KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES
4014 NW 13th STREET
GAINESVILLE, FL 32609-1923
www.kooglerassociates.com
352/377-5822 ■ FAX/377-5822

187-14-02

January 13, 2015

via email only

Tammy McWade
Air Permitting and Compliance Program
Division of Air Resource Management
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399
Tammy.McWade@dep.state.fl.us

Subject: Project: 0010087-051-AC, Alternative Fuel Materials Project
Air Construction Permit application
Argos Newberry Cement Plant
Response to Request for Additional Information

Dear Tammy,

This letter is in response to the request for additional information (RAI) letter sent to Chris Horner on July 18, 2014 and extended October 15, 2014. I have itemized our responses below and enclosed documents to address each item, as necessary.

Item 1) *Engineered Fuels: Based on the application, one of the categories of fuel materials that is proposed to be fired in the kilns includes "engineered fuels." Engineered fuels are described as fuel engineered to have targeted, consistent fuel properties such as: calorific value, moisture, particle size, ash content, and volatility. The specific targeted properties are established based on available alternative fuel material supply and are carefully controlled through blending of nonhazardous combustible materials or through separation of nonhazardous incombustible materials from combustible materials (mixes of any alternative fuels where the blending and processing may also include the addition of on-specification and off specification used oils or other non-hazardous liquids to ensure consistent and predictable fuel properties). Please provide a description of the materials that engineered fuels will be comprised of.*

Response

Information is provided below that describes materials that are considered engineered fuels (EF). Note that some of the information below is gathered from prior FDEP alternative fuel materials (AFM) permitting documents. The general description provided in the application and repeated above is that the EF must have targeted and consistent chemical and physical properties. The targeted properties must be consistent because operating a precalciner/preheater kiln demands extremely consistent thermal distribution over space and time in the kiln system. In addition, variability of AFM chemistry can degrade the quality of the cement product which must meet various regulating standards (e.g., Florida

DOT). As noted in the application (see Appendix 2, section 1.1, 1.2, and 1.3), inconsistencies in the properties can not only impact air emissions but also degrade cement product and even damage the kiln system.

The purpose of EF is to create a fuel that takes selected and separated materials, which may be composed of both primary and secondary materials, and then blend them in a desired ratio to generate a very consistent fuel that was created to maximize the consistency of the desired chemical composition. The chemical composition must be targeted and consistent since the fuel chemistry not only affects combustion characteristics, but also affects the cement product composition. It is also important that the engineered fuel have targeted and consistent physical properties which affect the combustion rate and resultant heat release and distribution. The properties of EF are generally targeted to match that of coal. The overall experience of the five other cement plants in Florida that have been using alternative fuel materials (AFM) over the past several years place consistency as the primary critical factor to successfully using AFM.[1]

Typical materials used to generate EF are paper and plastics (with chlorinated plastics separated out). The reason these two materials form the base of the chemical and physical properties of each engineered fuel is due to their complimentary nature. In general, paper has lower heat content and is higher in ash and moisture than coal. Plastics have higher heat content, lower moisture, and lower ash than coal. Paper physical properties are typically linear and flat shaped while plastics are three dimensional and bulky. Combining paper and plastics produces an EF that has properties that can be tightly controlled and near to that of coal. As noted above, the target properties are generally designed to emulate coal properties, even if EF properties (e.g., moisture or ash content) are markedly different. Through-and-through, EF is still a strong AFM with the consistency of properties remaining the most critical aspect.

Below are example product EFs available on the fuel market.

<u>SpecFUEL</u>

SpecFUEL is made through a 13-step process involving mechanical and sophisticated optical sorting equipment. The system removes recyclable metals, organics, PVC plastic and inert materials unsuitable for fuel. The remaining paper and plastic materials are manufactured into a uniform, high quality, high-energy content fuel. SpecFUEL is a blended fuel that has been reviewed by EPA to be comparable to fuels like coal or petroleum coke.[2]

<u>Materials Lifecycle Management Company (MLMC) Enviro-Fuelcubes[3]</u>

MLMC manufactures engineered fuel called “Enviro-Fuelcubes”. MLMC manufactures these fuel cubes at a plant in Westfield, Massachusetts. The fuel cubes are manufactured not only from label matrix, but also from other non-recyclable waste materials, such as coated and laminated papers, wax cardboard,

---

[1] http://www.gainesville.com/article/20101117/ARTICLES/101119432?p=2&tc=pg
[2] http://www.epa.gov/epawaste/nonhaz/define/pdfs/specfuel.pdf
[3] http://www.notwaste.com/home.html

textiles, Styrofoam, plastics, all types of packaging materials, wood products and process out-throws from various manufacturing process applications. These are typically materials with no recyclable value. Enviro-Fuel cubes have been supplied to power plants, cement kilns or process boilers as a clean alternative to fossil fuels such as oil and coal. Fuelcube AFM has been reviewed by EPA and assessed to be comparable to fuels like coal or petroleum coke.[4]

The following two materials descriptions are excerpts from 1210645-023-AC, TEPD, beginning on page 16 of 54 [footnotes removed]

Geocycle – Holcim, Worldwide

Geocycle is a wholly owned subsidiary of Holcim Ltd. Geocycle operates in various countries including the U.S., Spain, Australia, Germany and Malaysia. Geocycle-Australia has more than 15 years of experience in manufacturing engineered fuels. Industrial by-products and discarded materials are transformed into alternative fuels and raw materials, providing a valuable thermal energy source for Australia's cement kilns. Within the cement manufacturing process, co-processing captures a material's energy and mineral value. There is no residual ash and, more importantly, the intense high temperatures and chemical nature of the cement making process, ensures the final cement product quality. Geocycle designs EF specifically for a given plant.

Vexor Fuels

Vexor Fuels started processing non-hazardous materials in 2000. In 2003, the company began blending non-hazardous secondary materials for cogeneration units, including the Covanta and Wheelabrator facilities. In 2005, Vexor Fuels supplied engineered fuel to Holcim's Holly Hill Cement Plant in South Carolina. Holcim now owns this facility and Vexor Fuels is contracted as an operations consultant. The Dorchester facility manufactures an engineered fuel with a consistent heating value of 6,500 Btu/lb, which is fed into the preheater/precalciner portion of the cement kiln.

In July of 2007, the CEMEX plant in Wampum, Pennsylvania conducted a test program using engineered fuel produced by Vexor Fuels. The engineered fuel looked like mulch and had the following specifications: a minimum heating value of 10,000 Btu/lb, maximum moisture content of 10% by weight and sized for introduction to the kiln through a four-inch pipe. The plant test was successful and the facility is now permitted by the Pennsylvania Department of Environmental Protection to use the engineered fuel.

Vexor Fuels operates a facility in Medina, Ohio that manufacturers engineered fuel for cement kilns and cogeneration plants. The facility supplies the engineered fuel to nearby cement kilns in Pennsylvania. The engineered fuel consists of various types of non-hazardous materials including on-spec used oil, wood, biosolids, paper and plastic. Many engineered fuels made by Vexor Fuels may have as much as 40% biomass in it, depending on the EF feedstocks used. Vexor Fuels processes and blends materials to make an engineered fuel that meet the specifications for a particular cement plant. Vexor's Engineered

[4] http://www.epa.gov/osw/nonhaz/define/pdfs/paper.pdf

Fuel program received the award for Alternate Fuels Company of the Year at the Global Fuels Conference in Washington D.C. in June, 2010. In addition, Vexor Technology, Inc. was awarded the 2009 Medina County Business' Sustainability-Environmental Improvement Award.

Item 2) *Emissions Calculations: Table 1 (Past Operations Data (2009 – 2013)) of the application provides data that was used in calculating the baseline actual emissions and projected actual emissions. For kiln No. 1, there appears to be an error in the clinker production average for the years 2012 and 2013. Please review and update Table 3 (PSD Applicability Analysis) with the corrected baseline and projected actual emissions.*

Response

Please see the table below, which shows the updated Table 3 from the original application with the corrected baseline and projected actual emissions. The updated table also shows that the updated projected actual emissions correspondingly increased. The electronic document that corresponds with this table was emailed to you several months ago. This updated table is further revised and incorporated to the attached revised Appendix 3 (see Items 3) and 4) for other revisions in Appendix 3) PSD calculations spreadsheets.

The recent U.S Supreme court case decision, and EPA guidance that FDEP is following, states if PSD is not triggered for criteria pollutants then GHGs need not be considered. Given the criteria pollutants are not expected to trigger PSD thresholds, GHG emissions are not included.

Table 3. PSD Applicability Analysis.

PSD Pollutant	SO_2	NO_x	CO	VOC/Ozone	PM	PM10[a]	PM2.5[a]
Baseline Actual Emissions (BAE)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)
---Existing Unit (EU003)	Baseline Actual Production =			324590	ton clinker/yr		
---Baseline Actual Emissions (2012-2013)	0.74	328.8	286.9	7.8	5.7	5.5	3.3
---Existing Unit (EU010)	Baseline Actual Production =			382011	ton clinker/yr		
---Baseline Actual Emissions (2012-2013)	5.5	343.5	572.2	8.4	6.5	6.3	3.8
New Unit (processing/handling and injection equip.).							
---Baseline (Potential) Emiss.	0	0	0	0	0	0	0
Total BAE	6.2	672.3	859.1	16.2	12.2	11.8	7.1
PSD Pollutant	SO_2	NO_x	CO	VOC/Ozone	PM	PM10[a]	PM2.5[a]
Projected Actual Emissions (PAE)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)
---Existing Unit (EU003)	Projected Actual Production =			720,000	ton clinker/yr		
Baseline Emissions rate at Projected Actual Production	1.64	729.2	636.4	17.3	12.6	12.3	7.3
---Existing Unit (EU010)	Projected Actual Production =			985,500	ton clinker/yr		
Baseline Emissions rate at Projected Actual Production	14.2	886.2	1476.1	21.7	16.7	16.3	9.7
A reasonable maximum projection of production of clinker that could have been accomodated is based on producing more clinker of up to 90 percent of permitted clinker capacity, clinker/yr Example PAE (EU003) (720,000 ton clinker /yr permitted) / (324,590 ton clinker/yr actual) x (BAE, 0.74 ton SO2/yr) = 1.64 ton SO2/yr							
New Unit (processing/handling and injection equip.).							
---Projected (Potential) Emiss.	0.0	0.0	0.0	0.0	3.1	2.5	0.62
Total PAE	15.8	1615.4	2112.6	39.0	32.5	31.1	17.7
PSD Pollutant	SO_2	NO_x	CO	VOC/Ozone	PM	PM10[a]	PM2.5[a]
Could have Accommodated	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)	(tons/year)
Exclude emissions from PAE that could have emitted during the baseline actual emissions and that are unrelated to the particular project.							
Could have accom. BAE (EU003)	*0.90*	*400.5*	*349.5*	*9.5*	*6.9*	*6.7*	*4.0*
Could have accom. BAE (EU010)	*8.7*	*542.7*	*903.9*	*13.3*	*10.3*	*10.0*	*6.0*
adjusted PAE	*6.2*	*672.3*	*859.1*	*16.2*	*15.3*	*14.4*	*7.7*
adjusted PAE - BAE	0.0	0.0	0.0	0.0	3.1	2.5	0.62
PSD Significance Level	40	40	100	40	25	15	10
Is Sig. Level triggered?	NO	NO	NO	NO	NO	NO	NO

a. PM10 calculated as 84% and PM2.5 as 45% of filterable PM based on Table 11.6-5 of AP 42 for controlled (dry process with fabric filter) emissions. AP-42 has no size ratios for ESPs.
To account for condensable PM, the amount of stack-test measured filterable PM is increased by 13.2% to account for total PM. The fraction of 13.2 % is determined by SCC 3-05-006-22 in Table 11.6.-2 for filterable (0.25 lb/ton) and inorganic condensables (0.033 lb/ton). For example, 61.8 tn/yr PM x 0.132 (condensables) + 61.8 tn/yr x 0.84 (fraction of PM10 in filterable PM) = 60.1 ton/yr PM10.
AP-42 has no breakdown for filterable/condensable data for ESPs.

Item 3) *Projected Actual Emissions: The projected actual emissions provided in the application uses the same emission factors that were used in determining the baseline actual emissions, basically no change in emissions when firing the alternative solid fuels. Other applications provided to the Department by multiple Portland cement plants used emission factors and heat inputs specific to the category (material) of alternative solid fuels when calculating their projected actual emissions. Please provide supporting documentation (i.e. previous test data from other facility's, etc.) as to why heat inputs and emissions from the proposed firing of alternative fuels will not change when compared to baseline actual emissions.*

Response

The prior permit applications for use of AFM at other Florida cement plants determined projected actual emissions from available emissions data from other cement plants around the world using AFM. In addition to the projected actual emissions tables, research studies were included in the applications providing extensive discussion on the potential air emissions impact of AFM usage in cement kilns, focusing on precalciner kilns (See appendices 2 and 3 of application). Based on the projected actual emissions and research studies for prior AC permits for AFM, FDEP issued, along with the AC permits, technical evaluations and preliminary determination (TEPD) reports asserting that AFM is not expected to significantly increase pollutant emissions above PSD thresholds. Based on these determinations, the Department requires in those AC permits a comparison of projected actual emissions to baseline actual emissions for a period of 5-years to ensure that the project did not cause a PSD-significant emissions increase.[5] In review of these TEPD reports, which state that AFM is not expected to significantly increase pollutant emissions above PSD thresholds, the initial application submittal used the same emission factors before and after the project - which is in concert with the FDEP determinations that emissions are not expected to significantly increase. As noted in item 4) the facility still has the potential to increase emissions if the facility increases actual production which the kiln systems could have accommodated without regard to the use of AFM.

The attached revised Appendix 3 of the original application is provided to supplement the submitted PSD analysis to demonstrate, similar to the other Florida cement plant AFM permit applications, that AFM is not expected to significantly increase criteria pollutants above PSD thresholds. The revised and attached Appendix 3, Table 3 has been revised to include summary results of each AFM category projected actual emissions (PAE), similar to the other applications provided to the Department by multiple Portland cement plants using emission factors specific to each AFM category. While prior applications submitted to the Department determine PAE on a heat input basis, Argos is using a basis of clinker production. Clinker production and heat input are directly correlated; however clinker is more accurately measured and therefore Argos used a basis of clinker production, along with maximum permitted clinker production, for the comparison of emission factors and to determine PAE.

New tables are added in the attached Appendix 3 PSD analysis to show the calculation of proposed emission changes for each AFM category based on studies from other cement plants. These other

[5] See permits with TEPDs for 0250020-031-AC; 0250014-045-AC; 0530021-039-AC; 1210645-023-AC; 1190042-009-AC.

cement plant studies have been used in prior applications, as well. The Argos precalciner kilns are similar in design and have potential emissions that are comparable to other Florida precalciner kilns. Therefore, similar emission factors were used in these calculations. These revisions should address the requested additional information from FDEP. All of the compared emissions from baseline to project actual emissions are shown in Table 3. These emissions all show that PSD thresholds are not eclipsed. Since both Kiln Systems 1 and 2 use selective non-catalytic reduction systems to directly control NOx emissions and indirectly control CO emissions, those pollutants are controlled and actual emissions in the future will ultimately reflect the use of SNCR to control NOx and CO emissions.

Item 4) *Emission Reductions: In determining the "could have accommodated" emission reductions, please provide calculations and an explanation to how these emission reductions were calculated and what they represent.*

Response

Argos believes that regardless of this proposed project and based on the past production rates of the kiln systems that the kilns systems could have accommodated, conservatively, 90 percent of the permitted production capacity. This equates to 720,000 tons of clinker per year for the Kiln 1 system and 985,500 tons of clinker per year for the Kiln 2 system. For example, the annual clinker production of the Kiln 1 system was greater than 780,000 tons in 2006. The Kiln 2 system has only operated since 2010, and given the economic downturn, has had low production since its completion. However, it is expected that the system should be fully capable of producing greater than 985,500 tons of clinker per year without regard to this project.

Item 5) *Injection Point: Please identify where (the injection point) the proposed materials will be added to the pre-calciner chamber. Will all of these materials be added to the pre-calciner at the same point of injection?*

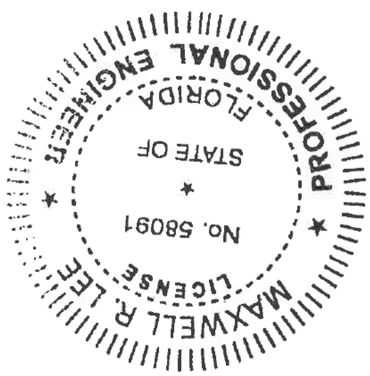
Response

The injection points of AFM categories will be either at the "backend" (i.e., the precalciner) or at the main burner. The main burner was originally designed to inject properly sized and processed AFM. Similar main burner systems are permitted for the other Florida cement plants for use with AFM. The rate of AFM injection at the main burner will be adjustable through adjustment of injection line pressure of the pneumatic feeders. The burner nozzles are adjustable, which affects the resulting flame shape. Control and adjustment of the flame shape is critically important in cement production to control air pollution, product quality and kiln structure integrity. In addition to the injection of the AFM at the main burner, materials will also be introduced at the precalciner. Similar to the main burner, the flame shapes in the precalciner must also be controlled and adjustable. The proposed injection points in the precalciner are shown in the attached diagram. These points will be adjusted during the installation and shakedown period to maximize the efficiency of combustion (these periods are further discussed in the original application). The adjustments will be made as the operations personnel assess a number of operational factors affected by the use of AFM. This includes the pressures and temperatures in the system, with a strong focus on the precalciner. Practical experience at other cement plants in Florida using AFM in the precalciner has shown that because of the range of AFM chemical and physical properties between each of the AFM fuel categories, the injection points need to be highly adjustable[6]. The need for consistent properties of AFM (see Item 1 discussion above for EF) is clearly a factor in the need for adjustments made to the injection points in the precalciner as AFM categories are changed. Two drawings are attached (Attachment 2).

The above items are provided in the effort to complete the revision of the Title V permit. If you have questions or comments please contact me at your earliest convenience.

Best regards,

Sincerely,



Max Lee, Ph.D., P.E.
Koogler and Associates, Inc.

Cc: David Read, (david.read@dep.state.fl.us)
Chris Horner, Plant Manager – Argos Cement, LLC (chorner@argos-us.com)
Henry Gotsch – Argos Cement, LLC (ogotsch@argos-us.com)
William Voshell – Argos Cement, LLC (wvoshell@argos-us.com)

Enc: Attachment 1: Revised application appendix 3, PSD Analysis
Attachment 2: K1 and K2 drawings

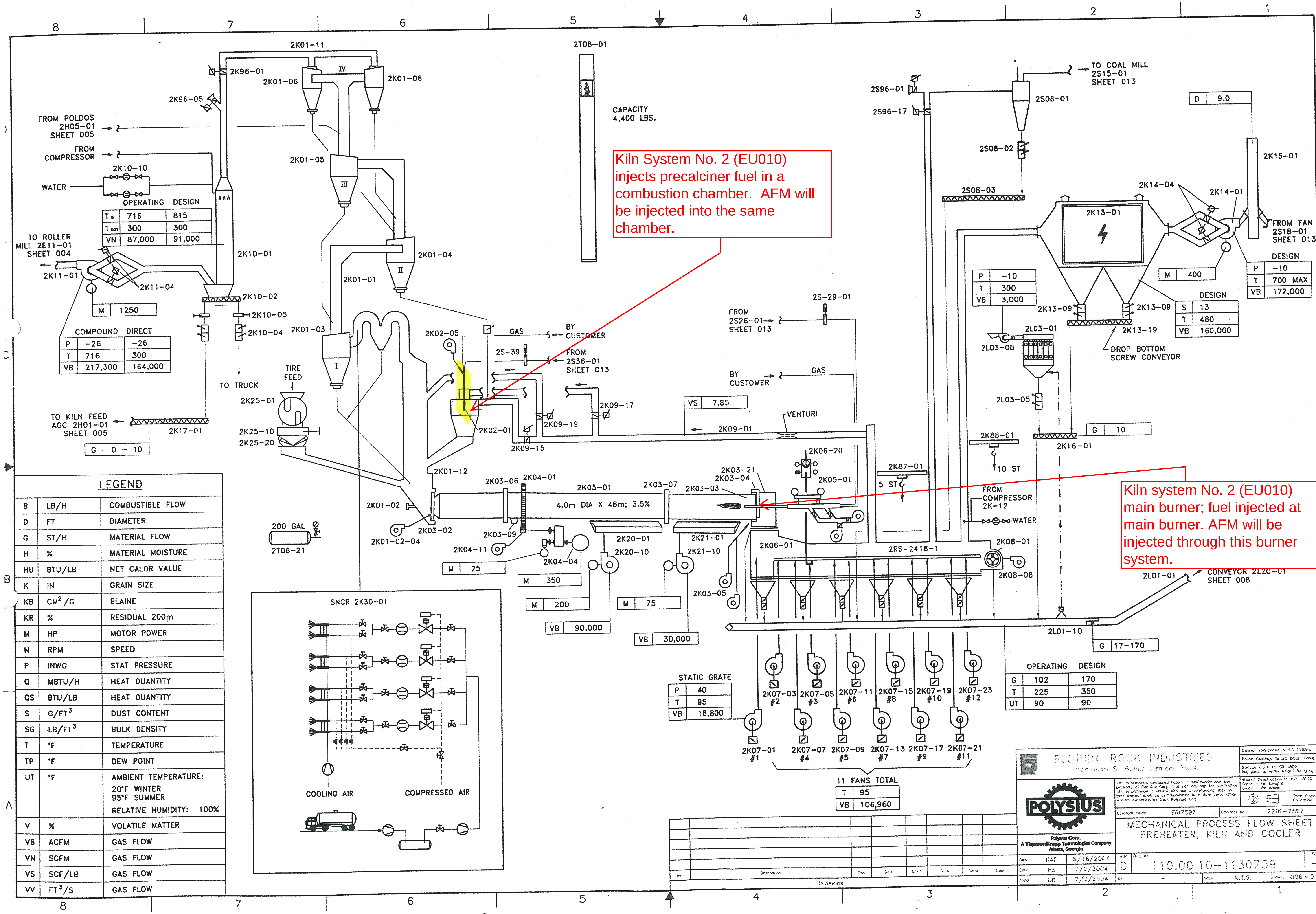
[6] See page 3 of Appendix 2 discussion of AFM burnout time and Figure 1.

Attachment 1

Revised application Appendix 3, PSD Analysis

Attachment 2

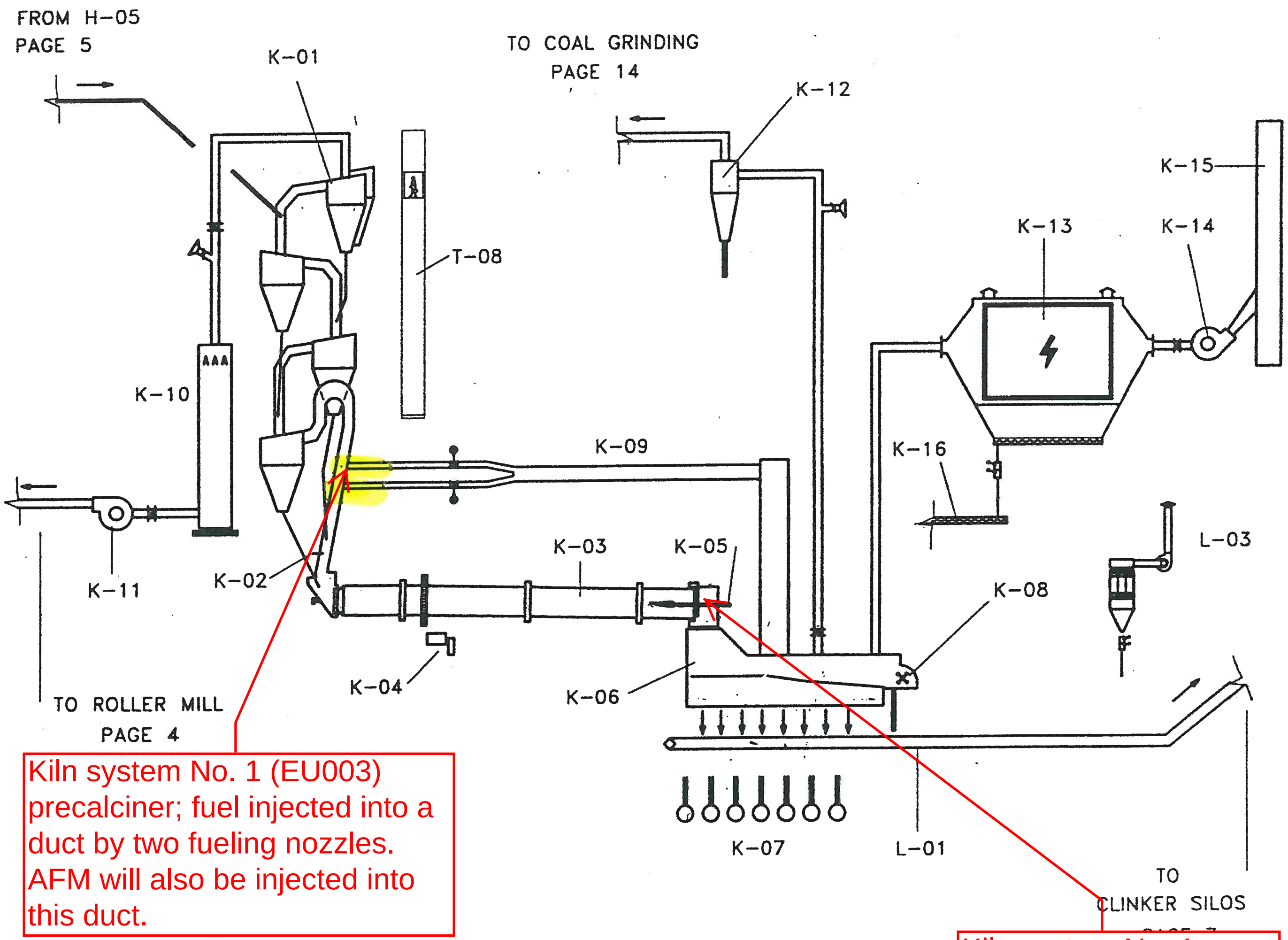
K1 and K2 drawings



Kiln System No. 2 (EU010) injects precalciner fuel in a combustion chamber. AFM will be injected into the same chamber.
Kiln system No. 2 (EU010) main burner; fuel injected at main burner. AFM will be injected through this burner system.
2K01-11
2K96-01
2K01-06
2K96-05
FROM POLDOS 2H05-01 SHEET 005
FROM COMPRESSOR
2K10-10
WATER
OPERATING DESIGN
T IN 716 815
T OUT 300 300
VN 87,000 91,000
TO ROLLER MILL 2E11-01 SHEET 004
2K11-01
2K11-04
M 1250
COMPOUND DIRECT
P -26 -26
T 716 300
VB 217,300 164,000
2K10-01
2K10-02
2K10-05
2K10-04
TO TRUCK
TO KILN FEED AGC 2H01-01 SHEET 005
2K17-01
G 0 - 10
2K01-05
2K01-04
2K01-01
2K01-03
TIRE FEED
2K25-01
2K25-10
2K25-20
2T08-01
CAPACITY 4,400 LBS.
2K02-05
GAS
BY CUSTOMER
2S-39
FROM 2S36-01 SHEET 013
2K09-17
2K09-19
2K02-01
2K09-15
FROM 2S26-01 SHEET 013
2S-29-01
BY CUSTOMER
GAS
VS 7.85
VENTURI
2K09-01
2K01-12
2K03-06
2K04-01
2K03-01
2K03-07
2K03-21
2K03-04
2K03-03
2K06-20
2K05-01
4.0m DIA X 48m; 3.5%
2K01-02
2K01-02-04
2K03-02
2K03-09
2K04-11
2K04-04
200 GAL
2T06-21
M 25
M 350
M 200
VB 90,000
2K20-01
2K20-10
2K21-01
2K21-10
M 75
VB 30,000
2K03-05
2K06-01
2RS-2418-1
2K87-01
5 ST
2K88-01
10 ST
FROM COMPRESSOR 2K-12
WATER
2K08-01
2K08-08
2L01-01
CONVEYOR 2L20-01 SHEET 008
2L01-10
G 17-170
OPERATING DESIGN
G 102 170
T 225 350
UT 90 90
STATIC GRATE
P 40
T 95
VB 16,800
2K07-03 #2
2K07-05 #3
2K07-11 #6
2K07-15 #8
2K07-19 #10
2K07-23 #12
2K07-01 #1
2K07-07 #4
2K07-09 #5
2K07-13 #7
2K07-17 #9
2K07-21 #11
11 FANS TOTAL
T 95
VB 106,960
2S96-01
2S96-17
TO COAL MILL 2S15-01 SHEET 013
2S08-01
2S08-02
2S08-03
D 9.0
2K15-01
2K14-04
2K14-01
2K13-01
FROM FAN 2S18-01 SHEET 013
DESIGN
P -10
T 700 MAX
VB 172,000
M 400
P -10
T 300
VB 3,000
2K13-09
2K13-09
2K13-19
DESIGN
S 13
T 480
VB 160,000
2L03-01
2L03-08
DROP BOTTOM SCREW CONVEYOR
2L03-05
2K16-01
G 10
SNCR 2K30-01
COOLING AIR
COMPRESSED AIR
LEGEND
B LB/H COMBUSTIBLE FLOW
D FT DIAMETER
G ST/H MATERIAL FLOW
H % MATERIAL MOISTURE
HU BTU/LB NET CALOR VALUE
K IN GRAIN SIZE
KB CM²/G BLAINE
KR % RESIDUAL 200m
M HP MOTOR POWER
N RPM SPEED
P INWG STAT PRESSURE
Q MBTU/H HEAT QUANTITY
QS BTU/LB HEAT QUANTITY
S G/FT³ DUST CONTENT
SG LB/FT³ BULK DENSITY
T °F TEMPERATURE
TP °F DEW POINT
UT °F AMBIENT TEMPERATURE: 20°F WINTER 95°F SUMMER RELATIVE HUMIDITY: 100%
V % VOLATILE MATTER
VB ACFM GAS FLOW
VN SCFM GAS FLOW
VS SCF/LB GAS FLOW
VV FT³/S GAS FLOW
FLORIDA ROCK INDUSTRIES
Thompson S. Baker Cement Plant
POLYSIUS
Polysius Corp. A ThyssenKrupp Technologies Company Atlanta, Georgia
Contract Name FRI7597
Contract no. 2200-7597
MECHANICAL PROCESS FLOW SHEET PREHEATER, KILN AND COOLER
KAT 6/16/2004
HS 7/2/2004
UR 7/2/2004
D 110.00.10-1130759
N.T.S.
006 of 013
Revisions

POLYSIUS DIVISION OF KRUPP USA, INC. ATLANTA, GA.	FLORIDA ROCK CEMENT PLANT – NEWBERRY, FLORIDA –	PROJECT No.: 6823–2200 PAGE: 6 of 14 DATE: 11–29–94	
	CAPACITY: 750,000 STPY	No.	REVISION DATE
		1	01–15–95
	– KILN SYSTEM –	2	02–07–95
		3	

FLOW CHART



DESCRIPTION

TYPE OF PREHEATER	:	DOPOL 90 , 4–STAGE
KILN SIZE	:	12 FT DIA x 162 FT
TYPE OF COOLER	:	GRATE COOLER
CAPACITY	:	2300 STPD

I/CONTRCTS/PROJECTS/ACAD/PLANT/FLOWSHTS/327487–6