit B - LCC-1008, Mining Plan and Depositional Areas – Lee Island, MO

Exhibit C - LCC-1009, Land Reclamation Plan and Permitted Areas by Year Permitted – Lee Island, MO

4. The Generalized Land Reclamation Program

- a) Land reclamation of the disturbed ground will commence when the final grading is completed and the disturbed land is of sufficient size to conduct reclamation activities.
- b) Slopes will be constructed in accordance with the MDNR Land Reclamation guidelines and/or regulations.
- c) Topsoil will be salvaged, in accordance with the MDNR Land Reclamation guidelines, and stockpiled at the designated “Topsoil Stockpile Area”, until reclamation is initiated and the area is ready for topsoil placement. The stockpiles will be seeded with a cover crop to prevent erosion.
- d) Reclaimed areas will be covered with topsoil of sufficient depth to promote growth of grasses and trees. The depth of the topsoil replaced in the reclaimed areas will approximately 12 inches (Horizon A (3”) + Horizon B (9”) =12 inches).
- e) Watercourse channels will be constructed in the valleys with a series of pool and riffle systems utilizing large rocks (or rip rap) to minimize erosion of the streambed and to create pools to encourage aquatic life. The streams will be designed with grade control of 1'-2' of drop. The jurisdictional streams will be reclaimed in accordance with the project’s approved final Wetlands and Stream Mitigation Plan.
- f) Highwalls will be reduced in height prior to the completion of the reclamation.
- g) The significant elevation difference between the undisturbed areas and the reclaimed areas will be gradual. Erosional control practices will be utilized to minimize erosion.
- h) All areas (with the exception of the proposed lake and wetlands) will be covered with topsoil and seeded with the native grasses and trees described below. Final contouring and grading will be scheduled so that immediate seeding occurs during the normal planting time for the species proposed. If seeding is not favorable, temporary measures will be employed to control erosion until the next favorable planting period occurs. Note that the following list of native grasses and trees to be utilized in the reclamation process may be modified and/or expanded based on final recommendations by the Soil Conservation Service, the U.S., the MDNR, the World Bird Sanctuary and others.

Native Grass Mixtures

• Big Bluestem (<i>Andropogon gerardii</i>)	1.8	PLS Lb.
• Indian Grass (<i>Sorghastrum nutans</i>)	2.0	
• Little Bluestem (<i>Schizachyrium scoparium</i>)	1.5	
• Sideoats Grama (<i>Buoteloua curtipendula</i>)	0.5	
• Switchgrass (<i>Panicum virgatum</i>)	0.2	
• Perennial Ryegrasses (<i>Lolium perenne</i>)	1.0	
• Illinois Bundleflower (<i>Desmanthus illinoensis</i>)	0.5	
• Roundhead Lespedeza (<i>Lespedeza capitata</i>)	5.0	
• TOTAL	11.5	PLS Lbs. / Acre

Trees or Shrub Species (Stems/acre at 48/acre or as recommended by the Soils Conservation Service and Forest Service)

- Upper Dry Areas
 - ◆ Chinkapin Oak (*Quercus muehlenbergi*)
 - ◆ Shagbark Hickory (*Carya ovata*)
 - ◆ White Oak (*Quercus alba*)
 - ◆ Flowering Dogwood (*Cornus florida*)
 - ◆ Northern Red Oak (*Quercus rubra*)
 - ◆ Post Oak (*Quercus stellata*)
 - ◆ Eastern Red Cedar (*Juniperus virginiana*)
 - ◆ Smooth Sumac (*Rhus glabra*)

- Lower Wet Areas
 - ◆ Persimmon (*Diosyprus virginiana*)
 - ◆ Possumhaw (*Ilex Decidua*)
 - ◆ Bur Oak (*Quercus macrocarpa*)
 - ◆ Pin Oak ((*Quercus palustris*)
 - ◆ Sycamore (*Platanus occidentalis*)
 - ◆ White Ash (*Fraxinus americana*)

Note: The 48 stems/acre is based on a composite of the above listed species. The density of species on any particular area will be dependent of a general inventory of trees in the area prior to mining.

The land use of the reclaimed area will be:

- **Wildlife** - Greater than 58% (forested or other habitat with livestock excluded)
- **Development** - Approximately 7% (residential, industrial and recreational)
- **Water impoundments** – Less than 35% of the Quarry Area (a lake on the East side of the quarry and a series of upland ponds)

See the attached map: **Exhibit C** - LCC-1009, Land Reclamation Plan and Permitted Areas by Year Permitted – Lee Island, MO

5. Initial Mining Prior to Cement Manufacturing

Mining has started under MDNR Permit No. 0858 (64 acres more or less) in the present abandoned aggregate quarry for construction of an access road from the quarry to highway 61. The east wall of this quarry and the knob extending into the quarry area will be benched for safety reasons. The present series of benches will be extracted and the mined limestone will be used to construct an entrance road from the plant site in the abandoned quarry to U.S. 61.

The plant location in the abandoned quarry will be excavated down to an elevation of approximately 410 feet above mean sea level (MSL), and other elevations as required by the final plant design. Around the plant areas, permanent rock faces will have benches constructed, of at least twenty feet in width, on the top of the formations where practical but with less than 60' vertical height between benches.

Topsoil will be salvaged, stockpiled and preserved in the mined out area of the quarry. Any overburden from the initial mining operations will be deposited temporarily in the mined out area of the quarry. Topsoils and overburden material will be transported to the Topsoil Stockpile Area and Head of Raddy Hollow depositional area respectively, at a later date.

See the attached map: **Exhibit B** - LCC-1008, Mining Plan and Depositional Areas – Lee Island, MO.

6. Topsoil Stockpile and Disposal Site Plan for the Overburden and Waste Rock.

The overburden consists of weathered Burlington limestone with very little topsoil and silty-clay with numerous limestone and chert fragments. The waste raw materials will probably consist of the upper part of the Burlington limestone, all of the Maquoketa shale and the upper two formations of the Decorah Group, and the Kimmswick layer of limestone. The Upper Burlington limestone contains an excess of SiO₂. The Maquoketa shale and Decorah Group contains too much alkali for the manufacture of low-alkali cement and the Kimmswick is marginal limestone in terms of volatile organics.

Topsoils have been calculated (Table 1) to have an average depth of three inches. This topsoil will be recovered in accordance with the MDNR Land reclamation Program guidelines and will be placed in the Topsoil Stockpile Area where it will be seeded and stabilized until reclamation can begin.

TOPSOIL DEPTHS - LEE ISLAND QUARRY			
AREA	Average Topsoil Thickness inches	Area of Quarry Acres	Available Topsoil inches/acre
A	B	C	D
151G	1.5	539	808.5
211D	2.5	17	42.5
241F	1.5	245	367.5
261F	6	171	1026
531D	4	142	568
531F	3	262	786
661A	30	23	690
QUARRY	0	74	0
TOTALS		1473	4288.5
AVE. OVERALL THICKNESS (D/C)			2.91 INCHES
<p>Note: Soil depths and acreages were taken from the Soils Report - Quarry Site, Lee Island Project - completed by Burton Brown - Brown Soil Services - May 03, 2001</p>			

Table 1

Note: The acreage indicated above (1473 acres) was based on the proposed quarry at the time of the report. Modifications to the areas completed after the submittal of the report indicated a change in the overall acreage. The final acreage's, shown in the application indicate a total of 1,627 acres, more or less. The difference in acreage's are due to the addition of 50 acres in the Southwest area of the quarry and the proposed plant site of 115 acres. Due to the modifications to the plan, the total acreage for the proposed quarry resulted in 1512 acres, more or less (1627 minus 115 acres).

Trucks will haul the overburden and waste rock materials to the disposal location in the Head of Raddy Hollow Depositional Area.

Characterization of the material from the proposed harbor area has been completed through a series of drill holes throughout the site. The average depth of the topsoil from the harbor area has been estimated to be approximately 24 inches. Topsoil from this area will be salvaged and hauled by truck to the Topsoil Stockpile Area for use in reclamation in the future.

Material excavated during the construction of the harbor site will be deposited in the Old Quarry Hollow Depositional Area. A portion of the material will be dry excavated and hauled to North branch of the Old Quarry Hollow. The remainder of the material will be dredged and transported via pipeline to the south branch of the Old Quarry Hollow. A dam will be constructed at the mouth of the south branch. The dam will be constructed in accordance with an approved Dam Safety Permit that will be applied for through the Missouri Department of Natural Resources, Division of Geology and Land Survey. A sedimentation basin will then be constructed at the mouth of the Old Quarry Hollow. The sedimentation basin will be constructed and operated in

accordance with an MDNR site specific stormwater discharge permit to ensure excess sediment will be removed prior to any stormwater discharge.

The depositional areas, as they are to be used, will be cleared of all trees and brush. Topsoil, whether it is in the quarry, harbor excavation or the depositional site will be removed and stockpiled for later use in the reclamation program. The topsoil stockpile will be protected from erosion by seeding of a native cover crop.

The finished grade of the overburden depositional area will advance down the hollow, generally in an easterly direction, at an elevation of the ridgelines. The finished grade will slope to the southeast, or back from the active depositional face at approximately 1': 1,000' to prevent water from eroding the active face. Therefore, terraces and/or benches will be constructed as the filling proceeds down the valley. Approximately 30 acres will be covered the first year and thereafter the acreage will decrease annually.

All precipitation from the area will drain down the hollows and will flow into a sedimentation basin for the deposition of suspended sediments prior to discharge into Isle du Bois Creek. The sedimentation basin will be constructed and operated in accordance with an MDNR stormwater discharge permit to ensure excess sediment will be removed prior to any stormwater discharge.

This overburden disposal site will be utilized for about eight to ten years at which time the west quarry will be depleted of raw materials and back filling of overburden or waste raw materials can begin in preparation for reclamation.

Reclamation of the site will commence with the spreading of the stockpiled topsoil and the seeding of trees and/or grasses as directed by the final reclamation plan. The end use of this reclaimed area will be designated a wildlife area.

See the attached: **Exhibit B** - LCC-1008, Mining Plan and Depositional Areas – Lee Island, MO

7. West Quarry Site Plan

The west quarry will be located just to the south of the entrance road in the SW ¼ of Section 9, T39N, R07E. The quarry initially will be approximately 2,000 feet in width and the face(s) will advance to the southwest.

Trees and brush will be removed annually from an area estimated to be about seven acres/year. Topsoil in the area will be removed and transported to the Topsoil Stockpile Area. The overburden will then be excavated and deposited in the Head of Raddy Hollow Overburden Depositional area. A portion of the Upper Burlington limestone, the Maquoketa shale, the Decorah Group, and the Kimmswick limestone are unsuitable for the manufacture of cement and will be excavated and hauled to the depositional area.

All water will drain down dip or by ditching from the active face(s) to the northeast and enter a sedimentation basin for the deposition of suspended sediments prior to discharge into Isle du Bois Creek. The sedimentation basin will be constructed and operated in accordance with an MDNR stormwater discharge permit to ensure excess sediment will be removed prior to any stormwater discharge in accordance with specifications set forth by an approved stormwater Discharge Permit.

The North end of this West quarry will be depleted of all raw materials in approximately eight to ten years and then this area will become the depositional site for the overburden and waste rock. The deposition will reflect the original rugged topography (at a lower elevation) as much as possible via a series of ridges and valleys. This area end use will be designated as wildlife habitat.

See the attached: **Exhibit B** - LCC-1008, Mining Plan and Depositional Areas – Lee Island, MO

8. East Quarry Site Plan

Development of the east quarry is necessary because the west quarry does not contain the entire stratigraphic sequence of raw materials necessary for the manufacture of cement, namely the Burlington limestone and the Fern Glen limestone.

The east quarry will be developed initially in the E 1/2 of Section 9 and the S 1/2 of Section 10, T39N, R07E and advance to the southeast as a ramp in order to excavate the eventual quarry.

Water will be pumped up the ramp to the west and then into a sedimentation basin so that suspended sediments will be removed prior to discharge into Isle du Bois creek. The sedimentation basin will be constructed and operated in accordance with an MDNR site specific stormwater discharge permit to ensure excess sediment will be removed prior to any stormwater discharge.

The land clearing, topsoil removal and overburden disposal will be done in the same fashion as in the west quarry. The estimated area to be disturbed each year initially will be about six acres. When the entire raw material production comes from the east quarry the annual land disturbance will be about 15 acres more or less per year.

Mining will commence as a ramp on an eight- percent slope to the east. This ramp will be approximately 1,000 feet wide and about 3,000 feet long, through the ridges towards the old quarry located near the Mississippi River. When the ramp contacts the base of the Plattin Limestone the quarry will be developed to the northwest in order to connect with the south flank of the west quarry. This is in order to expand the overburden and waste materials disposal area. The east quarry will continue to enlarge and within 25 years will become the primary quarry providing all five stratigraphic components for manufacture of Holcim cement. The quarry will

have its eastern border at the bluff, which is approximately 1,300 feet (average) from the Mississippi River. The quarry will parallel the Mississippi River for about 6,200 feet to the south and the floor of the quarry will be about 100 feet below normal river level.

When the entire quarry area is depleted of its raw materials this quarry will have involved approximately 1,627 acres, more or less (1505 acres, more or less, excluding the old Moline Quarry which is the proposed as the cement plant site). When the quarry is fully developed it will have covered all or portions of Sections 9, 10, 15 and 16, T39N, R07E.

This area end use will be designated as wildlife habitat and water impoundment.

See the attached map no. LCC-1008 "Generalized Mining Plan Lee Island, Missouri" for location.

Attachments:

Exhibit B - LCC-1008, Mining Plan and Depositional Areas – Lee Island, MO

Exhibit C - LCC-1009, Land Reclamation Plan and Permitted Areas by Year
Permitted – Lee Island, MO

Soils Report

Quarry Site, Lee Island Project

By:

Burton Brown
Brown Soil Services

Appendix I