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STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
PETITION OF LAFARGE MIDWEST, INC.	)	
FOR BOILER DETERMINATION THROUGH	)	
ADJUSTED STANDARD PROCEEDINGS	)	Case No. AS 06 - 03
Pursuant to 35 Ill. Adm. Code 720.132 and	)	
720.133	)	
	)	
Petitioner.	)	
	)	

NOTICE OF FILING

TO: Illinois Pollution Control Board
Attn: Dorothy M. Gunn, Clerk
100 West Randolph St., Suite 11-500
Chicago, IL 60601-3218

Division of Legal Counsel
Illinois Env. Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

PLEASE TAKE NOTICE that on this 28th day of March 2006, a copy of the attached ***Petition of Lafarge Midwest, Inc. for Boiler Determination Through Adjusted Standard Proceedings*** was filed with the Office of the Clerk of the Illinois Pollution Control Board, a copy of which is herewith served on you.

Respectfully Submitted,

On behalf of the LAFARGE MIDWEST, INC.,

By: Hinshaw & Culbertson LLP

Jon S. Faletto
One of Its Attorneys

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STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
PETITION OF LAFARGE MIDWEST, INC. FOR BOILER DETERMINATION THROUGH ADJUSTED STANDARD PROCEEDINGS Pursuant to 35 Ill. Adm. Code 720.132 and 720.133.	)	AS 06-03

PETITION FOR BOILER DETERMINATION
THROUGH ADJUSTED STANDARD PROCEEDINGS

NOW COMES the Petitioner, LAFARGE MIDWEST, INC., by and through its attorneys, Hinshaw & Culbertson LLP, and presents to the Illinois Pollution Control Board (hereafter "Board"), its *Petition for Boiler Determination Through Adjusted Standard Proceedings* (hereafter "Petition"), pursuant to 35 Ill. Adm. Code Sections 720.132 and 720.133 requesting a determination that Raw Mill Dryer #1 and Raw Mill Dryer #2 operated at its Joppa Portland Cement Manufacturing Plant be considered "boilers" as that term is defined in 35 Ill. Adm. Code 720.110.

The Board's determination that each of the Raw Mill Dryers are "boilers" pursuant to the criteria set forth in 35 Ill. Adm. Code 720.132 will allow them to be used for the combustion of off-specification used oil for the purpose of energy recovery, in compliance with 35 Ill. Admin. Code 739.161. The Board regulations at 35 Ill. Adm. Code 720.133 provide that the Board will make such a boiler determination on a case-by-case basis utilizing the Adjusted Standard procedures of Subpart D of 35 Ill. Adm. Code Part 104.

In support of its Petition, the Petitioner states as follows:

I. Description of Petitioner and Joppa Portland Cement Manufacturing Plant

The Joppa Portland Cement Manufacturing Plant ("Joppa Plant") is owned and operated by Lafarge Midwest, Inc. ("Lafarge"), a subsidiary of Lafarge North America, Inc. Together with its subsidiaries, Lafarge North America is the largest supplier of cement and a leading ready-mixed concrete supplier in North America. The Company also is one of the top four producers of construction aggregate (crushed stone, sand and gravel) and a leading manufacturer of gypsum drywall. Lafarge North America has over 1,000 operations doing business in almost every State and throughout all provinces in Canada through its Lafarge Canada, Inc. subsidiary. Lafarge's products are used in the construction of such diverse projects as roads, offices, factories, hospitals, department stores, sports stadiums, banks, museums, high-rise apartments, amusement parks, swimming pools and bridges. In 2004, Lafarge North America shipped 133 million short tons of aggregate, 11.4 million cubic yards of ready-mixed concrete, 14.2 million tons of cement and 2.2 billion square feet of gypsum drywall.

The Joppa Plant is located in Massac County, Illinois adjacent to the Ohio River in extreme southern Illinois. The closest community is Grand Chain, Illinois and the common address for the Joppa Plant is 2500 Portland Road, Grand Chain, Illinois. Massac County is a predominantly rural county, the 7th smallest in Illinois, with a county-wide population of approximately 15,000 residents (2000 Census). The County seat and largest municipality in Massac County is Metropolis which has a municipal population of approximately 6,500 residents. According to the Illinois Department of Commerce and Economic Opportunity, the populations in Metropolis and Massac County have decreased slightly since the 2000 Census. Other small communities in Massac County include Brookport (population 1,054), Joppa (population 409) and the small, unincorporated towns of Boaz, New Colombia, Mermet, Round

Knob, Big Bay and Unionville. In addition to the Joppa Plant, other industry in Massac County include the Joppa Steam Electric Plant, a 1100 MW coal-fired electric power generating facility owned and operated by Electric Energy, Inc. An aerial photograph showing the location of the Joppa Plant and the surrounding area is attached hereto as **Exhibit A.** A map depicting the location of the Joppa Plant and the population density in the surrounding area of Massac County is attached hereto as **Exhibit B.**

The Joppa Plant manufactures Portland cement which is the active ingredient of concrete. Portland cement is a closely controlled chemical combination of calcium, silicon, aluminum, iron and small amounts of other ingredients to which gypsum is added in the final grinding process to regulate the setting time of the concrete. Lime and silica comprise about 85% of the mass of Portland cement. Common among the materials used in its manufacture are limestone or marl combined with shale, clay, slate or blast furnace slag, silica sand, and iron ore.

Two different types of cement manufacturing processes, the "dry" and "wet" methods, can be used to manufacture Portland cement. The Joppa Plant utilizes the dry process and its two cement kilns are classified as conventional "long dry" kilns. In the dry cement manufacturing process, raw materials are ground, mixed and fed to the kiln in a dry state. No water is added to the raw materials prior to processing. In other respects, the wet and dry cement manufacturing processes are essentially alike.

At the Joppa Plant, limestone rock is the principal raw material used in the process. Limestone rock is quarried off-site and crushed to a size of about three inches or smaller. It is then transported by river barge and unloaded at the Joppa Plant site.

Together with the crushed limestone, other raw materials are added as sources of calcium, iron, silica and alumina. The raw materials or "raw mix" is dried and ground into a fine mix before introduction into the rotary kilns. After introduction into the kiln, the raw material is heated to almost 3,000° F in cylindrical steel rotary kilns lined with special refractory fire brick. Kilns are mounted with the axis inclined slightly from the horizontal. The finely ground raw mix is fed into the higher end of the kiln. At the lower end are the burners which provide a blast of heat and flame produced by precisely controlled burning of powdered coal, petroleum coke and other supplemental fuels.

As the material moves through the kiln, certain elements are driven off in the form of gases while the remaining ingredients undergo chemical and mineralogical changes to create a new substance with new physical and chemical characteristics. The new substance, called "clinker", is formed in pieces about the size of marbles. A small amount of gypsum is added to the clinker and the mixture is ground to a fine powder which is the final product – Portland cement.

Depending on the proportions of the original raw materials, the duration and intensity of the kiln processing and the parameters set during final grinding of the clinker, different cements are produced with distinctly different capabilities and uses. Each step in the manufacture of Portland cement is checked by frequent chemical and physical tests in plant laboratories. The finished product is also analyzed and tested to ensure that it complies with all product and ASTM specifications.

Lafarge's Joppa Plant manufactures several varieties of cement products and successfully competes in the international marketplace. A critical component of the Plant's ability to compete in the competitive international cement market is its ability to utilize cost effective, alternative energy sources. As energy prices reach record highs, Lafarge's commitment to utilize alternative energy sources is becoming more important to its financial viability. During 2005 Lafarge will utilize approximately 20,000 tons of tire-derived fuel in its kiln operations, offsetting approximately the same amount of coal/coke that would have otherwise been burned in 2005. As of September 1, 2005 Lafarge has utilized 870,000 gallons of specification used oil that replaced approximately 3.3 millions cubic meters of natural gas that would have been required for it Raw Mill operations. This used oil supplemental fuel accounted for 60% of all the fuel used by the Raw Mills in 2005, to date. Receiving Board approval in these proceedings to utilize off-specification used oil as supplemental fuel in the Raw Mill Dryers is a significant opportunity to further control escalating energy costs while converting a potential waste product into a valuable fuel source.

The U. S. Environmental Protection Agency ("USEPA") actively promotes and approves the recycling of used oil for energy recovery and has done so since Congress passed the Used Oil Recycling Act in 1980. USEPA's administrative regulations implement the legislative intent to promote the recovery of thermal energy from used and waste oils (See 40 Code of Federal Regulations Part 279). To implement the Illinois Legislature's directive to adopt a waste management program consistent with the federal program and secure USEPA approval thereof, the Board has adopted "identical-in-substance" regulations designed to encourage used oil recycling and burning of used oil for energy recovery.

Utilization of off-specification used oil fuel in the Raw Mill Dryers at the Joppa Plant is not expected to change the current air emissions from the facility as compared to the combustion of on-specification used oil fuel that currently is allowed under the existing Construction Permits and the federally-enforceable Clean Air Act Permit Program ("CAAPP") Operating Permit issued for the Joppa Plant. Use of used oil fuel would be subject to approval by the IEPA through issuance of a new Construction Permit and modification of the Joppa Plant's Title V

CAAPP Operating Permit. The review and approval processes employed by IEPA's Bureau of Air, Permits Section officials will provide the opportunity to resolve any questions related to air emissions from combustion of off-specification used oil as supplemental fuel in the Raw Mill Dryers.

II. Petition Content Requirements of 35 Ill. Adm. Code 104.406

Set forth below is the information specified by 35 Ill. Adm. Code 104.406 to be included in a Petition for Adjusted Standard. Since 35 Ill. Adm. Code Sections 720.132 and 720.133 mandate the use of the Board's Adjusted Standard procedures (Subpart D of 35 Ill. Adm. Code Part 104), for determining whether a particular enclosed flame combustion device is a "boiler," this Petition addresses the requirements of Subpart D and includes the information specified in Section 104.406. The information is organized under headings corresponding to the informational requirements of each subsection of Section 104.406, in compliance with that regulation.

a) A statement describing the standard from which an adjusted standard is sought. This must include the Illinois Administrative Code citation to the regulation of general applicability imposing the standard as well as the effective date of that regulation;

Response: The Board has promulgated administrative regulations applicable to the management of used oil which are set forth at 35 Ill. Adm. Code Part 739. Section 739.161(a) of Subpart G of the Part 739 Standards for the Management of Used Oil [35 Ill. Adm. Code 739.161(c)], allows the combustion of off-specification used oil as fuel for the purpose of recovering the thermal energy contained in the used oil. The burning of off-specification used oil is allowed only in certain devices specified in 35 Ill. Adm. Code Section 739.161(a), including "industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes."

The Board has promulgated regulations set forth at 35 Ill. Adm. Code Sections 720.132 and 720.133 establishing the criteria and procedures for making a determination that certain enclosed devices using controlled flame combustion are "boilers" that may be utilized for the burning of off-specification used oil, even though such devices do not otherwise meet the definition of "boiler" contained in 35 Ill. Adm. Code 720.110. Section 720.132 establishes the criteria to be considered by the Board in making such "case-by-case" determinations and Section 720.133 mandates use of the Adjusted Standard procedures of Subpart D of 35 Ill. Adm. Code 104 to determine whether a particular enclosed flame combustion device is a "boiler" that may be used to burn off-specification used oil.

Through this adjusted standard proceeding, Petitioner seeks a determination that its Raw Mill Dryer #1 and Raw Mill Dryer #2 may be considered boilers, even though the dryers may not otherwise meet the definition of "boiler" at 35 Ill. Adm. Code 721.110. Such a case-by-case boiler determination may be made by the Board upon Petitioner's demonstration of compliance with the criteria set forth at 35 Ill. Adm. Code 720.132. When the Board makes such a positive determination, the combustion device is considered a "boiler by designation" as that term is defined at 35 Ill. Adm. Code 721.110 (included within definition of the term "boiler"). The applicable Board regulations, specifically 35 Ill. Adm. Code 720.132 and 720.133 were both promulgated with an effective date of July 17, 2003 (27 *Ill. Reg.* 12713, effective July 17, 2003).

b) A statement that indicates whether the regulation of general applicability was promulgated to implement, in whole or in part, the requirements of the CWA (33 USC 1251 et seq.), Safe Drinking Water Act (42 USC 300(f) et seq.), Comprehensive Environmental Response, Compensation and Liability Act (42 USC 9601 et seq.), CAA (42 USC 7401 et seq.), or the State programs concerning RCRA, UIC, or NPDES [415 ILCS 5/28.1];

Response: The regulations applicable to case-by-case boiler determinations, specifically 35 Ill. Adm. Code Sections 720.132 and 720.133, were promulgated to implement, in whole or in part, the requirements of the Illinois program for the management of solid and hazardous waste, the Illinois analog to the federal regulatory program under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, 42 U.S.C. §6901, et seq. (hereafter "RCRA".)

c) **The level of justification as well as other information or requirements necessary for an adjusted standard as specified by the regulation of general applicability or a statement that the regulation of general applicability does not specify a level of justification or other requirements [415 ILCS 5/28.1] (See Section 104.426);**

Response: The Board's regulations at 35 Ill. Adm. Code 720.132 and 720.133 establish the criteria and procedures for obtaining a case-by-case boiler determination by the Board. Section 720.132 establishes the criteria to be considered by the Board for making a case-by-case determination that certain enclosed devices using controlled flame combustion are "boilers" that may be utilized for burning off-specification used oil for energy recovery, even though such devices do not otherwise meet the definition of a "boiler" set forth at 35 Ill. Adm. Code §720.110. Section 720.133 mandates use of the Adjusted Standard procedures of Subpart D of 35 Ill. Adm. Code 104 to determine whether a particular enclosed flame combustion device is a "boiler" that may be used to burn off-specification used oil.

(Note: Sections 720.132 and 720.133 are virtually identical to the federal RCRA regulations at 40 CFR 260.32 and 260.33 which establish the criteria and "variance" procedures for "case-by-case" determinations that specific combustion devices can be considered "boilers.")

The criteria to be considered by the Board and the procedures to be followed in making a case-by-case determination that certain enclosed devices using controlled flame combustion are "boilers" are provided by Sections 720.132 and 720.133. Those regulations are set forth in full below:

Section 720.132 Boiler Determinations

In accordance with the standards and criteria in Section 720.110 (definition of "boiler"), and the procedures in 720.133, the Board will determine on a case-by-case basis that certain enclosed devices using controlled flame combustion are boilers, even though they do not otherwise meet the definition of boiler contained in Section 720.110, after considering the following criteria:

a) The extent to which the unit has provisions for recovering and exporting thermal energy in the form of Steam, heated fluids or heated gasses;

b) The extent to which the combustion chamber and energy recovery equipment are of integral design;

c) The efficiency of energy recovery, calculated in terms of the recovered energy compared with the thermal value of the fuel;

d) The extent to which exported energy is utilized;

e) The extent to which the device is in common and customary use as a "boiler" functioning primarily to produce steam, heated fluids or heated gases; and

f) Other relevant factors.

(Source: Amended at 27 Ill. Reg. §12713, effective July 17, 2003.)

Section 720.133 Procedures for Determinations

The Board will use the procedures of Subpart D of 35 Ill. Adm. Code 104 for determining whether a material is a solid waste *or for determining whether a particular enclosed flame combustion device is a boiler.* (Emphasis added.)

(Source: Amended at 27 Ill. Reg. §12713, effective July 17, 2003.)

d) A description of the nature of the petitioner's activity that is the subject of the proposed adjusted standard. The description must include the location of, and area affected by, the petitioner's activity. This description must also include the number of persons employed by the petitioner's facility at issue, age of that facility, relevant pollution control equipment already in use, and the qualitative and quantitative description of the nature of emissions, discharges or releases currently generated by the petitioner's activity;

Response: The principal product produced by Lafarge at the Joppa Plant is Portland cement. The cement manufacturing process consists of the following activities: (1) raw material receiving, (2) raw material storage; (3) raw material reclaim; (4) raw material grinding and drying; (5) raw mix storage and kiln feed; (6) pyroprocessing in the rotary kilns; (7) clinker storage and reclaim; (8) clinker grinding; and (9) cement storage and load-out.

Raw Material Receiving – Raw materials are received at the Joppa Plant primarily by barge traveling the Ohio River, but are also received by truck, and potentially by rail. Typical raw materials include limestone, sand, clay, gypsum, bottom ash, fly ash, iron oxide, mill scale, iron slag, shale, alumina, spent industrial catalysts, foundry sand, coal tailings and fuels such as coal and petroleum coke.

Raw Material Storage – Raw materials are unloaded, screened and immediately conveyed to outside storage piles, covered storage piles, concrete storage bins and enclosed steel storage tanks. In general, the larger shipments are stored either in the outside storage areas or covered storage piles where the materials can be gradually reclaimed for use in the cement manufacturing process.

Raw Material Reclaim – Raw materials are reclaimed from storage piles and storage structures by several methods. Materials from covered storage piles or outside storage piles are transferred via under-pile reclaim system, or front end-loader and truck to one of several reclaim hoppers that feed various conveyors. Lafarge also operates portable belts to transfer materials from the plant-site storage locations to the existing conveyor systems. Materials from inside storage can feed directly to conveyors via vibratory feeders located under the covered storage hall. Materials stored in bins and tanks are fed directly to the conveyor system.

Raw Material Grinding and Drying - Raw materials are fed to the Raw Mill System by conveyors. The raw materials used at the Joppa Plant are typically coarse and wet before being fed into the Raw Mill Systems. The Raw Mill System is a continuous process. In the first stage of the Raw Mill System, raw materials are added to the "raw mix" in the separator body of the grinding process. The raw mix is then dried by direct contact with the hot dry gas produced by the Raw Mill Dryers. After the drying process, the raw mix is fed into one of two 3,000 horsepower Nordberg ball mills where it is ground to a fine consistency. After grinding, the raw mix is retuned to the separators where the fine material is removed for later introduction to the kiln while the coarser material is mixed with new raw material and sent back through the drying and grinding processes, i.e. dried by direct contact with the hot dry gas produced by the Raw Mill Dryers and returned to the ball mills for further grinding.

The raw materials in the Raw Mill Systems are recycled through the Raw Mills via air conveyance, air separators, screw conveyors and belt conveyors. As the materials are dried in the Raw Mill Dryers and ground to the desired particle size, they are removed in the air separators. The resulting mixture, often referred to as "kiln feed" is pneumatically conveyed to four storage silos located near the feed end of the cement kilns.

The typical feed to the Raw Mills consists of approximately 90% limestone with the balance composed of sand, clay, mill scale, bottom ash, fly ash and other materials. In general, all raw material used in the cement manufacturing process is added at this point. The exception is the addition of gypsum that occurs when the clinker is ground into the finished Portland cement product.

Raw Feed Storage and Transfer to Kilns – The ground and dried raw materials produced by the Raw Mill System is pneumatically conveyed to four large storage and blending silos located near the feed end of the kilns. Raw "kiln feed" is then transferred to smaller surge or "feed" tanks before transfer to the kilns. In addition, a hopper and conveyor system at the feed end of the kilns allows reclaim of outside materials (typically clinker) at the feed end of the kilns.

Pyroprocessing in the Kilns-- Both kilns at the Joppa Plant are long dry kilns. Each kiln is essentially a slightly inclined rotating cylinder with the raw feed introduced into the uphill end of each kiln while fuel and air is introduced into the downhill end. As the kiln rotates, the raw feed and combustion air flow counter-current.

In the #1 Kiln, the raw feed is introduced directly into the kiln via a bucket elevator. The #2 Kiln is equipped with a one-stage preheater where the raw feed is introduced into a series of cyclones. In the cyclones, the material flows counter-current with the kiln exhaust, thus recovering heat from the #2 Kiln exhaust gases to preheat the raw feed before introduction into the kiln, itself.

Once in the kilns, the raw materials undergo complex chemical and physical changes to produce the "clinker" which is ground into finished Portland cement. The ratio of raw feed to clinker is approximately 1.5 to 1. The loss of material during pyroprocessing in the kilns results from additional moisture being driven off as well as chemical reactions yielding gaseous products. As the clinker leaves the kilns, it resembles road gravel in size and consistency, with most material having a diameter of 0.5 to one inch.

After exiting the kilns, the clinker is fed directly to the clinker coolers, where it is air-cooled. In the clinker cooler, the clinker travels across grates as air is blown upward through the product. The cooled clinker is transferred via belt conveyors from the clinker coolers to storage to await grinding.

Clinker Storage and Reclaim – Clinker from the clinker coolers is transferred via conveyors either to covered storage piles, covered storage bins or directly to the steel feed tanks associated with the Finish Mill Systems. From the covered storage piles, clinker can be transferred as needed to outside storage piles for long-term storage. From the outside storage piles, clinker can be trucked to outside crusher/reclaim systems. From covered storage piles, reclaimed clinker is transferred via conveyors to the concrete bins that feed the #1 Finish Mill system or the steel tanks that feed the #2 Finish Mill system.

Clinker Grinding in Finish Mills– The clinker and small amounts of gypsum (95:5 typical ratio) are introduced into the Finish Mills for grinding to a precise, extremely fine particle size. Similar to the Raw Mill System, the Finish Mill System moves the material via air conveyance, air separators, screw conveyors and belt conveyors. As the clinker and gypsum mixture is ground to the desired particle size, they are removed in the air separators. The resulting product, finished Portland cement, is pneumatically conveyed to the storage silos.

Cement Storage and Loadout – Finished Portland cement is conveyed pneumatically from the Finish Mill systems to several storage silos. From each storage silo, the cement can be further transferred either to other storage silos, to trucks or to river barges. All conveyance of the finished product is via pneumatic conveyors.

Through this Adjusted Standard proceeding, Lafarge seeks Board approval to utilize off-specification used oil fuel as supplemental fuel in the two Raw Mill Dryers. A substantial amount of energy is needed to dry the raw mix to the very low moisture content that must be achieved before the raw materials can be introduced into the kilns. Currently, Lafarge is authorized to use natural gas and on-specification used oils as fuels in the two Raw Mill Dryers. Construction Permit No. 03080024 issued by the IEPA Bureau of Air on January 14, 2004, authorizes the use of on-specification used oil fuel for the two Raw Mill Dryers. A copy of Construction Permit No. 03080024 is attached hereto as **Exhibit C**. Allowable emissions under the Construction Permit authorizing the combustion of on-specification used oil in the Raw Mill Dryers are set forth below:

Air Contaminant	**Emissions (lbs/hour)**	**Emissions (tons/year)**
NOx	10.9	16.60
CO	2.5	4.15
SO2	77.1	39.00
PM	0.01	0.10
VOM	0.4	0.50

Lafarge's proposal to utilize off-specification used oil fuel in the Raw Mill Dryers provides significant environmental benefits by recycling used oils that are continuously generated from motor vehicles, refineries and manufacturing operations using machining/cutting oils, heat transfer fluids, hydraulic fluids and general lubricants. Burning used oil is an accepted and proven means of energy recovery in Illinois and throughout the United States. Recycling off-specification used oil by recovering the thermal energy through combustion in industrial boilers converts a potential waste stream into a valuable fuel source. Utilizing off-specification used oil fuel would permit Lafarge to better manage its fuel costs to stay competitive in the international marketplace. It would provide additional security for operations at the Joppa Plant and reduce exposure to the volatility of price and supply of natural gas, a non-renewable source of energy.

Economic Value of the Joppa Plant to Massac County and State –The Joppa Plant was developed at its current location in 1960 with the construction of Kiln #1 and all of the associated storage structures, process and pollution control equipment and ancillary facilities needed to manufacture Portland cement. The plant has been improved and expanded on numerous occasions with the addition of Kiln #2 in approximately 1975.

As of January 1, 2005 Lafarge employed 124 full-time employees at the Joppa Plant; 43 salaried plant employees and 81 other employees. The annual payroll for 2004 was approximately $7,737,000. Annual tax payments made to the State of Illinois and Massac County are approximately $153,000. Through its payroll and tax payments, Lafarge supports the depressed economy in Massac County.

Reported Emissions. The federal Clean Air Act and the Illinois Environmental Protection Act require reporting of air pollutant emissions by regulated sources and tracking of reported emissions data by the State of Illinois. To implement the requirements of State and Federal law, the State of Illinois has implemented an Annual Emissions Reporting requirement which applies to all sources required to have an operating permit in accordance with 35 Ill. Adm. Code 201.302. The requirements applicable to the Annual Emissions Reporting program are codified in 35 Ill. Adm. Code Section 254.

In accordance with applicable regulations, Petitioner submits an Annual Emissions Report to the Illinois Environmental Protection Agency to report on actual emissions from all emissions units and activities at the Joppa Portland Cement Plant. The most recent Annual Emissions Report was due on or before May 1, 2005.

Set forth below is a summary of the emissions reported by Petitioner in its most recent Annual Emissions Report which was submitted to the Agency on March 15, 2005. The

Summary Sheets from Petitioner's Annual Emissions Report are attached to the Petition as **Exhibit D.**

2004 REPORTED EMISSIONS FOR ENTIRE FACILITY	
Pollutant	***2004 Emissions (tons/year)***
CO	448
Lead	0.14
NH_3	1.4
NO_x	3,310
PM	256
PM_{10}	183
$PM_{2.5}$	30
SO_2	745
VOM	163

Other Discharges. Operation of the Joppa Portland Cement Plant also results in generation of process wastewater and sanitary wastewater and the discharge of storm water runoff from the site. Petitioner discharges process wastewater, sanitary wastewater and storm water runoff under NPDES Permit No. IL0004081. This NPDES Permit was issued on May 26, 2000 with and effective period of five years. An application for renewal of the NPDES Permit was timely submitted to the Illinois Environmental Protection Agency and such submittal continues the effective period of the permit until action by the agency.

In addition, the Petitioner was issued a Permit to Construct a new sanitary wastewater treatment facility on April 19, 2005, designated Permit Number 2005-EN-3317. The new sanitary wastewater treatment facility came on-line during November 2005.

The following table identifies the discharge points, wastewaters and effluent limitations established by NPDES Permit No. IL0004081:

Outfall Number	Description	Limitations
001	Non-contact cooling water, cooling tower blow down and storm water runoff. These wastewaters are treated in a settling pond prior to discharge to the Ohio River.	Flow, pH and temperature
002	Treated sanitary wastewater. At a cost in excess of $300,000, new sanitary wastewater treatment plant was constructed and brought on line in November 2005. Treatment consists of BOD removal through a sand bed media, disinfection using chlorine and de-chlorination prior to discharge of the treated effluent.	Flow, pH, biological oxygen demand ("BOD"), total suspended solids ("TSS"), fecal coliform, ammonia and residual chlorine
003, 004 & 005	Storm water runoff from storage piles.	Flow, pH and TSS
006, 007 & 008	Storm water runoff associated with industrial activity.	Subject to facility Storm Water Pollution Prevention Plan requirements, including containment systems, erosion control measures and waste and housekeeping controls.

Attached as **Exhibit E** is NPDES Permit No. IL0004081 and Permit to Construct No. 2005-EN-3317 for the new sanitary wastewater treatment facility.

e) **A description of the efforts that would be necessary if the petitioner was to comply with the regulation of general applicability. All compliance alternatives, with the corresponding costs for each alternative, must be discussed. The discussion of costs must include the overall capital costs as well as the annualized capital and operating costs;**

Response: Through this Adjusted Standard proceeding, Petitioner seeks a determination by the Board that the Raw Mill Dryers operated at its Joppa Plant may be considered "boilers" for purposes of using off-specification used oil as supplemental fuel. The two Raw Mill Dryers function as direct-fired process heaters to reduce the moisture content of the raw materials to allow grinding of the "raw feed" to the proper particle size and reduction of the moisture content of the raw feed before introduction into the kilns for pyroprocessing. The finished Portland cement is the main component of concrete used as an architectural building material and in numerous construction and building applications.

Lafarge believes that its Raw Mill Dryers meet the definition of "boiler" in 35 Ill. Adm. Code §720.110 and consequently, would be authorized under the existing regulations to utilize off-specification used oil as supplemental fuel. However, Petitioner has consulted with IEPA officials regarding previous proposals to utilize off-specification used oil as supplemental fuels. Through those discussions, Lafarge has been advised that it must utilize the Adjusted Standard administrative process before the Pollution Control Board to receive a "case-by-case" boiler determination that would permit use of off-specification used oil as supplemental fuel for the Raw Mill Dryers.

Lafarge would not risk an enforcement action by proceeding to utilize off-specification used oil as a fuel in the Raw Mill Dryers without assurances that such actions were done in full compliance with all applicable standards. According to IEPA's interpretation of Section 720.110, Lafarge is prohibited from burning off-specification used oil for energy recovery in its Raw Mill Dryers unless and until it receives from the Pollution Control Board a determination that each of the Raw Mill Dryers satisfy the criteria to be classified a "boiler by designation." Other than Board approval, there are no compliance alternatives, no capital improvements and no operational changes that would allow Petitioner to "comply with the regulation of general applicability" which would prohibit combustion of off-specification used oil until a case-by-case determination is made by the Board that the Raw Mill Dryers are "boilers by designation."

Costs of Specification Used Oil vs. Off-Specification Used Oil. Petitioner is proposing to supplement the current fuels used in the Raw Mill Dryers, specifically natural gas and on-specification used oil, with off-specification used oil as a cost saving measure. Off-specification used oil, due to its lower cost, will further reduce Lafarge's fuel costs and overall operating costs to produce finished Portland cement at the Joppa Plant.

Lafarge is proposing to use approximately 1,500,000 gallons of used oil fuel per year in the Raw Mill Dryers. In the Southern Illinois markets, specification used oil currently is priced at an average of $0.91 per gallon while off-specification used oil is averaging around $0.81 per gallon. Based on projected usage of 1,500,000 gallons per year and current market pricing, this translates to an annual cost of $1,369,000 for on-specification used oil and $1,281,000 for off-specification used oil. The additional cost savings of $88,000 annually gained by using off-specification used oil as supplemental fuel is a significant amount and this annual cost saving is expected to increase as the market costs for natural gas and on-specification used oil fuel continue to escalate.

As the costs of natural gas and on-specification used oil fuel increase, the economic benefits associated with using off-specification used oil as a supplemental fuel also increase. According to the Energy Information Administration of the U.S. Department of Energy, natural gas prices in the United States have more than doubled in the past three years, primarily because development of new gas supplies has not kept pace with increasing demand. (see *Annual Energy Outlook 2005 – Market Trends: Natural Gas Demand and Supply*). Natural gas is increasingly popular for use in homes, businesses, industrial facilities and electric power-generation because it is efficient, clean and reliable. Over the last several years, increased demand was spurred by the electric power industry, which is opting for cleaner, gas-fired power plants rather than conventional coal-fired power generation. Power plants were consuming 24 percent more natural gas in July 2005 than in July 2004, according to the federal Energy Information Administration.

In addition to a lag in the development of new natural gas production supplies, catastrophic weather has further widened the gap between supply and demand. In 2005, hurricanes Katrina and Rita devastated more than 250 oil and natural gas platforms in the United States and Mexico. Almost nine percent of the Gulf Coast's annual production of natural gas was lost between August 26th and October 19th, according to the U.S. Minerals Management Service.

Historically, the factors that led to rising oil prices, such as political instability or war in major production areas such as the Middle East, did not affect U.S. natural gas prices, because more than 90 percent of the natural gas used in this country was produced domestically. However, many large industrial facilities can switch between natural gas and oil with modest capital expenditures for fuel oil storage and distribution facilities. In the past, in times of rising natural gas prices, these industrial facilities would switch to lower-priced fuel oil and diesel, thus relieving demand and upward price pressure on the natural gas market. Today, however, with oil prices spiking at prices of upwards of $60 or $70 per barrel, many industrial facilities cannot afford to switch to virgin fuel oil, distillate or diesel fuels and are utilizing large quantities of alternative fuels, including recycled used oil. The rising prices for natural gas and refined petroleum products has further increased the demand for used oil fuels, and thus, the market prices for both on-specification and off-specification used oil are expected to continue increasing.

f) **A narrative description of the proposed adjusted standard as well as proposed language for a Board order that would impose the standard. Efforts necessary to achieve this proposed standard and the corresponding costs must also be presented;**

Response: Pursuant to the criteria set forth at 35 Ill. Adm. Code §720.132, the Board may grant the requested Adjusted Standard through a determination that each Raw Mill Dryer is a boiler, even though it may not otherwise meet the definition of the term "boiler" set forth at 35 Ill. Adm. Code §720.110. Once the Board determines that each of Petitioner's Raw Mill Dryers meet the criteria set forth at 35 Ill. Adm. Code §720.132, both units will meet the regulatory definition of the term "boiler" at 35 Ill. Adm. Code 720.110, which states in relevant part:

Boiler by designation. The unit is one that the Board has determined, on a case-by-case basis, to be a boiler, after considering the standards in Section 720.132.

An industrial boiler located on the site of a facility engaged in a manufacturing process is authorized under Subpart G of 35 Ill. Adm. Code Part 739 to utilize off-specification used oil for energy recovery. Upon determination by the Board that Petitioner's Raw Mill Dryers should be classified as a "boiler," these units will be allowed to burn off-specification used oil for energy recovery because they will be considered a "boiler by designation" and are "located on the site of a facility engaged in a manufacturing process where substances are transformed into new products."

Adequacy of Current Air Pollution Control Equipment. Emissions from the Raw Mill System are controlled by modern, high-efficiency fabric filter baghouse particulate control systems to minimize the release of particulate matter and other air contaminants in the exhaust gases. The combined capture and removal efficiency of these baghouse systems typically achieve greater than 99.9% overall control efficiency. As identified in the CAAPP Title V

Operating Permit issued for the Joppa Plant, the exhaust from Raw Mill #1 is controlled by the North DCs #1 and #2, South DCs #1 and #2 and the Auxiliary DC. The exhaust from Raw Mill #2 is controlled by the Utility DC #2 and Air Separator DC #1.

The dried "kiln feed" captured in the control equipment is a valuable material that is returned to the production process. In addition to controlling particulate emissions, maximizing capture of the dried raw materials entrained in the exhaust gases from the Raw Mills increases plant productivity and profitability that is critical to the overall financial health and long-term viability of the Joppa Plant. Consequently, there exists a strong economic incentive to operate the fabric filter baghouses at maximum removal efficiency.

Petitioner has estimated the potential particulate emissions from utilizing up to 1,500,000 gallons of off-specification used oil as a supplemental fuel in the Raw Mills. Based on those calculations, total particulate matter ("PM") emissions and emissions of PM10 resulting from the combustion of off-specification used oil supplemental fuel will be orders of magnitude lower than the emissions allowed by the CAAPP Title V Operating Permit. In addition, emissions from the combustion of off-specification used oil fuel will be in compliance with Construction Permit No. 03080024 issued by the IEPA Bureau of Air on January 14, 2004, authorizing the use of on-specification used oil fuel for the two Raw Mill Dryers.

Because predicted emissions from the combustion of off-specification used oil are predicted to be well below the allowable limits of the CAAPP Title V Operating Permits and the 2004 Construction Permit, Petitioner believes that no modifications to the existing fabric filter baghouse control equipment will be required to further control emissions when combusting off-specification used oil fuel. Additionally, Petitioner believes that no additional pollution control equipment will be required to control emissions from the combustion of off-specification used oil as supplemental fuel in the Raw Mill Dryers.

Utilization of off-specification used oil fuel in the Raw Mill Dryers will need to be reviewed and approved by the Illinois Environmental Protection Agency air permitting officials, with issuance of a Construction Permit and modifications to the existing CAAPP Title V Operating Permit. Under the provisions of 35 Ill. Adm. Code Section 201, the use of off-specification used oil as a supplemental fuel in the Raw Mill Dryers is likely to be considered a change in the method of operation which would trigger construction and operating permit requirements. All questions about the air pollutant emissions associated with combustion of used oil fuel would be addressed and fully answered through the air permitting review process conducted by IEPA.

Proposed language for a Board Order that would approve the requested Adjusted Standard relief:

1. *Procedural History*
2. *Background*
3. *Agency Recommendation*
4. *Response to Recommendation*
5. *Discussion*
    - *Legal Framework*
    - *Availability of Relief Under Section 720.132*
    - *Section 720.132 Factors*
    - *Other Relevant Factors*
6. *Conclusion*

The Board finds that Lafarge Midwest, Inc. has established under Section 720.132 of the Board regulations (35 Ill. Adm. Code 720.132), that each of the Raw Mill Dryers at the Joppa Plant satisfies the criteria set forth in Section 720.132 to be considered a "boiler." Accordingly, the Board finds and determines that the Raw Mill Dryers are "boilers" within the meaning of 35 Ill. Adm. Code 720.110.

The Board's determination that the Raw Mill Dryers are "boilers" will allow the units to be used for the combustion of off-specification used oil for energy recovery, in compliance with Section 739.161 of the Board's regulations (35 Ill. Adm. Code 739.161). The Board emphasizes that use of off-specification used oil as fuel for the Raw Mill Dryers must comply with all other applicable Illinois and federal environmental standards and requirements, including the terms and conditions of "CAAPP Operating Permit and Title I Permit No. 95090110" issued for operation of the Joppa Portland Cement Manufacturing Plant and associated air pollution control equipment and any subsequent modifications thereto.

This opinion constitutes the Board's findings of fact and conclusions of law.

ORDER

1. *The Board finds that the Raw Mill Dryers operated by Lafarge Midwest, Inc. at its Joppa Portland Cement Manufacturing Plant meet the criteria set forth in 35 Ill. Adm. Code §720.132 to be considered a "boiler." The Board accordingly grants Lafarge Midwest, Inc. an Adjusted Standard under 35 Ill. Adm. Code 720.132 and determines that the Raw Mill Dryers are "boilers by designation" under 35 Ill. Adm. Code §720.110.*
2. *The Adjusted Standard will allow the Raw Mill Dryers to combust off-specification used oil for energy recovery under 35 Ill. Adm. Code 739.161, subject to compliance with all other applicable Illinois and federal environmental standards and requirements.*

IT IS SO ORDERED.

g) **The quantitative and qualitative description of the impact of the petitioner's activity on the environment if the petitioner were to comply with the regulation of general applicability as compared to the quantitative and qualitative impact on the environment if the petitioner were to comply only with the proposed adjusted standard. To the extent applicable, cross-media impacts must be discussed. Also, the petitioner must compare the qualitative and quantitative nature of emissions, discharges or releases that would be expected from compliance with the regulation of general applicability as opposed to that which would be expected from compliance with the proposed adjusted standard;**

Response: Lafarge believes that the Raw Mill Dryers at its Joppa Plant meet the regulatory definition of a "boiler" in 35 Ill. Adm. Code 720.110 and therefore are allowed to combust off-specification used oil fuels. However, IEPA officials have advised that obtaining a "boiler by designation" determination from the Pollution Control Board is necessary to comply with the applicable regulations. As a result, Lafarge is not able to secure the full benefits of used oil recycling and recover the significant amount of thermal energy contained in the off-specification used oil available as dryer fuels.

Lafarge will continue to combust substantial quantities of natural gas and on-specification used oil in its Raw Mill Dryers and be subject to the economic uncertainties associated with the volatility of oil and natural gas supplies and costs. As the costs of natural gas and petroleum increase and the availability of these non-renewable resources decreases, the economic success and viability of the Portland cement production operations at the Joppa Plant are threatened.

The Joppa Plant itself utilizes a number of other byproducts and materials from other industries as the raw materials in cement manufacturing processes. For example, Lafarge utilizes petroleum coke, a byproduct of the refining process, and waste tires as fuel for the kilns. In addition to byproduct fuels, Lafarge utilizes spent foundry sand, fly ash, bottom ash, iron slag and mill scale as raw materials in the raw feed. If not utilized by Lafarge as alternative raw materials in the cement manufacturing process, most of these industrial byproducts would be landfilled or otherwise disposed of as waste.

If the Board grants Lafarge's Adjusted Standard request, it would purchase off-specification used oil fuel from regulated used oil marketers at a cost per Btu of thermal energy that is significantly less than the escalating cost of natural gas and petroleum. The used oil fuels would be subject to strict specifications to ensure high Btu value, allow complete combustion and produce negligible change in the combustion exhaust gas composition.

The only consequence associated with the Board's approval to approve Lafarge's request to utilize off-specification used oil fuels in its Raw Mill Dryers would be a possible change in the air emissions from the Raw Mill Dryers. As noted above, the Raw Mill Dryers are permitted to combust natural gas and on-specification used oil as the primary dryer fuels. The Title V CAAPP Operating Permit establishes emissions limitations for particulate matter ("PM/PM_{10}"), sulfur dioxide ("SO_2"), carbon monoxide ("CO"), volatile organic material ("VOM"), and nitrogen oxides ("NO_x"). Compliance with the permitted emissions limits is achieved by full and complete combustion of the fuel and operation of air separators, and cyclone equipment designed to remove particulate matter from the mill exhaust gases.

Lafarge has investigated how combustion of off-specification used oil fuel would affect air emissions from the Raw Mill Dryers and whether it would maintain compliance with the existing emission limitations of the Title V CAAPP Operating Permit and the 2004 Construction Permit authorizing combustion of on-specification used oil fuel in the Raw Mill Dryers. Based on representative off-specification used oil fuels that would be supplied by reputable, authorized used oil marketers, Lafarge estimates that emissions from the Raw Mill Dryers would not exceed the existing permit limits. Utilization of off-specification used oil fuel in the Raw Mill Dryers must be reviewed and approved by the IEPA's Bureau of Air permitting officials, with issuance of a Construction Permit and modifications to the existing Title V CAAPP Operating Permit. As a result, any questions associated with combustion of off-specification used oil fuel would be addressed and fully resolved through the air permitting review process. Attached hereto as **Exhibit F** is the Clean Air Act Permit Program ("CAAPP") Title V Operating Permit and Title I Permit No. 95090119 issued November 14, 2002 for Petitioner's Joppa Plant.

Quantitative and Qualitative Impacts of Using Supplemental Used Oil Fuels. In preceding sections of this Petition, Lafarge has described the results of its investigations of air emissions associated with the combustion of off-specification used oil fuel as a supplemental fuel in the Raw Mill Dryers compared to the permitted fuels natural gas and on-specification used oil fuel. All emissions associated with combustion of off-specification used oil fuel would be less than the allowable emissions under the current CAAPP Title V Operating Permit and 2004 Construction Permit.

Utilization of off-specification used oil fuel in the Raw Mill Dryers will need to be reviewed and approved by the IEPA air permitting officials, with issuance of a Construction Permit and modifications to the existing Operating Permit. The permitting process would ensure that all emissions associated with combustion of off-specification used oil fuel would be in full compliance with all applicable regulatory requirements and environmental standards.

On a qualitative basis, Lafarge's proposal to utilize off-specification used oil fuel in the Raw Mill Dryers provides significant environmental benefits by recycling and reclaiming the thermal energy from used oils that are generated from motor vehicles, refineries and numerous industrial processes. Recycling used oil for reuse or energy recovery provides environmental and economic benefits. According to the USEPA's Office of Solid Waste, re-refining used oil for reuse as a lubricant takes approximately one-third the energy of refining crude oil to lubricant quality. It takes 42 gallons of crude oil, but only one gallon of used oil, to produce two and a half quarts of new, high-quality lubricating oil. In addition, as a fuel source one gallon of used oil processed for fuel contains about 140,000 British Thermal Units (BTUs) of energy.

Substituting off-specification used oil for natural gas helps to conserve this non-renewable resource. As noted in preceding sections of this Petition, the demand for natural gas has far outpaced current supplies and as a result, natural gas prices in the United States have more than doubled in the past three years. Substituting on-specification and off-specification used oil fuel in place of natural gas provides an environmental benefit by conserving a valuable natural resource.

Indirectly, the Board's approval of the relief requested by Lafarge would support the additional environmental benefits associated with the industrial byproduct recycling operations at the Joppa Plant. As noted earlier, Lafarge's production of Portland cement at the Joppa Plant utilizes a number of industrial byproducts to produce the finished product, byproducts that otherwise would be landfilled as solid wastes. Controlling the operating costs of the Joppa Plant by approving use of lower cost off-specification used oil supplemental fuel would provide more stability to Lafarge's production operations and maintain the environmental benefits of recycling various industrial byproducts into Portland cement products. It would reduce Lafarge's exposure to the volatility of price and supply of natural gas, a non-renewable source of energy.

Sources of Used Oil Supplies and Basic Quality Control Management Standards. Included in **Exhibit G** is a description of the nature and source of the used oil that is likely to be available for use as supplemental fuel for the slag dryer. In addition, Exhibit G summarizes the key procedures that would be instituted to control the quality of off-specification used oil to be used as fuel for the slag dryer. This summary document, entitled *"Potential Supply Sources and Basic Principles of Management of Off-Specification Used Oil Fuel for the Joppa Raw Mill Dryers,"* was prepared for Lafarge by Systech Environmental Corporation, a wholly owned subsidiary of Lafarge. It is anticipated that Systech Environmental Corporation will serve as Lafarge's principal contractor for identifying and qualifying used oil suppliers and making arrangements for delivery of off-specification used oil fuels to the Joppa Plant by pre-qualified suppliers.

h) A statement which explains how the petitioner seeks to justify, pursuant to the applicable level of justification, the proposed adjusted standard;

Response: Section 720.132 of the Board's regulations (35 Ill. Adm. Code §720.132), establishes the criteria to be considered by the Board in making a "case-by-case" determination that certain enclosed devices using controlled flame combustion are boilers, even though they do not otherwise meet the definition boiler contained in Section 720.110. The criteria for "case-by-case" boiler determination track closely the regulatory definition of "boiler" set forth at 35 Ill. Admin. Code 720.110. Consequently, when evaluating whether a particular combustion source, such as the Raw Mill Dryers at the Joppa Plant, should be classified as a boiler, the regulatory definition of "boiler" provides the determinative physical characteristics.

Set forth below is the regulatory definition of a "boiler" set forth at 35 Ill. Admin. Code 720.110:

> **"Boiler"** means an enclosed device using controlled flame combustion and having the following characteristics:
>
> > Boiler physical characteristics.
> >
> > The unit must have physical provisions for recovering and exporting thermal energy in the form of steam, heated fluids, or heated gases; and the unit's combustion chamber and primary energy recovery sections must be of integral design. To be of integral design, the combustion chamber and the primary energy

recovery sections *such as waterwalls and superheaters) must be physically formed into one manufactured or assembled unit. A unit in which the combustion chamber and the primary energy recovery sections are joined only by ducts or connections carrying flue gas is not integrally designed; however, secondary energy recovery equipment (such as economizers or air preheaters) need not be physically formed into the same unit as the combustion chamber and the primary energy recovery section. The following units are not precluded from being boilers solely because they are not of integral design: process heaters (units that transfer energy directly to a process stream) and fluidized bed combustion units; and

While in operation, the unit must maintain a thermal energy recovery efficiency of at least 60 percent, calculated in terms of the recovered energy compared with the thermal value of the fuel; and

The unit must export and utilize at least 75 percent of the recovered energy, calculated on an annual basis. In this calculation, no credit may be given for recovered heat used internally in the same unit. (Examples of internal use are the preheating of fuel or combustion air, and the driving of induced or forced draft fans or feedwater pumps); or

Boiler by designation. The unit is one that the Board has determined, on a case-by-case basis, to be a boiler, after considering the standards in Section 720.132.

The 35 Ill. Admin. Code 720.132(a) Criteria. Set forth below is a demonstration that Petitioner's Raw Mill Dryers satisfy each of the criteria specified at 35 Ill. Admin. Code 720.132(a) to be considered a boiler.

Section 720.132(a) The extent to which the unit has provisions for recovering and exporting thermal energy in the form of steam, heated fluids or heated gases:

The Raw Mill Dryers are constructed with burners designed to recover the maximum amount of thermal energy in the fuel being burned in order to heat the raw material mix and drive off moisture. Each Raw Mill Dryer functions as a direct-fired process heater in which the "raw feed" and additional air are brought into contact with the hot combustion gases. The thermal energy released by the combustion of the fuel is transferred to the raw mix and "raw feed" materials. Heating the raw materials vaporizes a portion of the moisture that is in the pores of the material. The heat is then exported in the form of heated and dried "raw feed" materials, hot gases and water vapor. The "raw feed," hot gases and water vapor are discharged from the dryer through cyclone and air separators, where the heated and dried raw materials are removed from the exhaust gas stream. Based on the raw material size, coarser raw materials are fed to the raw mills to further reduce particle size, while the finer hot, dried "raw feed" is conveyed directly to the four storage silos located near the feed ends of the two kilns.

The Raw Mill Dryers are fully enclosed with an outer shell of steel. The burning chamber is lined with a high temperature resistant refractory material and the transport shaft is lined with ceramic tile. This design is conducive to recovering as much energy as possible from the fuel. (A schematic drawing of the Raw Mill System is included as **Exhibit H.**)

Section 720.132(b). The extent to which the combustion chamber and energy recovery equipment are of integral design;

The Raw Mill System is designed such that operation of the Raw Mill is dependant upon operation of the Raw Mill Dryer and the dryer cannot operate if the Raw Mill is not operating. The entire system was installed as one operating unit and the function of the Raw Mill Dryers is to directly heat the raw materials and provide the centrifugal force (air velocity) to the separators. The Raw Mill Dryers are not operated as an independent revenue source.

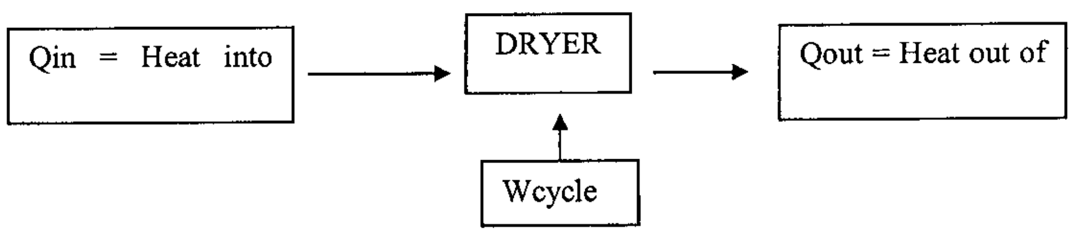
The combustion chamber and energy recovery sections of each Raw Mill Dryer are integral in design and assembly to function as a single unit. In addition, the regulatory definition of a "boiler" set forth in the Board's regulations at 35 Ill. Adm. Code 720.110 includes an express exemption from the "integral design" element for process heaters such as the Raw Mill Dryers. The regulation states:

"The following units are not precluded from being boilers solely because they are not of integral design: process heaters (units that transfer energy directly to a process stream) and fluidized bed combustion units."

Because the Raw Mill Dryers are direct-fired process heaters where the thermal energy of the combusted fuel is transferred directly to the raw materials being processed, the element of "integral design" is not a sole determinative criterion in this proceeding.

Section 720.132(c) The efficiency of energy recovery, calculated in terms of the recovered energy compared with the thermal value of the fuel;

For purposes of calculating the efficiency of energy recovery, a detailed analysis of the Raw Mill Dryers is necessary. The Raw Mills Dryers can be depicted in the following process flow diagram:



"Qin" = heat into the system

"Qout" = Energy out of the system

"Wcycle" = net amount of energy transfer by heat and work.

Systems undergoing the drying process as described above deliver a network transfer of energy to the surroundings. This is called a "power cycle". Thermal efficiency is calculated in engineering thermodynamic reference materials as the following:

η = Wcycle/Qin eq#1

An alternative form based on the balance of the system described above can be:

η = (Qin-Qout)/Qin eq#2

Equation #2 translates into: ***Efficiency = Energy Absorbed (Qin-Qout) divided by Qin (Heat into system)***

The efficiency method described above is based on the principles of the First and Second Laws of Thermodynamics, hence a method uniformly used worldwide for the design, operation and evaluation of heat systems. (See *Fundamentals of Engineering Thermodynamics*, Michael J. Moran, Third Edition, 1996, pages 60-61; *Chemical and Process Thermodynamics*, B.G. Kyle, Second Edition, 1992, page 63

A heat balance has been calculated for the Raw Mill Drying System to provide the input variables for the thermal efficiency calculations. All values and parameters used in the heat balance calculations are set forth in the following Tables:

- Table 1. Heat Balance Calculations: Total Heat In-Raw Mill 1
- Table 2. Heat Balance Calculations: Total Heat Out-Raw Mill 1
- Table 3. Heat Balance Calculations: Total Heat In-Raw Mill 2
- Table 4. Heat Balance Calculations : Total Heat Out-Raw Mill 2

Table 1. Heat Balance Calculations: Total Heat In RM 1

Line	Feed	Definition	As Measured (kg/hr)	Moisture Calculation	As measured (dry basis)	**Feed**	Kg/ Kg_mix	T(C)	CP (kcal/kgC)	Heat (Kcal/Kg Mix)
1	North CF	North Combustion Fan	10,100		10,029	10,029	0.0875	35	0.2450	0.7504
2	South CF	South Combustion Fan	13,756		13,659	13,659	0.1192	35	0.2450	1.0220
3	North FAD	North Fresh Air Damper	19,034		11,657	11,657	0.1017	39	0.2459	0.9755
4	South FAD	South Fresh Air Damper	11,740		18,900	18,900	0.1649	39	0.2459	1.5816
5	Raw Mix	Raw Material	120,000		114,600	114,600	1.0000	60	0.2150	12.9000
6	Raw Mix_H_2O	Raw Material Water		5,400		5,400	0.0471	60	0.4594	1.2988
7	North CF_H_2O	North Combustion Fan Air Water		71		71	0.0006	35	0.4570	0.0099
8	South CF_H_2O	South Combustion Fan Air Water		97		97	0.0008	35	0.4570	0.0135
9	North FAD_H_2O	North Fresh Air Damper Air Water		83		83	0.0007	39	0.4587	0.0129
10	South FAD_H_2O	South Fresh Air Damper Air Water		134		134	0.0012	39	0.4587	0.0209
11	North Fuel Gas_H_2O	North Fuel Gas Water		4		4	0.0000	80	0.4759	0.0012
12	North Fuel Oil_H_2O	North Fuel Oil Water		2		2	0.0000	80	0.4759	0.0007
13	South Fuel Gas_H_2O	South Fuel Gas Water		5		5	0.0000	80	0.4759	0.0017
14	South Fuel Oil_H_2O	South Fuel Oil Water		2		2	0.0000	80	0.4759	0.0005
15	North Gas Latent Heat		36		32	32	0.0003	80	0.2500	0.0057
16	North Oil Latent Heat		248		246	246	0.0022	80	0.4492	0.0773
17	South Gas Latent Heat		50.4		45	45	0.0004	80	0.2500	0.0079
18	South Oil Latent Heat		205		204	204	0.0018	80	0.4492	0.0638
19	False Air		5,463		5,463	5,463	0.0477	39	0.2459	0.4572
20	North Fuel Combustion Heat Gas		40	(m^3/hr)					35.4300	2.9531
21	North Fuel Combustion Heat Oil		248						44.0330	22.7918
22	South Fuel Combustion Heat Gas		56	(m^3/hr)					35.4300	4.1344
23	South Fuel Combustion Heat Oil		205						44.0330	18.8280
24									Total Heat In	67.9089

Table 2. Heat Balance Calculations: Total Heat Out RM 1

25	False Air in Stack Gas		5,463	Estimate 10%	5,463	5,463	0.0477	88	0.2573	1.0793
26	Stack Gas		60,048		54,244	54,244	0.4733	88	0.2573	10.7174
27	Stack Gas_H20	Stack Gas Water		5,803		5,803	0.0506	88	0.4725	2.1057
28	Raw Mix	Raw Material	115,288		114,600	114,600	1.0000	86	0.2150	18.4900
29	Raw Mix_H_2O	Raw Material Water		688		688	0.0060	86	0.4599	0.2373
31	Heat of vaporization					4,712	0.0411		539	22.1639
32									Heat Out	56.1986
33	Other heat escaping the system (radiation, joints, fitings, etc.)									11.7102
34									Total Heat Out	67.9089
35									% Recovery	[illegible]

Table 3. Heat Balance Calculations: Total Heat In RM 2

Line	Feed	Definition	As Measured (kg/hr)	Moisture Calculation	As measured (dry basis)	Feed	Kg/ Kg_mix	T(C)	CP (kcal/kgC)	Heat (Kcal/Kg Mix)
1	CF	Combustion Fan	36,388		36,132	36,132	0.3900	38	0.2457	3.6417
2	FAD	Fresh Air Damper	51,444		51,417	51,417	0.5551	38	0.2457	5.1823
3	Raw Mix	Raw Material	97,000		92,635	92,635	1.0000	60	0.2150	12.9000
4	Raw Mix_H_2O	Raw Material Water		4,365		4,365	0.0471	60	0.4594	1.2988
5	CF_H_2O	Combustion Fan Air Water		256		256	0.0028	38	0.4582	0.0481
6	FAD_H_2O	Fresh Air Damper Air Water		362		362	0.0039	38	0.4582	0.0680
7	Fuel Gas_H_2O	Fuel Gas Water		27		27	0.0003	80	0.4759	0.0111
8	Fuel Oil_H_2O	Fuel Oil Water		2		2	0.0000	80	0.4759	0.0007
9	Gas Latent Heat		270		243	243	0.0026	80	0.2500	0.0525
10	Oil Latent Heat		216		214	214	0.0023	80	0.4492	0.0831
11	False Air		8,783		8,783	8,783	0.0948	38	0.2457	0.8853
12	Fuel Combustion Heat Gas		300	(m^3/hr)					35.4300	27.4001
13	Fuel Combustion Heat Oil		216						44.0330	24.5184
14									Total Heat In	76.0901

Table 4. Heat Balance Calculations: Total Heat Out RM 2

15	False Air in Stack Gas		8,783	Estimate 10%	8,783	8,783	0.0948	88	0.2573	2.1468
16	Stack Gas		92,505		87,549	87,549	0.9451	88	0.2573	21.3993
17	Stack Gas_H20	Stack Gas Water		4,956		4,956	0.0535	88	0.4725	2.2245
18	Raw Mix	Raw Material	93,191		92,635	92,635	1.0000	86	0.2150	18.4900
19	Raw Mix_H_2O	Raw Material Water		556		556	0.0060	86	0.4599	0.2373
20	Heat of vaporization					3,809	0.0411		539	22.1639
21									Heat Out	68.3712
22	Other heat escaping the system (radiation, joints, fitings, etc.)									7.7189
23									Total Heat Out	76.0901
24									% Recovery	[redacted]

The following parameters were used to calculate the heat balance for the Raw Mill Drying System:

Inlet Parameters RM1 (Table 1)

*Heat input from north combustion fan (CF) = (Dry North combustion Fan Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T*

*Heat input from south combustion fan (CF) = (Dry South combustion Fan Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T*

*Heat input from north Fresh Air Damper (FAD) = (Dry Fresh Air Damper Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T*

*Heat input from south Fresh Air Damper (FAD) = (Dry Fresh Air Damper Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T*

*Heat input from Raw Material stream = (Dry Raw material Feed Rate (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature Raw material Feed before dryer (°C) * Specific Heat capacity of Raw material @ stream T ** The raw material feed rate was used as the reference material (Kcal /Kg raw material)*

*Heat input from water in raw material = (Water mass flow in raw material (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature water in raw material (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in north combustion fan air stream = (Water mass flow in combustion fan air stream from relative humidity (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in combustion fan air stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in south combustion fan air stream = (Water mass flow in combustion fan air stream from relative humidity (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in combustion fan air stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in north fresh air damper air stream = (Water mass flow in fresh air damper air stream from relative humidity (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in fresh air damper air stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in south fresh air damper air stream = (Water mass flow in fresh air damper air stream from relative humidity (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in fresh air damper air stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in north furnace Natural Gas stream = (Water mass flow in north furnace gas from moisture provided by gas company (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in gas stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in north furnace oil stream = (Water mass flow in north furnace oil from moisture provided by oil company (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in oil stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in south furnace Natural Gas stream = (Water mass flow in south furnace gas from moisture provided by gas company (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in gas stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in south furnace oil stream = (Water mass flow in south furnace oil from moisture provided by oil company (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in oil stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from latent heat of north furnace natural gas = (Dry north furnace natural gas flow rate (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of natural gas stream (°C) * Specific Heat capacity of natural gas @ stream T*

*Heat input from latent heat of north furnace oil = (Dry north furnace oil flow rate (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of oil stream (°C) * Specific Heat capacity of oil @ stream T*

*Heat input from latent heat of south furnace natural gas = (Dry south furnace natural gas flow rate (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of natural gas stream (°C) * Specific Heat capacity of natural gas @ stream T*

*Heat input from latent heat of south furnace oil = (Dry south furnace oil flow rate (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of oil stream (°C) * Specific Heat capacity of oil @ stream T*

*Heat input from false air = (Dry false air Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T *** False air is the air as a result of in-leakage in the system. It is estimated to be about 10% of the stack's air flow rate*

*Heat input from north furnace natural gas stream = north furnace natural gas flow rate from gas meter (ft^3/hour) * Gas fuel value from gas company (BTU/ft^3) * conversion factor to Kcal / Dry Raw material Feed Rate (Kg/hour)*

*Heat input from north furnace natural oil stream = north furnace oil flow rate (kg/hour) * oil fuel value from oil company (BTU/kg) * conversion factor to Kcal / Dry Raw material Feed Rate (Kg/hour)*

*Heat input from south furnace natural gas stream = south furnace natural gas flow rate from gas meter (ft^3/hour) * Gas fuel value from gas company (BTU/ft^3) * conversion factor to Kcal / Dry Raw material Feed Rate (Kg/hour)*

*Heat input from south furnace natural oil stream = south furnace oil flow rate (kg/hour) * oil fuel value from oil company (BTU/kg) * conversion factor to Kcal / Dry Raw material Feed Rate (Kg/hour)*

Total heat in = SUM Lines (1 to 23)

Outlet Parameters RM 1 (Table 2)

*Heat output from false air = (Dry false air Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T *** False air is the air as a result of in-leakage in the system. It is estimated to be about 10% of the stack's air flow rate*

*Heat output from stack stream = (Dry stack stream Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T*

*Heat output from water in stack air stream = (Water mass flow in stack air stream from relative humidity (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in stack air stream (°C) * Specific Heat capacity of water @ stream T*

*Heat output from Raw material stream = (Raw material mass flow rate after dryer (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature Raw material after dryer (°C) * Specific Heat capacity of Raw material @ stream T*

*Heat output from water in raw material stream after dryer = (Water mass flow in raw material steam (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature water in raw material (°C) * Specific Heat capacity of water @ stream T*

*Heat output from heat loss thru the system walls = Total heat out (SUM lines 14 to 18 and line 20) * 0.025*

*Heat output released from the vaporization of water = Water mass flow rate (kg/hr) / Dry Raw material Feed Rate (Kg/hour) * heat of vaporization of water*

Heat out = (SUM Lines (25 to 31)) / 0.975 (stack factor)

*Other heat escaping the system = Line 24 - Line 32 ** This heat includes the radiation heat loss*

Total heat Out = SUM Lines (32 to 33)

*% Recovery = (Line 34 – Sum Lines (25 to 27) – Line 33)/(Sum Lines (20 to 23) * 100%*

Inlet Parameters RM2 (Table 3)

*Heat input from combustion fan (CF) = (Dry combustion Fan Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T*

*Heat input from Fresh Air Damper (FAD) = (Dry Fresh Air Damper Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T*

*Heat input from Raw Material stream = (Dry Raw material Feed Rate (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature Raw material Feed before dryer (°C) * Specific Heat capacity of Raw material @ stream T ** The raw material feed rate was used as the reference material (Kcal /Kg raw material)*

*Heat input from water in raw material = (Water mass flow in raw material (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature water in raw material (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in combustion fan air stream = (Water mass flow in combustion fan air stream from relative humidity (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in combustion fan air stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in fresh air damper air stream = (Water mass flow in fresh air damper air stream from relative humidity (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in fresh air damper air stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in furnace Natural Gas stream = (Water mass flow in furnace gas from moisture provided by gas company (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in gas stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from water in furnace oil stream = (Water mass flow in furnace oil from moisture provided by oil company (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in oil stream (°C) * Specific Heat capacity of water @ stream T*

*Heat input from latent heat of furnace natural gas = (Dry furnace natural gas flow rate (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of natural gas stream (°C) * Specific Heat capacity of natural gas @ stream T*

*Heat input from latent heat of furnace oil = (Dry furnace oil flow rate (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of oil stream (°C) * Specific Heat capacity of oil @ stream T*

*Heat input from false air = (Dry false air Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T *** False air is the air as a result of in-leakage in the system. It is estimated to be about 10% of the stack's air flow rate*

*Heat input from furnace natural gas stream = furnace natural gas flow rate from gas meter (ft^3/hour) * Gas fuel value from gas company (BTU/ft^3) * conversion factor to Kcal / Dry Raw material Feed Rate (Kg/hour)*

*Heat input from furnace natural oil stream = furnace oil flow rate (kg/hour) * oil fuel value from oil company (BTU/kg) * conversion factor to Kcal / Dry Raw material Feed Rate (Kg/hour)*

Total heat in = SUM Lines (1 to 13)

Outlet Parameters RM 2 (Table 4)

*Heat output from false air = (Dry false air Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T *** False air is the air as a result of in-leakage in the system. It is estimated to be about 10% of the stack's air flow rate*

*Heat output from stack stream = (Dry stack stream Airflow (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature of Air stream (°C) * Specific Heat capacity of Air @ stream T*

*Heat output from water in stack air stream = (Water mass flow in stack air stream from relative humidity (kg/hour) * / Dry Raw material Feed Rate (Kg/hour)) * Temperature of water in stack air stream (°C) * Specific Heat capacity of water @ stream T*

*Heat output from Raw material stream = (Raw material mass flow rate after dryer (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature Raw material after dryer (°C) * Specific Heat capacity of Raw material @ stream T*

*Heat output from water in raw material stream after dryer = (Water mass flow in raw material steam (kg/hour) / Dry Raw material Feed Rate (Kg/hour)) * Temperature water in raw material (°C) * Specific Heat capacity of water @ stream T*

*Heat output from heat loss thru the system walls = Total heat out (SUM lines 14 to 18 and line 20) * 0.025*

*Heat output released from the vaporization of water = Water mass flow rate (kg/hr) / Dry Raw material Feed Rate (Kg/hour) * heat of vaporization of water*

Heat out = (SUM Lines (15 to 20)) / 0.975 (stack factor)

*Other heat escaping the system = Line 14 - Line 21 ** This heat includes the radiation heat loss*

Total heat Out = SUM Lines (21 to 22)

*% Recovery = (Line 23 – Sum Lines (15 to 17) – Line 22)/(Sum Lines (12 to 13) * 100%*

Other Definitions

- "CP" = Specific Heat Capacity. At a given temperature, this is the heat input expected from each of the components named above.
- "As measure sample." On actual conditions, without moisture adjustments
- "Moisture calculation." In the case of the air, the relative humidity and temperature is used along with a Psychometric chart to determine the Kg of water/Kg or air ratios.
- "As measured (Dry basis)." Stream of water or material with the moisture removed
- "Kg/Kg Raw Mix." When performing heat balances it is important to select a reference variable. In this case, we selected the raw mix feed as a reference variable.
- "T.: This is the actual temperature of the material or gas stream.
- "Heat." The heat consumption can be obtained by multiplying the Kg/Kg Raw Mix times the temperature times the CP of the individual values.

Assumptions Used in Heat Balance Calculations. One of the primary tasks in designing combustion equipment or engineering a complex mineral drying process is the development of a heat balance. Development of a heat balance is essentially a detailed accounting of the distribution of heat input, heat output and system losses. The heat balance accounting relies on actual test data, mathematical derivations and generally accepted engineering assumptions. Bejan, A., "Advance Engineering Thermodynamics," John Wiley & Sons, 1988. Two of those assumptions used by Petitioner in preparation of the heat balance calculations for the Raw Mill Dryers were the amount of "false air" input to the system and the amount of heat loss due to "shell radiation." These two assumptions are utilized in deriving heat balance calculations, designing drying equipment and improving the efficiency of the cement manufacturing process. Bhatty, J.I., Miller, F.M. and Kosmota, S.H., "Innovations in Portland Cement Manufacturing," Portland Cement Association, 2004.

For Lafarge cement manufacturing and mineral processing facilities and generally within the cement industry, an accepted assumption for average "false air" in newer combustion equipment and mineral drying systems is a 10 percent value. This value takes into account devices such as expansion joints, inspection doors/ports, normal equipment wear and any other in-leakage inherent with the system. An accepted assumption for average heat losses due to "shell radiation" in newer combustion equipment and mineral drying systems is a 2.5 percent value. This assumption addresses the radiant heat lost to the surrounding structures of the dryer or combustion device.

Thermal Energy Recovery Efficiency Calculation. The definition of the term "boiler" at 35 Ill. Admin. Code 720.110 specifies a standard for thermal energy recovery efficiency for a boiler. The relevant portion of the definition (which is identical to the federal definition) states: "While in operation, the unit must maintain a thermal energy recovery efficiency of at least 60 percent, calculated in terms of the recovered energy compared with the thermal value of the fuel"

Calculations to demonstrate compliance with the 60% thermal energy recovery efficiency standard of Section 721.110 were performed as described below:

- Thermal value of the fuel from lines 24 and 14 in Tables 1 and 4 Raw Mills 1 and 2 are 67.9089 and 76.0901 respectively.
- Recovered Energy = Energy used by the system. This value is calculated as follows:
    - The total value of energy used is calculated by subtracting the total heat out less 1.5% to account for energy used in the preheating process of the Raw Mill Dryer.
    - In order to calculate the recovered energy (energy absorbed) from the system, to the total heat value calculated above, we will subtract all heats that leave the system (False air in stack gas, stack gas, stack gas H2O, and radiation)
    - The values obtained from the step above are 56.1986 and 68.3712 Kcal/Kg raw mix for Raw Mill Dryers 1 and 2 respectively.
- Finding the thermal energy recovery as per 40 CFR 260.10(1)(iii): The last step is to divide the recovered energy (energy absorbed) by the thermal

value of the fuel producing energy recovery efficiencies of 86.84% and 82.05% for Raw Mill Dryers 1 and 2 respectively.

As demonstrated by the foregoing calculations (and supported by the heat balance calculations), the Raw Mill Drying System achieves a thermal energy recovery efficiency of 86.84% and 82.05% for Raw Mill Dryers 1 and 2, respectively. The thermal energy recovery efficiency clearly exceeds the Section 720.110 criterion of a minimum of 60% recovery.

Section 720.132(d) The extent to which exported energy is utilized;

The definition of the term "boiler" at 35 Ill. Admin. Code 720.110 specifies a standard for utilization of the recovered thermal energy for a boiler. The relevant portion of the definition (which is identical to the federal definition) states: "The unit must export and utilize at least 75 percent of the recovered energy, calculated on an annual basis. In this calculation, no credit may be given for recovered heat used internally in the same unit. (Examples of internal use are the preheating of fuel or combustion air, and the driving of induced or forced draft fans or feedwater pumps.)"

Internal use of the recovered heat only occurs during preheating every time the system is started. The preheating hours account for 1.5% of the total operating hours in a year. With the loss of 1.5 percent of the fuel heat input due to preheating the dryer, the annual energy recovery is estimated to be 82.40% for Raw Mill Dryer #1 and 79.85% for Raw Mill Dryer #2. The utilization of the recovered thermal energy clearly exceeds the Section 720.110 criterion of a minimum of 75% utilization.

Section 720.132(e) The extent to which the device is in common and customary use as a "boiler" functioning primarily to produce steam, heated fluids or heated gases.

Direct-fired dryers and process heaters are widely used in the production of cement and other non-metallic mineral products. Cement kilns and the associated process heaters and dryers used in the production of Portland cement utilize a tremendous amount of fuel to prepare and dry the raw materials used in the dry cement manufacturing process and to produce the extreme temperatures and long residence times needed to calcine limestone rock, shale, sand and other minerals to produce clinker and ultimately Portland cement. It is a matter of common knowledge that cement kilns utilize a variety of fuel types including coal, petroleum coke, specification and off-specification used oil, used vehicle tires and even hazardous wastes in a safe and environmentally sound manner under express authorization and approvals from state and federal environmental regulatory agencies.

Lafarge operates a large Portland cement manufacturing plant located near Alpena, Michigan. The Alpena Plant is Lafarge's largest cement-producing facility and reputed to be the largest cement manufacturing facility in North America. The plant consists of five cement kilns that produce approximately 2.7 million tons of cement annually.

Lafarge is committed to sustainable development and the Alpena Plant has served as a showcase for several environmentally beneficial recycling projects. For example, the Alpena Plant is one of the few North American cement plants to use waste heat from the cement kilns to generate steam which drives turbines that produce electricity to power the plant's internal electrical system. Another recycling opportunity implemented by Lafarge at the Alpena Plant was the utilization of off-specification used oil as fuel in the Raw Mill Dryers.

The State of Michigan administers a used oil regulatory program that is virtually identical to the federal and Illinois used oil management programs. Consequently, Lafarge consulted with the Michigan Department of Environmental Quality ("DEQ") to secure approval to combust off-specification used oil fuel in the Alpena Raw Mill Dryers. Under the DEQ-administered used oil/RCRA regulations, specifically Michigan DEQ rules R299.9814 and 299.9101, Lafarge was required to demonstrate that the Alpena Raw Mill Dryers satisfied the physical boiler criteria established by USEPA (and adopted by both Illinois and Michigan), to demonstrate that combustion of off-specification used oil fuel in the dryers constituted a legitimate use for energy recovery.

The Michigan DEQ reviewed the design, combustion efficiency and energy recovery attributes of the Alpena Raw Mill Dryers and determined that the Raw Mill Dryers satisfied the physical criteria established by USEPA (and adopted by Michigan and Illinois), in the regulatory definition of "boiler." Because the DEQ officials determined that the physical criteria were met, Lafarge was given approval to proceed with the combustion of off-specification used oil fuel in the Raw Mill Dryers. The Michigan DEQ approved the use of off-specification used oil fuel by a detailed analysis of the dryer information provided by Lafarge, and did not require Lafarge to seek a variance or Adjusted Standard through the "boiler by designation" process. A copy of the Michigan DEQ's April 2, 2004 determination is attached hereto as **Exhibit I**.

The Raw Mill Dryers utilized at Lafarge's Joppa Plant are virtually identical to the Alpena Raw Mill Dryers that were given approval by the Michigan DEQ to combust off-specification used oil. With respect to the physical criteria established in the definition of "boiler," specifically integral design, combustion efficiency and energy recovery, the Raw Mill Dryers at Joppa and Alpena are virtually identical. The Michigan DEQ's determination that the Alpena Raw Mill Dryers meet the boiler physical characteristics and therefore are authorized to combust off-specification used oil fuel is an excellent example that such combustion sources are *"in common and customary use as a "boiler" functioning primarily to produce steam, heated fluids or heated gases."* Moreover, it demonstrates that the Board's approval to grant the adjusted standard relief requested in this proceeding would be consistent with the findings of other environmental regulatory authorities.

Section 720.132(f) Other relevant factors.

The federal used oil/RCRA regulations at 40 CFR 260.33 specify the procedures for making a case-by-case determination that a particular combustion device, such as the Raw Mill Dryers at Lafarge's Joppa Plant, should be considered a "boiler" for purposes of utilizing off-specification used oil fuels. The federal regulations define the term "boiler" (40 CFR 260.10), allow the combustion of off-specification used oil in boilers (40 CFR 279.61), and specify the criteria to determine which combustion devices can be considered equivalent to a boiler and allowed to combust off-specification used oil (40 CFR 260.32.) As noted above, the Pollution Control Board has completed "identical–in-substance" rulemakings to adopt these federal RCRA regulations as the Illinois regulations applicable to the combustion of off-specification used oil in boilers and similar combustion devices.

In promulgating the referenced RCRA regulations, USEPA has provided explanations of the regulations and discussed application of the rules to specific fact patterns. Those explanations and interpretations are set forth in the preamble discussions that accompany the rulemakings published in the Federal Register. In its legislative capacity, the Board has relied on USEPA preamble discussions to support its own rulemaking efforts and at times, has actually adopted USEPA guidance as mandatory and not advisory. (See the Board's recent rulemaking in R03-18 and its determination in that rulemaking that USEPA's RCRA guidance for delisting hazardous wastes was mandatory and not solely advisory.) Consequently, the justifications set forth by USEPA to explain and interpret the criteria for making "case-by-case" boiler determinations can and should be relied upon by the Board in reviewing Lafarge's request for a case-by-case boiler determination in this proceeding. As provided by 35 Ill. Admin. Code 101.630, Petitioner requests the Board take offical notice of USEPA rulemakings and guidance on utilizing used oil fuels.

In its November 29, 1985 rulemaking for the used oil management standards (50 *Federal Register* 49164), USEPA explained why it was allowing combustion of off-specification used oil in industrial boilers but not in "...nonindustrial boilers (e.g., located in apartment and office buildings, schools, hospitals.)" USEPA focused on the risks of burning off-specification used oil in such "nonindustrial" combustion sources due to proximity to highly populated areas. Due to the greater number of "nonindustrial" boilers and the location of such sources in populated areas, these combustion sources would potentially expose many more individuals to emissions from burning off-specification used oil fuels.

Combustion of off-specification of used oil in industrial and utility boilers was believed by USEPA as presenting much lower risks because such boilers are not located in close proximity to populated areas and because *"...large boilers or industrial furnaces may be operated by trained operators and equipped with combustion controls sophisticated enough to maintain peak combustion efficiency when burning fuels the unit is not designed to burn. Further, many industrial furnaces and some boilers are* *equipped with particulate control equipment that may adequately control emissions from metal-bearing waste fuels."*

As evidenced by USEPA's preamble discussion, the agency considered four basic criteria in permitting combustion of off-specification used oil in industrial but not "nonindustrial" combustion sources: (1) location away from populated areas; (2) operation by trained operators; (3) maintaining good combustion efficiency to destroy organics; and (4) pollution control equipment to control particulate matter emissions. In addition, USEPA has defined certain physical characteristics of boilers to distinguish boilers used to reclaim thermal energy from used oil or waste from other devices designed primarily to incinerate or dispose of wastes without legitimate thermal recovery.

In the final RCRA rulemaking for the definition of the term "boiler," USEPA explained "The integral design test is supplemented by quantified criteria for continuous and long-term energy recovery. These supplementary tests are designed to ensure that units that are physically designed as boilers are not actually being used to destroy hazardous waste." (50 Fed. Reg. 614.)

The use of off-specification used oil fuel in the Raw Mill Dryers at the Joppa Plant will satisfy all of the criteria relied upon by USEPA to allow combustion of off-specification used oil in industrial boilers. As set forth above, the design, combustion efficiency and energy recovery attributes of the Raw Mill Dryers satisfy the physical criteria established by USEPA for boilers.

In addition, the Joppa Raw Mill Dryers satisfy the non-physical criteria identified by USEPA as justifying combustion in industrial boilers versus non-industrial boilers. First, the Joppa Plant is located in the sparsely populated, rural Massac County and its location is remote from any significant residential development. (See **Exhibit B** Population Density Map.) The Joppa Plant and the Raw Mill Dryers, in particular, are operated by trained personnel. The Raw Mill Dryers are equipped with of state-of-the-art, efficient combustors and operating controls to maximize complete combustion of the fuels. Good combustion controls are designed into the system to maximize the extraction of all Btu value from the fuels combusted. Since fuel costs are critical to the overall profitability of the Joppa Plant, maximizing fuel efficiency is always a top priority, even if Lafarge is allowed to use lower cost off-specification used oil fuels.

Finally, the Raw Mill Dryers are equipped with high-efficiency fabric filter baghouses, cyclones and air separators designed to capture the heated, dried raw materials and minimize the release of PM and other air contaminants in the exhaust gases. Maximizing capture of the heated, dried "raw feed" is another component of plant productivity and profitability that is critical to the overall financial health and long-term viability of the facility.

i) **A statement with supporting reasons that the Board may grant the proposed adjusted standard consistent with federal law. The petitioner must also inform the Board of all procedural requirements applicable to the Board's decision on the petitioner that are imposed by federal law and not required by this Subpart. Relevant regulatory and statutory authorities must be cited;**

Response: The Board may grant the case-by-case boiler determination in this adjusted standard proceeding in full compliance with federal law. Section 7.2 and 22.4(a) of the Illinois Environmental Protection Act [415 ILCS 5/7.2 and 22.4(a)] require the Pollution Control Board to adopt regulations that are "identical in substance" to the hazardous waste regulations adopted by the USEPA. The USEPA hazardous waste regulations implement Subtitle C of the federal Resource Conservation and Recovery Act of 1976 [RCRA Subtitle C, 42 U.S.C. 6921, et seq.].

The federal RCRA regulations contain identical provisions for making a determination that a particular combustion device, such as the Raw Mill Dryers operated at Lafarge's Joppa Plant, should be considered a "boiler" for purposes of utilizing off-specification used oil fuels. That federal regulation is set forth at 40 CFR 260.32 "*Variance to be classified as a boiler*." Although the Illinois regulatory program uses the term "adjusted standard" rather than "variance" to describe the agency "case-by-case" boiler determination, the standards, criteria and procedures are identical.

In short, the Illinois hazardous waste management regulations are "identical in substance" to the federal RCRA regulations with respect to making case-by-case boiler determinations for certain combustion devices. Both Illinois and federal regulations provide a mechanism to determine "...on a case-by-case basis that certain enclosed devices using controlled flame combustion are boilers, even though they do not otherwise meet the definition of boiler contained in Section 260.10." The federal regulation is set forth at 40 CFR 260.32 and the "identical in substance" Illinois regulation is set forth at 35 IAC 720.132. Approval by the Board of Lafarge's Petition would be consistent with federal law and the implementing RCRA regulations.

j) A statement requesting or waiving a hearing on the petition (pursuant to Section 104.422(a)(4) of this Part a hearing will be held on all petitions for adjusted standards filed pursuant to 35 Ill. Adm. Code 212.126 (CAA));

Response: Petitioner waives its right to a hearing on the Petition.

k) The petition must cite to supporting documents or legal authorities whenever they are used as a basis for the petitioner's proof. Relevant portions of the documents and legal authorities other than Board's decisions, State regulations, statutes and reported cases must be appended to the petition;

Response: Relevant portions of all documents or other information sources that have been used to support this Petition are attached.

l) **Any additional information which may be required in the regulation of general applicability.**

Response: The regulation of general applicability does not specify any additional information requirements that must be addressed in this Petition. However, Lafarge requests that the Board consider the determinations made by other regulatory authorities to allow the combustion of off-specification used oil in controlled flame combustion devices such as Raw Mill Dryers used in the dry Portland cement manufacturing process. As noted previously, the Michigan DEQ has determined that the Raw Mill Dryers at Lafarge's Alpena cement plant meet the physical characteristics of a "boiler" that are specified in the used oil/RCRA regulations and approved Lafarge's request to utilize off-specification used oil as fuel in those process dryers. (See Exhibit J.) The Raw Mill Dryers in use at Lafarge's Joppa Plant are virtually identical to the Alpena Raw Mill Dryers authorized by the Michigan DEQ to utilize off-specification used oil fuel. The technical and regulatory analysis conducted by Michigan DEQ officials should be considered by the Board in evaluating Lafarge's request to utilize off-specification used oil fuel in the Raw Mill Dryers at its Joppa Plant.

WHEREFORE, Petitioner requests a determination from the Illinois Pollution Control Board that each of the Raw Mill Dryers operated at the Joppa Portland Cement Manufacturing Plant satisfy the criteria set forth in Section 720.132; that each of the Raw Mill Dryers are "Boilers by designation" within the meaning of 35 Ill. Adm. Code 720.110; and may utilize off-specification used oil for energy recovery, in compliance with Section 739.161 of the Board's regulations (35 Ill. Adm. Code 739.161).

Respectfully submitted,

LAFARGE MIDWEST, INC., Petitioner

By: ______________________________
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LIST OF EXHIBITS

Exhibit A: Aerial Photograph of Joppa Plant
(Source: Terraserver.com Aerial Photography Service)

Exhibit B: Map Depicting Joppa Plant and Population Density in Massac County
(Source: USEPA *Enviromapper* Database)

Exhibit C: Construction Permit No. 03080024 issued January 14, 2004, authorizing combustion of on-specification used oil fuel in the two Raw Mill Dryers.

Exhibit D: Annual Emissions Report for 2004 Calendar Year Reporting Period

Exhibit E: NPDES Permit No. IL0004081 and Permit to Construct No. 2005-EN-3317 for the new sanitary wastewater treatment facility.

Exhibit F: Clean Air Act Permit Program ("CAAPP") Title V Operating Permit and Title I Permit No. 95090119 issued November 14, 2002

Exhibit G: Potential Supply Sources and Basic Principles for Management of Off-Specification Used Oil Fuel for the Joppa Raw Mill Dryers

Exhibit H: Schematic Drawing of Raw Mill System

Exhibit I: Michigan DEQ Correspondence (April 2, 2004) - Approval for Off-Specification Used Oil Fuel in Alpena Raw Mills

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
PETITION OF LAFARGE MIDWEST, INC.	)	
FOR BOILER DETERMINATION THROUGH	)	
ADJUSTED STANDARD PROCEEDINGS	)	Case No. AS ____ - ____________
Pursuant to 35 Ill. Adm. Code 720.132 and	)	
720.133	)	
	)	
Petitioner.	)	
	)	

CERTIFICATE OF SERVICE

I, the undersigned, certify that I have served the attached ***Petition of Lafarge Midwest, Inc. for Boiler Determination Through Adjusted Standard Proceedings*** upon the person or agency to whom it is directed, by placing it in an envelope addressed to:

Illinois Pollution Control Board
Attn: Dorothy M. Gunn, Clerk
100 West Randolph Street
James R. Thompson Center, Suite 11-500
Chicago, IL 60601-3218

Division of Legal Counsel
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

and mailing it via UPS Ground Mail from Peoria, Illinois, on this 28th day of March, 2006, with sufficient postage affixed thereto.

Respectfully Submitted,

On behalf of the LAFARGE MIDWEST, INC.,

By: Hinshaw & Culbertson LLP

Jon S. Faletto
One of Its Attorneys

HINSHAW & CULBERTSON LLP
456 Fulton Street, Suite 298
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