State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee

To: _____ Loctn.: _____
To: _____ Loctn.: _____
To: _____ Loctn.: _____
From: _____ Date: _____

Reply Optional [ ] Reply Required [ ] Info. Only [X]
Date Due: _____ Date Due: _____

TO: Dan Williams
District Air Engineer, Tampa

THROUGH: Steve Smallwood
Chief, Air Quality Management

FROM: Bill Thomas, Bureau Air Quality Management
Martha Harrell Hall, Assistant General Counsel MHH

DATE: April 21, 1982

SUBJECT: Amax Phosphate, Inc.

In your memorandum of February 19, 1982, you describe various changes underway and planned at the Amax facility in Plant City. The questions you ask will be addressed in the order set out in your memorandum.

1. Amax currently holds an operating permit for two reactors and a kiln with a total allowable emission rate of 20.03 pounds per hour of particulates. This emission rate was calculated by applying the Process Weight Table to the sum of the emissions from the reactors and kiln. DER cannot hold Amax to this emission rate if they request a permit modification since the Process Weight Table is to be applied to each source separately.

2. If Amax does request a modification of its permit and increases production to an emission rate of 41.07 pounds per hour, this could trigger PSD. PSD applicability would depend upon several factors, including: (1) the current actual emissions of the facility; (2) the potential emissions resulting from the increased production; and (3) the availability of any contemporaneous, creditable emissions decreases.

It should be noted that an increase in production is considered a modification only if formally prohibited by a federally enforceable permit condition -- that is, prohibited by a State construction permit.

3. The reduced emissions from other sources might offset the proposed increase in emissions from the reactors. However, reductions in emissions can not be credited unless

they meet the requirements of Florida Administrative Code Rule 17-2.500(2)(e)3 and 4. These provisions require:

(1) that there be decreases in actual emissions;

(2) that the decreases have occurred no earlier than five years before the modification application is filed and no later than the date the modification is to begin operation;

(3) that the decrease hasn't already been relied upon by the Department in issuing a permit;

(4) that the old level of actual emissions exceeds the actual emissions after the modification is completed and operating;

(5) that the decrease is federally enforceable; and

(6) that the emissions which decrease have approximately the same public health and welfare impacts as the emissions proposed to increase.

4. You describe efforts by Amax to control unconfined particulates but relate a fear on their part that such clean-up efforts will make them subject to nonattainment requirements. Chapter 17-2 now differentiates between unconfined emissions and fugitive emissions. Fugitive emissions are defined in Rule 17-2.100(72) to include those emissions which cannot be passed through a stack while unconfined emissions are defined merely as those emissions which escape from unenclosed operations or do not pass through a stack. While some fugitive emissions (those which cannot be quantified) need not be considered when determining the impact of facilities in the area of influence upon the nonattainment area, all unconfined emissions which are not fugitive and all quantifiable fugitive emissions must be considered. Therefore, in adding control devices to reduce unconfined particulate emissions, Amax is not increasing the emissions utilized in calculating its impact upon the nonattainment area. Those particulate emissions should have been considered all along.

5. You state that Amax has verbally agreed to a 0.02 grains per dry standard cubic foot emission limit. If the facility is not subject to PSD, no BACT determination would be made. However, the use of baghouses with the ability to limit emissions to 0.02 gr/dscf could be required of the facility pursuant to Rule 17-2.610(3)(c) which relates to the use of reasonable precautions to control unconfined particulate emissions. If Amax wanted a higher emission rate in the future, it would have to prove that the 0.02 gr/dscf was no longer a reasonable limit.

6. The answer to your final question is discussed above. Basically, emissions which can be controlled but presently are not, are unconfined emissions -- not fugitive emissions. If, through the addition of control devices, Amax decreases its overall particulate emissions, it may be able to escape PSD and NSR permitting.

SS:MHH:jy

cc: Marshall Mott-Smith
Jack Preece
Tom Moody
Johnny Cole
J. Ketteringham
Chuck Collins
Dan Williams
Dave Knowles
Jim Williams

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

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Date Due: _____ Date Due: _____

TO: Martha Hall, Office of General Counsel
Steve Smallwood, Chief, BAQM

FROM: Dan A. Williams DAW

DATE: February 19, 1982

SUBJECT: Hillsborough County AP
AMAX Phosphate, Inc.

Attached are two letters concerning the AMAX Phosphate facility in Plant City. Several legal and/or policy questions have been brought up which need answering.

The first letter is from Ms. Rhea Law, Attorney for AMAX, discussing a request for a revision to an existing operating permit. As detailed in her letter, Operating Permit AO29-6778 is for Fluid Bed Reactors #1 and #2 and Paragon Kiln #2. Each source has its own separate control system with a common stack containing the emissions from all three sources. The allowable emission rate on the operating permit is 20.03 lbs/hr of particulates and was calculated by summing the input weight rates to each process (4 + 4 + 8 = 16 T/Hr.) and then applying the process rate formula $E = 3.59 (16)^{0.62} = 20.03$ lb/hour.

AMAX is requesting two things. One is that individual permits be issued for each source with the allowable emission rate being calculated by separating the input process rate for each source. Using this method the allowable emission rates would be 8.48 lbs/hour for each reactor and 13.03 lbs/hour for the kiln. The total emission rate from the common stack would be 30 lbs/hour. Second is that AMAX is requesting the input process rates for the two reactors be increased to 9 tons/hour each. The allowable emission rate, using the process rate formula, would then be 14.02 lbs/hour for each reactor or a total of 41.07 lbs/hour from the common stack.

The increase over current allowable emissions with the increased production rates would be 92 tons per year. The increase over allowable emissions using separate input rates and the increased production would be 48 tons/year. AMAX has offered internal offsets from two other sources resulting in a net overall reduction of emissions.

My question on the above request are several:

1. Can DER hold them to the existing emission rate of 20.03 lbs/hour? NO

maybe — depending on major/minor & contemporaneous changes

2. If not, would the increase in allowable emissions for the increased production trigger a PSD review and new source permitting since the increased emission rate would be 48 tons/year of particulates? The question of increased fluoride emissions has not been considered.

yes

3. Can we accept the offer of reduced emissions from other sources as a method to offset increased emissions thereby negating the PSD and NSR requirements?

yes — but allowable/actual must be considered including established quantifiable fug + uncontrolled part. emissions

The second letter is from Fred Mullins of AMAX Phosphates. They have undertaken a major voluntary effort to reduce fugitive particulate emissions at the Plant City facility. The entire program will require an expenditure of several million dollars before completion. Their concern is that each time a new baghouse or other control device is added the facility comes closer to being a significant impactor on the Hillsborough County nonattainment area. The current modelling work doesn't include anything for fugitive emissions. They don't want the facility to come under the RACT rules. — ∴ it is invalid (SS)

My questions on the second letter are:

1. If additional point sources are added at the facility to reduce fugitive dust emissions and through these additions they cause the facility to have a significant impact on a nonattainment area; does the facility then have to comply with RACT?

Yes — act of confusing will reduce

2. AMAX has verbally agreed to a BACT determination of 0.02 grains/dscf for each new control device installed to reduce fugitive emissions. Under what condition could BACT be applied in this case? If BACT can't be applied but if AMAX agrees to 0.02 grains/dscf as the emission standard for these sources, can it be made legally enforceable by permit proviso? Also, at some future date, if AMAX came back and ask for a higher allowable emission rate, what rule would apply?

3. If AMAX can quantify the fugitive emissions and verify a net reduction in emissions after control devices are added would PSD, NSR, BACT, LAER, or RACT be applicable?

NO

AMAX has requested an answer as soon as possible because some of the answers may impact their further actions.

If my questions are unclear or if you need any additional information, please let me know.

DAW/rkt

cc: Hillsborough County EPC
Fred Mullins
Rhea F. Law

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER, P. A.

ATTORNEYS AT LAW

FREEDOM SAVINGS BUILDING
TAMPA, FLORIDA 33602
(813) 228-7411

601 FLORIDA NATIONAL BANK BUILDING
ST. PETERSBURG, FLORIDA 33701
(813) 896-0601

600 CLEVELAND STREET-SUITE 760
CLEARWATER, FLORIDA 33515
(813) 446-8525

490 FLORIDA FEDERAL BUILDING
LAKELAND, FLORIDA 33802
(813) 688-8517

CABLE ADDRESS
"FOWHITE"
TELEX 052776

PLEASE REPLY TO:
P. O. BOX 1438
TAMPA, FLORIDA 33601

February 10, 1982

Mr. Dan Williams
Department of Environmental Regulation
7601 Highway 301 North
Tampa, Florida 33610

Re: Revision of Permit #AO29-6778
for operation of Defluorinating Units,
Reactors #1 & #2 and Paragon Kiln #2.

Dear Dan:

This letter is being sent as a followup to our meeting of February 4, 1982, wherein we discussed the subject permit. Primarily, this revision is requested as a result of Amax's commitment to critically review and revise all permits previously procured and held by Borden, Inc. The purpose of these revisions is to secure a permit which more accurately reflects the actual operating conditions of the facilities. As I mentioned, this program is ongoing and hopefully will be completed as expeditiously and painlessly as possible to the benefit of both the regulatory agencies and Amax.

As for the subject permit, Amax is requesting a revision which would recognize the independent nature of the equipment. Reactors #1 and #2 and the Kiln are in actuality three separate and distinct facilities. Each has its own scrubber and each is capable of independent operation. The only point of commonality is the single stack. It is on this basis that Amax is requesting that the conglomerate permit for these facilities be broken down to provide a separate permit for each facility.

There are several reasons for this request. The first, the recognition of each facilities' independent character, is fundamental permitting policy. In fact, the original inclusion

of these three facilities under a common permit was probably an oversight. Secondly, this revision would serve to resolve collateral difficulties with the current permit.

Originally, the permit was issued for the operation of Reactor #1 at an input rate of four tons/hour, Reactor #2 at an input rate of four tons/hour, and the Kiln at an input rate of 8 tons/hour. These permitted input figures , however, are not reflective of the actual input rates utilized for the facilities. In fact, Reactor #1 is currently operating at an input rate of 8 tons/hour and Reactor #2 is operating at 8 tons/hour. The Paragon Kiln is currently not operating, having been shut down since February, 1981.

This is not to say, however, that these departures from the permitted input rates constitute violation of the permit. This is true because the facilities were grouped together under the terms of the current permit, thereby allowing, under Condition #9, a total input of 16 tons/hour. Therefore, because the Kiln is shut down, the total current input of 16 tons/hour into the reactors is within the permitted allowable.

Needless to say, this temporary condition is totally fortuitous, and therefore requires that steps be taken now to accomodate the future startup of the Kiln. It is on this basis that Amax requests a further revision of the individual permit input rates to maximum operating capacity;i.e.,

Reactor #1 9 tons/hour

Reactor #2 9 tons/hour

and Paragon Kiln 8 tons/hour.

There are other effects resulting from a revision of this nature. The most obvious being the recalculation of emission rates. As we discussed, the input rates are currently summed for all three facilities and then subjected to the Process Weight Table. The result of this method is a lower emission rate than would be possible under separate consideration for each facility. In this particular instance, this method of calculation results in a cummulative emission rate of 20.03 pounds/hour.

If the facilities were permitted separately, the maximum allowable emission rate for the common stack would be the sum of the individual maximum allowable emission rates for

each source. In this case, the total allowable rate would be 41.05 pounds/hour.

While this rate is, in fact, higher than that previously permitted, it is comparable with that originally imposed by EPA in the Consent Order of May 9, 1977. That Order fixed an emission rate of no greater than 37 pounds/hour for the joint facilities at a total input rate of 16 tons/hour.

Further, in recognition of the increased emission rate, Amax is prepared to offer internal offsets as follows:

#5 Based on 1.

Permit No.	Facility	Permitted Emission Rate	Proposed Emission Rate	Total Reduction
A029-6315	Phosphate Feed Preparation Plant	34.57 lbs/hour	20 lbs/hour	14.57
A029-6316	#6 and #7 Defluorinating Kilns	25.00 lbs/hour	15 lbs/hour	10.00
			TOTAL	24.57

These changes would result in a net reduction of 3.55 lbs/hour. (41.05 - 20.03= 21.02 increase for Reactors #1 and #2 and Paragon Kiln; 24.57(offset) - 21.02(increase) = 3.55 net reduction in emissions.)

Thank you for your consideration of these requests. If I can provide any additional information, please let me know.

Sincerely yours,

RHEA F. LAW

RFL/wr

cc: Mr. Fred Mullins

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE • SUITE 600 • LAKELAND, FLORIDA 33801 • (813) 687-2561

February 17, 1982

Mr. Dan Williams
Department of Environmental Regulation
7601 Highway 301 North
Tampa, Florida 33610

Dear Dan:

In response to your question regarding RACT applicability raised at our meeting of February 4, 1982, we are submitting a report by Sholtes and Koogler wherein an air quality model was conducted to determine the impact of our current (including the proposed changes discussed at our meeting) particulate matter emitting sources on the Hillsborough County non-attainment area. Their report, attached as Exhibit A, indicates an insignificant impact of 0.6 ug/cu. m, annual average and 4.2 ug/cu. m, 24-hour average. These figures are well below those specified for a significant impact thereby exempting this facility under Rule 17-2.650(2)(b)2., F.A.C. from the imposition of RACT.

As you are aware, however, Amax is undertaking a massive voluntary "clean-up" program at its Plant City - Coronet Facility. Specifically, the program calls for the installation of baghouses and wet scrubbers to reduce and/or alleviate fugitive dust emissions. Each of these changes are being made solely for the purposes of enhancing air quality and efficiency.

The purpose for this letter, therefore, is to define our position relative to specific emission standards which may be imposed as a result of this "clean-up" effort. Obviously, Amax is not interested in becoming liable for compliance with an economically prohibitive requirement.

According to Rule 17-4.23(1)(c) "New control devices installed on existing process equipment for the purpose of decreasing air pollutant mass emission rates shall comply with the existing source limitations pursuant to Chapter 17-2, F.A.C."

Under 17-2, General and Specific Air Quality Standards are enumerated in Parts II and III. Part IV contains Specific Emission Limiting and Performance Standards. The installation of the new control devices will not negatively impact any of these standards.

Other limitations contained in 17-2 include:

1) 17-2.500 PSD
2) 17-2.510 New Source Review
3) 17.2-630 BACT
4) 17-2.640 LAER
5) 17-2.650 RACT

As mentioned previously, RACT is inapplicable to our facility. Further, because the changes envisioned do not fall within the definition of "modification" in that the net result will be a decrease in emissions for the facility, and the changes do not rise to the level of a "New Source," the New Source Review and LAER criteria appears inapplicable. Similarly, because the facility is not located in an area of attainment or unclassifiable area, PSD criteria should not be applied.

A BACT determination, however, may be required at the time of each application for construction. If the Department determines that there is the necessity for a BACT determination, Amax would request that they be so notified as expeditiously as possible in order to avoid any delay in the "clean-up" effort.

If I can provide any additional information to assist in this determination, please do not hesitate to call.

Sincerely yours,

Fred G. Mullins
Manager
Regulatory Compliance

/kaw

cc: Rhea F. Law
Hillsborough County EPC

TO: William Thomas
FROM: Teresa M. Heron
DATE: March 19, 1982
SUBJECT: AMAX Phosphate, Inc.

In your memorandum of February 19, 1982, you ask the following questions:

I (Question

Can DER hold them to the existing emission rate of 20.03 lbs/hour?

-ANSWER

The Department can not deny AMAX's request of recognizing the independent nature of the equipment. Operating permit No. A029-6778 shall be broken down to an individual permit for each unit (Reactor #1 & #2 and Paragon Kiln #2)

The allowable maximum input rate shall be:

Reactor #1	9 tons per hour
Reactor #2	9 tons per hour
Paragon Kiln	8 tons per hour.

The allowable emission rate using the process rate formula, shall not exceed 41.05 lbs per hour from the common stack.

II Question

If not, would the increase in allowable emissions for the increased production trigger a PSD review and new source permitting since the increased emission rate would be 48 tons/year of particulates? The question of increased fluoride emissions has not been considered.

ANSWER

AMAX phosphate rock processing plant shall be considered a major facility (17-2.500(2)(f) Table 500-2), if the sum of the quantifiable fugitive emissions and the potential emissions of all sources at the facility would be equal to or greater than 100 tons per year.
A net significant increase of 25 tons per year of particulate matter would subject this facility to a PSD review for this pollutant.

III Question

Can we accept the offer of reduced emissions from other sources as a method to offset increased emissions thereby negating the PSD and NSR requirements?

ANSWER

In estimating emissions increases - decreases - it is imperative to assess only actual emissions from equipment which are to be credited as contemporaneous emission reductions. This should be done using most recent operational data, including average production capacity within the two years prior to the actual reductions.
The proposed modification to this facility would not be subject to PSD review, only

if the net emission increase is under 7 PSD significance emission level. The Departme can accept the offer of reduced emissions from oth sources if these emissions are calculated as ab mentioned.

IV Question

If additional point sources are added at the facility to reduce fugitive dust emissions and through these additions they cause the facility to have a significant impact on a nonattainment area; does the facility then have to comply with RACT?

ANSWER

This facility would have to comply with the RACT rule, unless exempted under 17-2.650(2)(a) and 17-2.650(2)(b).

V Question

AMAX has verbally agreed to a BACT determination of 0.02 grains/dscf for each new control device installed to reduce fugitive emissions. Under what condition could BACT be applied in this case? If BACT can't be applied but if AMAX agrees to 0.02 grains/dscf as the emission standard for these sources, can it be made legally enforceable by permit proviso? Also, at some future date, if AMAX came back and ask for a higher allowable emission rate, what rule would apply?

ANSWER

If this facility is a major facility and a PSD is required, BACT would apply under the PSD provisions.
If a net significant increase is expected BACT would also apply.
If there is a reduction, the Department can give potential emissions based on actual performance.

VI Question

If AMAX can quantify the fugitive emissions and verify a net reduction in emissions after control devices are added would PSD, NSR, BACT, LAER, or RACT be applicable?

ANSWER

If fugitive emissions can be quantified and a net reduction is verified, the Department can modify the existing operating permits.

PSD, NSR, BACT, LAER or RACT would only be applicable depending of nature of future modifications.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

April 20, 1982

Mr. Fred G. Mullins, III
Regulatory Compliance Manager
Amax Phosphate, Inc.
Suite 600
402 South Kentucky Avenue
Lakeland, Florida 33801

Dear Mr. Mullins:

Thank you for the emission data from the phosphate rock dryer COM fuel conversion test burn and the two stack tests. Willard Hanks, CAPS review engineer, has some questions concerning test procedures which he has discussed with you and Amax environmental personnel. A copy of his memorandum is enclosed for your information.

Enclosed is a copy of the requested BACT determination for Brewster Phosphates. The preliminary determination (PSD) for Brewster Phosphates is presently on public notice at Hillsborough County Environmental Commission and DER Southwest District office in Tampa. The information may be reviewed at either location.

If I can be of further assistance, please call me at (904) 488-1344.

Sincerely,

Edward Palagyi
BACT Coordinator

EP/bjm
Enclosures:

BACT Determination
Memorandum

Appendix A, but it is specifically prohibited by DER regulations (Chapter 17-2.700(6)(a)6.). Thus, the emission data collected during the test burn cannot be used for determination of compliance with Florida regulations.

If Amax wants to test for particulate matter and sulfur dioxide simultaneously for compliance verification with State regulations, they will have to obtain a waiver from DER Method 6 by the procedure described in Chapter 17-2.700(3), Exceptions and Approval of Alternate Procedures and Requirements. To obtain the waiver, Amax Phosphate would have to furnish data showing a correlation between the emission measured by the official and proposed test methods. I

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE • SUITE 600 • LAKELAND, FLORIDA 33801 • (813) 687-2561

April 6, 1982

DER
APR 13 1982
BAQM

Mr. Edward Palagy
BACT Coordinator
The Florida Dept. of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Palagy:

As promised in our telephone conversation of March 26th, I have enclosed the information you requested for the AMAX Big Four Mine coal-oil mixture tests. This material provides a history of the coal-oil test burns for the phosphate rock dryer which services the Big Four Phosphate Mine. Along with the history of the test burns, there are two stack tests which were conducted in February and March of this year.

Also, as we discussed, I would like to have a copy of the Brewster Phosphate's BACT and PSD when it becomes available. AMAX is in the process of exploring alternate fuels for the Big Four rock dryer and would find this BACT/PSD information very useful in our future planning.

If you have any questions about the attached information or the request for information, please let me know.

Sincerely,

Fred G. Mullins
Regulatory Compliance Manager

FGM/rit

Enclosure

cc: Ms. R. Law
Mr. S. R. Sandrik
Mr. R. H. Swanson

FRED G. MULLINS, III
REGULATORY COMPLIANCE MANAGER

AMAX Phosphate, Inc.
SUITE 600
402 SOUTH KENTUCKY AVENUE
LAKELAND, FLORIDA 33801
(813) 687-2561

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE · SUITE 600 · LAKELAND, FLORIDA 33801 · (813) 687-2561

March 16, 1982

Ms. Lynne Stevenson
Air Engineering Department
Hillsborough County
Environmental Protection Commission
1900 9th Avenue
Tampa, Florida 33605

Dear Ms. Stevenson:

Attached are the results of the stack sampling conducted at the Big Four Mine dryer during the coal-oil-water mix (COM) fuel tests. The COM tests were undertaken on February 22, 1982 and March 2, 1982, with the approval of HCEPC and FDER. The initial test was run using low sulfur content fuel and the latter test was run using a high sulfur content fuel. Fuel analyses for each test, including sulfur content, is included in the attached information.

The five-day test burn of this fuel that was tentatively scheduled for sometime during the last half of March 1982 has now been scheduled to begin on March 30, 1982. Low sulfur content fuel, similar to that used in the March 2 test, will be burned during this test. As stated in my letter of December 14, 1981, AMAX's stack testing team will perform an emissions test during this test burn. They will use the Modified Method #5 sampling procedure for particulate and sulfur emissions and the results of this sampling will be submitted to HCEPC and FDER. In addition to emissions data, this five-day test will also allow AMAX to determine the effect of the fuel on the dryer facility and the product.

At this time, AMAX does not anticipate that additional testing of the COM fuel will be necessary to determine if it is a viable alternative to the fuel (#6 fuel oil) presently being used at the dryer. However, a final decision on this matter cannot be made until the results of the above described test have been analyzed.

If you should have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

R. H. Swanson

R. H. Swanson
Environmental Supervisor
Big Four Mine

RS/rit

cc: (All With Attachments)
Ms. Rhea Law
Mr. Harold Mott
Mr. Fred Mullins
Mr. Randy Sandrik
Mr. George Townsend
Mr. Gary Uebelhoer
Mr. Ken Wagner
Mr. Dan Williams

MEMORANDUM

AMAX Phosphate, Inc.
402 SOUTH KENTUCKY AVENUE • SUITE 600 • LAKELAND, FLORIDA 33801

TO: Mr. Fred Mullins

DATE: March 12, 1982

FROM: George Townsend

SUBJECT: Coal-Oil Test Burn

During the second coal-oil mixture test burn on March 2, 1982, we again conducted tests to determine particulate and sulfur dioxide emission rates. During the test, pebble was being dried at an average rate of 252 tons per hour. Test results were as follows:

	Stack Conditions		Particulate Emissions		Sulfur Dioxide Emissions
Run	DSCFM	Temp°F	Lbs./Hr.	Grains/DSCF	Lbs./Hr.
1	55,028	123	15.50	.0328	25.11
2	54,319	123	14.11	.0302	28.69
3	55,164	126	22.85	.0482	38.23
Avg.	54,837	124	17.49	.0371	30.68

The average sulfur dioxide removal efficiency of scrubber was 77.42%, ash contribution to total scrubber loading from COM combustion was 83.22 lbs./hour. Attached you will find scrubber water analyses of samples collected during a stack test conducted on February 18, 1982; at which time pebble was being dried and #6 fuel oil was the source of combustion. Comparatively, the analyses of scrubber water samples collected on February 22, 1982; during first COM test burn showed an appreciable increase in solids of scrubber discharge water. This would indicate effective scrubbing of ash, given similarities of the two tests and if feed quality was relatively similar.

George Townsend

GT/rit

cc: Mr. H. P. Mott
Mr. S. R. Sandrik
Mr. R. S. Swanson
[redacted]

Analysis - (ppm)

Date: _____

	Description	P_2O_5	F	Solids	SO_4	Fe_2O_3	Al_2O_3	CaO	MgO	Na_2O	SiO_2	H_2O		
1	Scrubber H_2O In	7.60	2.70	26	176	0.30	0.4	78	-		5			
2	#6 Fuel Oil 2/18/82													
3														
4	Scrubber H_2O In	11.10	2.40	95	190	.85	4.2	80	33.7		24			
5	COM 2/22/82													
6														
7														
8														
9	Scrubber H_2O Out													
10	#6 Fuel Oil 2/18/82	282.00	31.00	833	265	11.00	19.0	420	-		72			
11														
12	Scrubber H_2O Out													
13	COM 2/22/82	445	53.00	1492	264	16.4	50.0	574	52.8		118			
14														
15														
16														
17														
18														
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21														
22														
23														
24														
25														
26														
27														

FLA STATE DER
GENERAL
PARTICULATE
METHOD

TEST?

BIG FOUR DRYER
3-2-82 R 1
12:45-1:31

DATA SUMMARY:

BAR. PRESS.?
30.04
AVG DELTA H?
3.2125
METERED VOL?
36.40
METER TEMP?
66.40
STACK TEMP?
123.30
SQRT DELTA P?
0.6558
ML. H20 INC?
45.00
SIL GEL WT GAIN?
10.80
STACK AREA?
27.8831
PROBE AREA?
5.03 -04
PROBE WASH PART?
23.80
FILTER WT GAIN?
54.90
TIME THETA?
36.00
PITOT FACTOR?
0.83

DRY GAS VOL=
36.96 S.C.F.

VOLUME OF
H20 VAPOR=
2.68 S.C.F.

MOISTURE
CONTENT= 0.0664
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
0.0328
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
4.6951 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
38.7537 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
3.3017 06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
55028.35
S.C.F.M.

VOLUMETRIC FLOW
RATE=
64834.33
A.C.F.M.

PARTICULATE
OUTPUT=
15.50 LBS/HR

ISOKINETIC
CONDITION=
103.63%

```
FLA STATE DER
GENERAL
PARTICULATE
METHOD


TEST?


BIG FOUR DRYER
3-2-82 R 2
2:16-2:59


DATA SUMMARY:

BAR. PRESS.?
        30.04
AVG DELTA H?
       3.1083
METERED VOL?
        35.30
METER TEMP?
        74.60
STACK TEMP?
       122.80
SQRT DELTA P?
       0.6566
ML. H2O INC?
        55.00
SIL GEL WT GAIN?
        12.70
STACK AREA?
      27.8831
PROBE AREA?
         5.03 -04
PROBE WASH PART?
        37.30
FILTER WT GAIN?
        42.00
TIME THETA?
        36.00
PITOT FACTOR?
         0.83

DRY GAS VOL=
     35.28 S.C.F.

VOLUME OF
H2O VAPOR=
      3.19 S.C.F.

MOISTURE
CONTENT=   0.0829
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
           0.0302
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
        4.3307 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
  38.9091 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
        3.2591  06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
          54318.84
S.C.F.M.

VOLUMETRIC FLOW
RATE=
          65094.33
A.C.F.M.

PARTICULATE
OUTPUT=
     14.11 LBS/HR

ISOKINETIC
CONDITION=
           100.22%
```

FLA STATE DER
GENERAL
PARTICULATE
METHOD

TEST?

BIG FOUR DRYER
3-2-82 R 3
3:57-4:43

DATA SUMMARY:

BAR. PRESS.?
30.04
AVG DELTA H?
3.2958
METERED VOL?
37.40
METER TEMP?
77.70
STACK TEMP?
126.00
SQRT DELTA P?
0.6630
ML. H2O INC?
55.00
SIL GEL WT GAIN?
7.50
STACK AREA?
27.8831
PROBE AREA?
5.03 -04
PROBE WASH PART?
64.30
FILTER WT GAIN?
52.10
TIME THETA?
36.00
PITOT FACTOR?
0.83

DRY GAS VOL=
37.19 S.C.F.

VOLUME OF
H2O VAPOR=
2.95 S.C.F.

MOISTURE
CONTENT= 0.0734
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
0.0482
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
6.9023 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
39.3230 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
3.3098 06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
55164.09
S.C.F.M.

VOLUMETRIC FLOW
RATE=
65786.83
A.C.F.M.

PARTICULATE
OUTPUT=
22.85 LBS/HR

ISOKINETIC
CONDITION=
104.00%

Run #1

[redacted] SULFUR DIOXIDE EMISSIONS

ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)= 66.4

ACK STATIC PRESSURE(IN.HG.)= .37

LO TY HEAD OF STACK GAS(IN. H20)= .4301

LUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)= 36.4

AMETER OF SAMPLE NOZZLE(INCHES)= .3037

AMETER OF THE STACK(FT)= 5.958

AROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)= 30.035

OTAL VOLUME OF SAMPLE(ML)= 2000

ITOT TUBE COEFFICIENT= .8336

ORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)= 9.8E-03

OLU OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)= 0

OLU OF BARIUM PERCHLORATE TITRANT USED FOR SO2 (ML)= 5.275

RY GAS VOLUME(DSCF)= 37.0352

TANDARD VOLUME OF H20 VAPOR(CF)= 2.62651

OISTURE CONTENT= .0912227

ULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)= 0

ULFUR DIOXIDE CONCENTRATION(LB/DSCF)= 7.73531E-06

ERCENT OF ISOKINETIC SAMPLING= 102.349%

AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)= 3.2125

AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)= 123.3

AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .655749

DRY GAS METER CALIBRATION FACTOR= 1.003

AREA OF SAMPLE NOZZLE(SQ FT)= 5.03058E-04

AREA OF THE STACK(SQ FT)= 27.8799

TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)= 55.8

VOLUME OF ALIQUOT(ML)= 25

TOTAL SAMPLING TIME(MIN.)= 36

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= 0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= .1

********** FUEL INFORMATION **********

GH HEATING VALUE OF FUEL(BTU/GAL)= 14704

EL FIRING RATE (GPM)= 7.93

NSITY OF OIL(LB/GAL)= 9.3

S. OF SULFUR IN PER MIN.= 1.13573

S. OF SO2 IN PER MIN.= 2.2692

S. OF SO2 OUT PER MIN.= .418443

MOVAL EFFICIENCY IN PERCENT= 81.5599%

M. BTU'S PER MIN.= .116603

S. OF SO2 EMITTED/10^6 BTU'S INPUT= 3.58862

AVERAGE TEMPERATURE OF FUEL(DEG F)= 216

AVERAGE %TOTAL SULFUR AS S IN FUEL= 1.54

TE - 3,2,82
Run #2

**********[redacted]**********

[redacted] SULFUR DIOXIDE EMISSIONS

ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)= 74.6

ACK STATIC PRESSURE(IN.HG.)= .37

LOCITY HEAD OF STACK GAS(IN. H2O)= .4311

LUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)= 35.3

AMETER OF SAMPLE NOZZLE(INCHES)= .3037

AMETER OF THE STACK(FT)= 5.958

ROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)= 30.035

TAL VOLUME OF SAMPLE(ML)= 2000

TOT TUBE COEFFICIENT= .8336

RMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)= 9.88E-03

LUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)= 0

LUME OF BARIUM PERCHLORATE TITRANT USED FOR SO2 (ML)= 5.775

Y GAS VOLUME(DSCF)= 35.3562

TANDARD VOLUME OF H2O VAPOR(CF)= 3.18664

ISTURE CONTENT= .107678

ULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)= 0

ULFUR DIOXIDE CONCENTRATION(LB/DSCF)= 0.95806E-06

ERCENT OF ISOKINETIC SAMPLING= 98.9818%

AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)= 3.1083

AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)= 122.8

AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H2O^.5)= .656576

DRY GAS METER CALIBRATION FACTOR= 1.003

AREA OF SAMPLE NOZZLE(SQ FT)= 5.03058E-04

AREA OF THE STACK(SQ FT)= 27.8799

TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)= 67.7

VOLUME OF ALIQUOT(ML)= 25

TOTAL SAMPLING TIME(MIN.)= 36

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= 0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= .1

TE - 3,2,82

Run #2

********** FUEL INFORMATION **********

GH HEATING VALUE OF FUEL(BTU/GAL)= 14704

EL FIRING RATE (GPM)= 7.93

NSITY OF OIL(LB/GAL)= 9.3

AVERAGE TEMPERATURE OF FUEL(DEG F)= 214

AVERAGE %TOTAL SULFUR AS S IN FUEL= 1.54

S. OF SULFUR IN PER MIN.= 1.13573

S. OF SO2 IN PER MIN.= 2.2692

S. OF SO2 OUT PER MIN.= .478165

EMOVAL EFFICIENCY IN PERCENT= 78.928%

M. BTU'S PER MIN.= .116603

S. OF SO2 EMITTED/10^6 BTU'S INPUT= 4.10081

Run #3

[redacted] SULFUR DIOXIDE EMISSIONS

ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)= 77.7

ACK STATIC PRESSURE(IN.HG.)= .37

LO[illegible]TY HEAD OF STACK GAS(IN. H2O)= .4396

LUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)= 37.4

AMETER OF SAMPLE NOZZLE(INCHES)= .3037

AMETER OF THE STACK(FT)= 5.958

ROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)= 30.035

TAL VOLUME OF SAMPLE(ML)= 2000

ITOT TUBE COEFFICIENT= .8336

RMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)= 9.8E-03

OLU[illegible] OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)= 0

OLU[illegible]OF BARIUM PERCHLORATE TITRANT USED FOR SO2 (ML)= 8.05

RY GAS VOLUME(DSCF)= 37.2605

TANDARD VOLUME OF H2O VAPOR(CF)= 2.94187

OISTURE CONTENT= .0981766

ULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)= 0

ULFUR DIOXIDE CONCENTRATION(LB/DSCF)= 1.18114E-05

ERCENT OF ISOKINETIC SAMPLING= 102.707%

AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)= 3.2958

AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)= 126

AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .663026

DRY GAS METER CALIBRATION FACTOR= 1.003

AREA OF SAMPLE NOZZLE(SQ FT)= 5.03058E-04

AREA OF THE STACK(SQ FT)= 27.8799

TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)= 62.5

VOLUME OF ALIQUOT(ML)= 25

TOTAL SAMPLING TIME(MIN.)= 36

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= 0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= .1

[illegible] FLOW RATE CORRECTED TO STANDARD CONDITIONS(DSCF/HR)= 1.25355E+04

********** FUEL INFORMATION **********

Run #3

H HEATING VALUE OF FUEL(BTU/GAL)= 14704

L FIRING RATE (GPM)= 7.93

SITY OF OIL(LB/GAL)= 9.3

AVERAGE TEMPERATURE OF FUEL(DEG F)= 216

AVERAGE %TOTAL SULFUR AS S IN FUEL= 1.54

. OF SULFUR IN PER MIN.= 1.13573

. OF SO2 IN PER MIN.= 2.2692

. OF SO2 OUT PER MIN.= .640481

OVAL EFFICIENCY IN PERCENT= 71.775%

. BTU'S PER MIN.= .116603

. OF SO2 EMITTED/10^6 BTU'S INPUT= 5.49285

737 Executive Park, Louisville, Kentucky 40207
(502) 893-0106

COALIQUID, INC

FUEL ANALYSIS SHEET

SAMPLE # 8223040M

DATE FEB. 26 1982

CUSTOMER Amax Phosphate

COAL USED

0.24 Chlorine

Seam: Blue Gem
Source: G&G Coal, London Ky
BTU/Lb.: 13,951
Ash (%): 3.75
Sulfur (%): 0.78
Moisture (%): 3.99
Hardness: 46
Fusion(Ash): 2500+
Volatiles (%): 40.17
Fixed Carbon (%): 52.09
Percent Passing 200 Mesh: 90.3

OIL USED

Type: Fuel 0.16
Source: Amax Phosphate
BTU/Lb.: 17,737
Ash (%): 0.24
Sulfur (%): 2.33
B. S. & W: <0.1
Sp. Grav.: 0.995
API: 10.71
Lb./Gal.: 8.29
Viscosity (@ 122°F): 200 cps
Flash: 248°F
Chlorine .013

COM

Coal (%): 50.13
Oil (%): 41.11
Water (%): 8.76
BTU/Lb.: 14,704
Sulfur: 1.54
Ash (%): 1.86
Sp. Grav.: 1.18
Lb./Gal.: 9.9
Flash: 257°F
Viscosity (@ 122°F): 16,500 cps
Chlorine 0.11

Percentages are by weight

BROOKFIELD VISCOSITY (COM)

Temp. (f)	Centipoise	Temp. (F)	Centipoise
50	100,000+	140	8,410
60	100,000+	150	6320
70	100,000+	160	3950
80	80,000	170	1440
90	56,000	180	810
100	42,000	190	600
110	33,600	200	425
120	18,800	220	320
130	11,450	240	185

Name Wilfred L Brown
Position Quality Control Mgr

4,140 Gallons

DRYER LOG

OPERATOR: T. Adams SHIFT: Pollution Test DATE: 3-2-82

HOUR	SCALE READING	TONS PER HOUR	FUEL OIL READING	GALLONS PER HOUR	OIL PRESSURE-1	OIL PRESSURE-2	OIL TEMPERATURE	STEAM PRESS. BURNER	PLENIM TEMPERATURE	PLENIM PRESSURE	BED TEMPERATURE	BED PRESSURE	BED LEVEL	EXHAUST FAN INLET PRESS.	SCRUBBER INLET PRESS.	EXHAUST FAN AMPS	PRIMARY FAN AMPS	COMBUSTION FAN AMPS	PRODUCT TEMPERATURE	EXHAUST TEMPERATURE	TYPE ROCK	SILD	REMARKS
1	1000	240	530	530	92	70	230	100	1250	28	185	10	10	4.6	16	55	51	23	220	180	B	A	Test Start 1100
2	1240	240			98	52	200	9	1250	32	190	15	15	4.4	16	54	53	22	220	190	B	A	
3	1480	240	1550		75	100	250	100	1300	32	170	15	15	4.5	13	52	52	23	215	170	B	A	
4	1650	270	2380 –	830	97	70	200	100	1200	32	175	15	15	4.8	16	55	52	22	220	170	B	A	
5	1920	270	3400	1020	97	70	200	100	1200	32	170	15	15	4.6	14	56	55	22	220	170	B	A	
6																							
7	Avg Rate	252																					
8																							
9																							
10																							

Avg. Fuel Firing – 476 GPH ÷ 7.93 GPM

SCALE STOP: _____

SCALE START: _____

TOTAL: _____

OIL STOP: _____

OIL START: _____

TOTAL: _____

water pressure 740 G-PM

737 Executive Park, Louisville, Kentucky 40207
(502) 893-0106

COALIQUID, INC.

FUEL ANALYSIS SHEET

SAMPLE # 8223040M

DATE FEB. 26 1982

CUSTOMER Amax Phosphate

COAL USED

0.24 Chlorine

Seam: Blue Gem
Source: GEG Coal, London Ky.
BTU/Lb.: 13,951
Ash (%): 3.75
Sulfur (%): 0.78
Moisture (%): 3.99
Hardness: 46
Fusion(Ash): 2500+
Volatiles (%): 40.17
Fixed Carbon (%): 52.09
Percent Passing 200 Mesh: 90.3

COM

Coal (%): 50.13
Oil (%): 41.11
Water (%): 8.76
BTU/Lb.: 14,709
Sulfur: 1.54
Ash (%): 1.86
Sp. Grav.: 1.13
Lb./Gal.: 9.9
Flash: 257°F
Viscosity (@ 122°F): 16,500 cps
Chlorine 0.11

Percentages are by weight

4,140 Gallons

OIL USED

Type: Fuel 0.16
Source: Amax Phosphate
BTU/Lb.: 17,737
Ash (%): 0.24
Sulfur (%): 2.33
B. S. & W: <0.1
Sp. Grav.: 0.995
API: 10.71
Lb./Gal.: 8.29
Viscosity (@ 122°F): 200 cps
Flash: 248°F
Chlorine .013

BROOKFIELD VISCOSITY (COM)

Temp. (f)	Centipoise	Temp. (F)	Centipoise
50	100,000+	140	8,410
60	100,000+	150	6320
70	100,000+	160	3950
80	80,000	170	1440
90	56,000	180	810
100	42,000	190	600
110	33,600	200	475
120	18,800	220	310
130	11,450	240	185

Name William L Brown
Position Quality Control Mgr.

MEMORANDUM

AMAX Phosphate, Inc.
402 SOUTH KENTUCKY AVENUE · SUITE 600 · LAKELAND, FLORIDA 33801

TO: Mr. Fred Mullins

DATE: March 1, 1982

FROM: George Townsend

SUBJECT: Coal-Oil Test Burn

During the first coal-oil mixture test burn at the Big Four Mine dryer on February 22, 1982, we conducted tests to determine particulate and sulfur dioxide emission rates. During the test, pebble was being dried at an average rate of 256 TPH.

Test results were as follows:

Run	Stack Conditions DSCFM	Stack Conditions Temp°F	Particulate Emissions Lbs/Hr	Particulate Emissions Grains/DSCF	Sulfur Dioxide Emissions Lbs/Hr
1	48,781	118	17.06	0.0407	6.05
2	46,249	120	15.80	0.0398	5.73
3	44,677	125	19.95	0.0520	6.03
Avg.	46,569	121	17.60	0.0442	5.94

26 TPH

The average sulfur dioxide removal efficiency during the three tests was 87.54% ash contribution, per calculated basis, to total scrubber loading was 77.33 lbs/hr. Ash removal efficiency could not be calculated; as it's contribution to total particulate emissions could not be determined.

$\frac{5.94}{12.46} = 48\ \#/hr\ SO_2$

George Townsend

George Townsend

GT:kb

cc: Mr. H. P. Mott
Mr. S. R. Sandrik
[redacted]
Mr. G. P. Uebelhoer

$\frac{7.53\ gal}{min} \left| \frac{60\ min}{Hr} \right. \frac{(157)(58)}{1000} = 41\ \#/Hr\ SO_2$

FLA STATE DER
GENERAL
PARTICULATE
METHOD

TEST?

BIG FOUR DRYER
2-22-82 R 1
10:05-10:50

DATA SUMMARY:

BAR. PRESS.?
29.92
AVG DELTA H?
2.3325
METERED VOL?
31.10
METER TEMP?
63.20
STACK TEMP?
118.40
SQRT DELTA P?
0.5937
ML. H2O INC?
58.00
SIL GEL WT GAIN?
10.30
STACK AREA?
27.8831
PROBE AREA?
5.03 -04
PROBE WASH PART?
31.20
FILTER WT GAIN?
52.30
TIME THETA?
35.00
PITOT FACTOR?
0.83

DRY GAS VOL=
31.58 S.C.F.

VOLUME OF
H2O VAPOR=
3.22 S.C.F.

MOISTURE
CONTENT= 0.0925
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
0.0407
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
5.8305 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
35.1847 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
2.9268 06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
48780.60
S.C.F.M.

VOLUMETRIC FLOW
RATE=
58863.48
A.C.F.M.

PARTICULATE
OUTPUT=
17.06 LBS/HR

ISOKINETIC
CONDITION=
99.88%

FLA STATE DER
GENERAL
PARTICULATE
METHOD

TEST?

BIG FOUR DRYER
2-22-82 R 2
11:20-12:03

DATA SUMMARY:

BAR. PRESS.?
29.92
AVG DELTA H?
2.1858
METERED VOL?
30.00
METER TEMP?
56.00
STACK TEMP?
119.90
SQRT DELTA P?
0.5733
ML. H2O INC?
70.00
SIL GEL WT GAIN?
10.30
STACK AREA?
27.8831
PROBE AREA?
5.03 -04
PROBE WASH PART?
31.90
FILTER WT GAIN?
46.30
TIME THETA?
36.00
PITOT FACTOR?
0.83

DRY GAS VOL=
30.29 S.C.F.

VOLUME OF
H2O VAPOR=
3.79 S.C.F.

MOISTURE
CONTENT= 0.1111
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
0.0398
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
5.6929 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
34.1442 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
2.7750 06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
46249.49
S.C.F.M.

VOLUMETRIC FLOW
RATE=
57122.83
A.C.F.M.

PARTICULATE
OUTPUT=
15.80 LBS/HR

ISOKINETIC
CONDITION=
101.04%

FLA STATE DER
GENERAL
PARTICULATE
METHOD

TEST?

BIG FOUR DRYER
2-22-82 R 3
12:23-1:32

DATA SUMMARY:

BAR. PRESS.?
29.92
AVG DELTA H?
2.0533
METERED VOL?
29.10
METER TEMP?
72.70
STACK TEMP?
124.60
SQRT DELTA P?
0.5548
ML. H2O INC?
67.00
SIL GEL WT GAIN?
8.00
STACK AREA?
27.8831
PROBE AREA?
5.03 -04
PROBE WASH PART?
38.10
FILTER WT GAIN?
59.80
TIME THETA?
36.00
PITOT FACTOR?
0.83

DRY GAS VOL=
29.00 S.C.F.

VOLUME OF
H2O VAPOR=
3.54 S.C.F.

MOISTURE
CONTENT= 0.1087
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
0.0520
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
7.4436 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
33.1602 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
2.6806 06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
44677.06
S.C.F.M.

VOLUMETRIC FLOW
RATE=
55476.61
A.C.F.M.

PARTICULATE
OUTPUT=
19.95 LBS/HR

ISOKINETIC
CONDITION=
100.15%

UN #1

TE - 2,22,82 ********** [redacted] ********** PAGE 1 OF 2

[redacted] SULFUR DIOXIDE EMISSIONS

ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)= 63.2

ACK STATIC PRESSURE(IN.HG.)= 0

LOCITY HEAD OF STACK GAS(IN. H2O)= .3525

LUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)= 31.1

AMETER OF SAMPLE NOZZLE(INCHES)= .3037

AMETER OF THE STACK(FT)= 5.958

ROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)= 29.915

OTAL VOLUME OF SAMPLE(ML)= 2000

ITOT TUBE COEFFICIENT= .8336

ORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)= 9.88E-03

OLUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)= 0

OLUME OF BARIUM PERCHLORATE TITRANT USED FOR SO2 (ML)= 1.3

Y GAS VOLUME(DSCF)= 31.642

ANDARD VOLUME OF H2O VAPOR(CF)= 3.21488

ISTURE CONTENT= .117231

LFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)= 0

LFUR DIOXIDE CONCENTRATION(LB/DSCF)= 2.11656E-06

RCENT OF ISOKINETIC SAMPLING= 99.2508%

AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)= 2.3325

AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)= 118.4

AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H2O^.5)= .593659

DRY GAS METER CALIBRATION FACTOR= 1.003

AREA OF SAMPLE NOZZLE(SQ FT)= 5.03058E-04

AREA OF THE STACK(SQ FT)= 27.8799

TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)= 68.3

VOLUME OF ALIQUOT(ML)= 25

TOTAL SAMPLING TIME(MIN.)= 36

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= 0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= .1

[redacted] STANDARD CONDITIONS(DSCF)(M3)= 2.8578E+04

Run #1

ATE - 2,22,82

********** FUEL INFORMATION **********

IGH HEATING VALUE OF FUEL(BTU/GAL)= 14901

UEL FIRING RATE (GPM)= 7.53

ENSITY OF OIL(LB/GAL)= 9.1

BS. OF SULFUR IN PER MIN.= .397433

BS. SO2 IN PER MIN.= .794072

BS. OF SO2 OUT PER MIN.= .100812

EMOVAL EFFICIENCY IN PERCENT= 87.3045%

.H. BTU'S PER MIN.= .112205

BS. OF SO2 EMITTED/10^6 BTU'S INPUT= .898465

AVERAGE TEMPERATURE OF FUEL(DEG F)= 233

AVERAGE %TOTAL SULFUR AS S IN FUEL= .58

Run #2

TE - 2,22,82

********** [redacted] **********

[redacted] SULFUR DIOXIDE EMISSIONS

VERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)= 66

TACK STATIC PRESSURE(IN.HG.)= 0

ELOCITY HEAD OF STACK GAS(IN. H20)= .3287

OLUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)= 30

IAMETER OF SAMPLE NOZZLE(INCHES)= .3037

IAMETER OF THE STACK(FT)= 5.958

AROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)= 29.915

OTAL VOLUME OF SAMPLE(ML)= 2000

ITOT TUBE COEFFICIENT= .8336

ORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)= 9.88E-03

OLUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)= 0

OLUME OF BARIUM PERCHLORATE TITRANT USED FOR SO2 (ML)= 1.25

RY GAS VOLUME(DSCF)= 30.3495

TANDARD VOLUME OF H20 VAPOR(CF)= 3.77972

OISTURE CONTENT= .135747

ULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)= 0

ULFUR DIOXIDE CONCENTRATION(LB/DSCF)= 2.11475E-06

ERCENT OF ISOKINETIC SAMPLING= 100.394%

AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)= 2.1858

AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)= 119.9

AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .573334

DRY GAS METER CALIBRATION FACTOR= 1.003

AREA OF SAMPLE NOZZLE(SQ FT)= 5.03050E-04

AREA OF THE STACK(SQ FT)= 27.8799

TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)= 80.3

VOLUME OF ALIQUOT(ML)= 25

TOTAL SAMPLING TIME(MIN.)= 36

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= 0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= .1

[redacted] TO STANDARD CONDITIONS(DSCF/MIN)= 2.70955E+04

Run #2

DATE - 2,22,82

********** FUEL INFORMATION **********

HIGH HEATING VALUE OF FUEL(BTU/GAL)= 14901

FUEL FIRING RATE (GPM)= 7.53

DENSITY OF OIL(LB/GAL)= 9.1

LBS. OF SULFUR IN PER MIN.= .397433

LBS. OF SO2 IN PER MIN.= .794072

LBS. OF SO2 OUT PER MIN.= .0954652

REMOVAL EFFICIENCY IN PERCENT= 87.9778%

M.M. BTU'S PER MIN.= .112205

LBS. OF SO2 EMITTED/10^6 BTU'S INPUT= .850814

AVERAGE TEMPERATURE OF FUEL(DEG F)= 233

AVERAGE %TOTAL SULFUR AS S IN FUEL= .58

Run #3

ATE - 2,22,02 ********** [redacted] **********

[redacted] SULFUR DIOXIDE EMISSIONS

VERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)= 72.7

TACK STATIC PRESSURE(IN.HG.)= 0

EL[redacted]ITY HEAD OF STACK GAS(IN. H20)= .3078

OLUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)= 29.1

IAMETER OF SAMPLE NOZZLE(INCHES)= .3037

IAMETER OF THE STACK(FT)= 5.958

AROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)= 29.915

OTAL VOLUME OF SAMPLE(ML)= 2000

ITOT TUBE COEFFICIENT= .8336

NORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)= 9.88E-03

VOL[redacted]E OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)= 0

VOL[redacted] OF BARIUM PERCHLORATE TITRANT USED FOR SO2 (ML)= 1.3

AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)= 2.0533

AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)= 124.6

AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .554795

DRY GAS METER CALIBRATION FACTOR= 1.003

AREA OF SAMPLE NOZZLE(SQ FT)= 5.03050E-04

AREA OF THE STACK(SQ FT)= 27.8799

TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)= 75

VOLUME OF ALIQUOT(ML)= 25

TOTAL SAMPLING TIME(MIN.)= 36

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= 0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)= .1

DRY GAS VOLUME(DSCF)= 29.0593

STANDARD VOLUME OF H20 VAPOR(CF)= 3.53025

MOISTURE CONTENT= .133325

SULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)= 0

SULFUR DIOXIDE CONCENTRATION(LB/DSCF)= 2.30467E-06

PERCENT OF ISOKINETIC SAMPLING= 99.5159%

[redacted] FLOW RATE CORRECTED TO STANDARD CONDITIONS(DSCF/HR)= 2.41646E+06

Run #3

ATE - 2,22,82

********** FUEL INFORMATION **********

IGH HEATING VALUE OF FUEL(BTU/GAL)= 14901

UEL FIRING RATE (GPM)= 7.53

ENSITY OF OIL(LB/GAL)= 9.1

BS. OF SULFUR IN PER MIN.= .397433

BS. OF SO2 IN PER MIN.= .794072

BS. OF SO2 OUT PER MIN.= .100501

EMOVAL EFFICIENCY IN PERCENT= 87.34367

.H. BTU'S PER MIN.= .112205

BS. OF SO2 EMITTED/10^6 BTU'S INPUT= .895497

AVERAGE TEMPERATURE OF FUEL(DEG F)= 233

AVERAGE %TOTAL SULFUR AS S IN FUEL= .58

DRYER LOG

OPERATOR: R. Hurion SHIFT: Pollution DATE: 2-22-82

HOUR	SCALE READING	TONS PER HOUR	FUEL OIL READING	GALLONS PER HOUR	OIL PRESSURE-1	OIL PRESSURE-2	OIL TEMPERATURE	STEAM PRESS. BURNER	PLENUM TEMPERATURE	PLENUM PRESSURE	BED TEMPERATURE	BED PRESSURE	BED LEVEL	EXHAUST FAN INLET PRESS.	SCRUBBER INLET PRESS.	EXHAUST FAN AMPS	PRIMARY FAN AMPS	COMBUSTION FAN AMPS	PRODUCT TEMPERATURE	EXHAUST TEMPERATURE	TYPE ROCK	SILO	REMARKS
10	720	280				49	230	95	1150	30	125	15	15	4	13	51	49	22	200	160	C	B	Temperature 550
11	990	270				49	235	95	1175	36	125	15	15	4	13	51	49	22	200	165	B	B	Moisture 980
12	1260	270				49	235	93	1250	30	125	15	15	4	13	51	49	22	205	165	F	B	
1	1470	210	Quick.								KNIFE GATE CHOKE UP DOWN 15 MIN												Water analysis
2	1720	250	4294 used	452		50	240	93	1250	30	185	15	15	4.6	15	56	51	22	220	175	E	C	Dust sensible
			Test Burn	Avg																			
		Total	Test Burn	Time		9.5 Hr.																	

Fuel Firing rate 2.53 gal/min

SCALE STOP: _____

SCALE START: _____

TOTAL: _____

OIL STOP: _____

OIL START: _____

TOTAL: _____

737 Executive Park, Louisville, Kentucky 40207
(502) 893-0106

COALIQUID, INC.

FUEL ANALYSIS SHEET

SAMPLE # 82230104 DATE 1/13/82

CUSTOMER AMAX PHOSPHATE

COAL USED [redacted]

Seam: Blue Gem, Jackson Co, Ky
Source: G E G Coal & Energy Co
BTU/Lb.: 14,757
Ash (%): 2.41
Sulfur (%): 0.69
Moisture (%): 5.79
Hardness: 46
Fusion(Ash): 2500°F +
Volatiles (%): 39.69
Fixed Carbon (%): 57.90
Percent Passing 200 Mesh: 83.1

OIL USED

Type: Fuel Oil 6
Source: Allied Oil Co
BTU/Lb.: 18,790
Ash (%): 0.36
Sulfur (%): 0.68
B. S. & W: < 0.1
Sp. Grav.: 0.9779
API: 13.2
Lb./Gal.: 8.144
Viscosity (@ 122°F): 1380 SUS
Flash: 316 F

COM

Coal (%): 50.06
Oil (%): 42.85
Water (%): 7.09
BTU/Lb.: 14,901
Sulfur: 0.58
Ash (%): 1.88
Sp. Grav.: 1.12
Lb./Gal.: 9.1
Flash: 318°F
Viscosity (@ 122°F): 11,950

BROOKFIELD VISCOSITY (COM)

Temp. (f)	Centipoise	Temp. (F)	Centipoise
50	100,000	140	6,870
60	"	150	4,000
70	86,610	160	2,910
80	53,820	170	2,380
90	42,100	180	1,550
100	25,940	190	1,100
110	18,480	200	980
120	12,200	220	840
130	9,800	240	760

Percentages are by weight

1,000 Gallons

Temp: (COM) 102°F

Name William L Brown

Position Quality Control Mgr.

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE · SUITE 600 · LAKELAND, FLORIDA 33801 · (813) 687-2561

February 17, 1982

Ms. Lynne Stevenson
Air Engineering Department
Hillsborough County
Environmental Protection Commission
1900 9th Avenue
Tampa, Florida 33605

Dear Ms. Stevenson:

As we discussed on the telephone yesterday, AMAX would like to perform an additional eight hour test burn of the coal-oil-mixture (COM) fuel on February 22, 1982. The original testing program and fuel description were transmitted to you in my letter of December 14, 1982 which is attached for your reference. The January 18 and January 25 tests detailed in the December letter failed due to ignition problems. No stack sampling was achieved as the dryer did not reach normal operating temperature and phosphate rock throughput was held at less than 20 percent of design.

The additional test would be run using low sulfur, approximately 0.8 percent, COM fuel. This fuel was scheduled to be burned during the unsuccessful January 18 test and has been onsite in a Coaliquid, Inc. truck tanker, since that time. Also, the existing Eclipse burner assembly would be replaced, for testing purposes only, with a Forney oil gun design. Coaliquid, Inc. believes the Forney gun will alleviate the ignition problems that plagued the first two tests. If this test is successful, AMAX's stack testing team will perform emissions tests using the modified Method #5 sampling procedure for particulate and sulfur emissions. The results of the stack tests will be submitted to your office and the Florida Department of Environmental Regulation.

An analysis of the first two unsuccessful tests and details of the proposed additional test are presented in Coaliquid, Inc.'s correspondence to AMAX dated February 4, 1982 and February 5, 1982, respectively. This correspondence is attached for your review.

During our telephone conversation you stated that HCEPC has no objection to AMAX proceding with the additional test of COM fuel as described above. Further, it was my understanding that you would notify FDER as to this test. I am also sending Mr. Dan Williams of FDER a copy of this letter for his perusal.

I thank you for your attention to this matter.

Sincerely,

R. H. Swanson
Environmental Supervisor
Big Four Mine

RHS/rit

cc: (all with attachments)
Ms. Rhea Law
Mr. Harold Mott
Mr. Fred Mullins
Mr. Randy Sandrik
Mr. George Townsend
Mr. Gary Uebelhoer
Mr. Dan Williams

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE · SUITE 600 · LAKELAND, FLORIDA 33801 · (813) 687-2561

December 14, 1981

Ms. Lynne Stevenson
Air Engineering Department
Hillsborough County
Environmental Protection Commission
1900 9th Avenue
Tampa, Fl. 33605

Dear Ms. Stevenson:

The purpose of this letter is to inform you of AMAX's intent to expand the alternate fuel testing program at the Big Four Mine dryer facility to include a coal-oil-mixture (COM) fuel. By weight, this fuel is made up of 50 percent coal, 40 percent fuel oil and 10 percent water. If the use of COM is found to be a viable alternative the fuel oil consumption rate at the dryer would be reduced by about 55 percent. In turn, this would result in a cost savings of approximately $400,000.00 per year. The attached CoaLiquid, Inc. brochure further describes this fuel.

AMAX plans to test burn this fuel for approximately 8 hours on January 18, 1982, for 8 hours on January 25, 1982 and for 5 days during the last half of March, 1982. The first 2 tests will allow AMAX to determine emission rates from low and high sulfur content fuel. Low sulfur (0.8 percent) fuel will be utilized during the January 18, 1982 test and high sulfur (1.5 percent) fuel will be burned during the January 25, 1982 test. The 5 day test burn will allow AMAX to determine the effect of the fuel on the dryer facility and the product.

AMAX's stack testing team will perform emissions tests during the use of this fuel. They will use the modified Method #5 sampling procedure for particulate and sulfur emissions. The results of these tests will be submitted to the Hillsborough County Environmental Protection Commission and the Florida Department of Environmental Regulation.

I have discussed this matter with the FDER and they have no objection to the plans presented herein for the testing of COM. If HCEPC is also agreeable to these plans, please notify me as soon as possible so I can confirm the test dates with CoaLiquid, Inc.

I appreciate your attention to this matter and if you should have any questions regarding the same, please do not hesitate to contact me.

Sincerely,

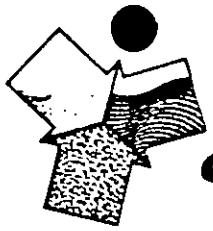
R. H. Swanson

R. H. Swanson
Environmental Supervisor
Big Four Mine

RHS:st
Attachment

cc: Ms. Rhea Law/with attachment
Mr. Fred Mullins/without attachment
Mr. Randy Sandrik/without attachment
Mr. George Townsend/without attachment
Mr. Gary Uebelhoer/without attachment
Mr. Dan Williams/with attachment

737 Executive Park, Louisville, Kentucky 40207
(502) 893-0106



CoaLiquid, Inc.

February 4, 1982

Mr. Randy Sandrik
Mine Manager
Big Four Mine
AMAX Phosphate, Inc.
P.O. Box 508
Bradley, Florida 33835

Subject: COM Test Burn In Phosphate Rock Dryer
CLI Project 8120

Dear Mr. Sandrik:

This letter will summarize the results to date of our attempts to burn CoaLiquid COM in your phosphate rock dryer and convey our commitment to conduct additional testing as considered necessary to demonstrate the practical feasibility of burning COM in this process application .

On January 17, CLI attempted to burn the COM fuel using the existing Eclipse oil gun assembly, modified to include a replacement "crud" nozzle tip with wide open bore which was specifically designed for burning waste liquid fuels and heavy oils. The test was curtailed after burning approximately 300 gallons of COM due to failure to achieve acceptable atomization at low fire conditions.

On January 24, after consultation with the burner manufacturer, CLI returned with a modified version of the existing Eclipse Mark IV oil nozzle tip. Based on results of the initial test firing from the preceeding week, both Eclipse and CLI felt that the poor atomization characteristics could best be resolved by using a conventional oil tip with size and number of orifices changed to accommodate the more viscous COM fuel. The subsequent attempts at burning COM were successful in that good fuel atomization and flame pattern were obtained; however, the nozzle consistently plugged at low fire conditions. After 4 hours of attempting to burn the COM, AMAX requested that the test effort be called off pending further improvement in burner design. Subsequent analysis of this test burn indicates that fuel stoppage probably was due to an

overheated nozzle tip and the inability to control temperature at this critical section of the burner assembly during initial light off conditions.

In reviewing the results of the two test burns, we believe the following observations are appropriate:

1. The attempts to burn COM in this application were confined to an existing burner system with minimum equipment modifications and disruption of process operation (reference CLI letter of November 9, 1981 and attached test burn program). CLI acknowledged at the outset that COM had not been previously fired in this burner system and the burner selection might not be the most efficient design for optimum combustion. The test was to be conducted on the basis of determining if COM could be fired using this burner design and what initial observations could be identified in terms of impact of COM combustion on phosphate rock product and dryer facilities and resultant emission characteristics.

2. The results of COM test firing to date are indicative only of improper burner design/calibration to accept the COM fuel. Insufficient data has been generated to verify impact of COM on product material or dryer facilities, or to identify emission characteristics.

3. To date there is no indication of unacceptable COM fuel characteristics. Test observations to date indicate ability to burn the fuel if properly atomized and without fuel stoppages in the nozzle tip.

4. CLI does not believe that sufficient time has been allocated for proving or disproving the merits of the Eclipse burner system to burn COM fuel in this dryer application. However, we recognize the practical need to honor production requirements which limit the available down time to experiment with different burner tip selections and adjustments which are obviously needed to adapt this burner to burn COM. Based on the significance of minimizing dryer down time and limiting burner development work, CLI acknowledges that additional attempts to use the Eclipse burner system must be curtailed.

We appreciate the cooperation and interest extended to date by AMAX Phosphate, and understand that CLI will be afforded an additional opportunity to utilize a different burner assembly having demonstrated capacity for burning COM. Based on this arrangement, CLI proposes an additional test burn in the same dryer facility using a different oil gun design in an effort to burn the same CoaLiquid COM fuel to satisfy the same test objectives as originally established for the initial 5,000 gallon test burn demonstration. The details as to new burner selection and necessary arrangements for installation will be addressed in a separate forthcoming letter. We wish to emphasize, however, our commitment to AMAX Phosphate to provide the necessary resources to effectively burn the CoaLiquid COM fuel in your phosphate dryer installation as required for a fair analysis of the practical utilization of CoaLiquid COM fuel as an acceptable atlernate fuel in this energy intensive process application.

Very truly yours,

Charles J. Lauer
Senior Project Engineer

CJL/ce

cc: Mr. Harold Mott - AMAX Phosphate

737 Executive Park, Louisville, Kentucky 40207
(502) 893-0106

CoaLiquid, Inc.

February 5, 1982

Mr. Randy Sandrik
Mine Manager
Big Four Mine
AMAX Phosphate, Inc.
P.O. Box 508
Bradley, Florida 33835

Subject: COM Test Burn in Phosphate Rock Dryer
CLI Project 8120

This letter will outline the requirements associated with a proposed forthcoming test burn of COM using a different oil gun assembly from the existing Eclipse burner which failed to produce acceptable results in previous attempts of January 17, and 24 (reference separate CLI letter of February 5, 1982).

The major requirements and/or commitments for completing a test burn using a new oil gun design are as follows:

1. As a replacement for the existing Eclipse oil burner assembly, which utilizes an outside or external mix type atomizer, CLI proposes to install an oil gun designed by Forney Engineering which employs a Y-jet internal mix type atomizer which uses a smaller quantity of saturated steam for atomization plus high pressure air to cool the nozzle assembly. The Forney oil gun design has been successfully used on other applications to burn the CoaLiquid COM fuel. The proposed oil gun assembly is compatible with the existing fuel train, using the same ignitor and flame scan sensor. The only significant change from the existing burner requirements involves the need for high pressure cooling air which for purposes of the test burn would be satisfied by a portable air compressor.

2. To mount the Forney oil gun into the existing Eclipse burner throat, CLI proposes to utilize a separate front mounting plate (approximately 48" diameter) as shown by attached Figure 1. The

plate and all accessories for mounting the oil gun, ignitor, flame scan sensor and peep sight will be fabricated in advance for installation as soon as the existing oil gun can be removed from the dryer. Once the new burner plate is bolted to the front of the burner housing, it will not be necessary to remove the plate to clean or inspect the oil gun or reposition the gun assembly (as is currently required with the Eclipse gun) since the Forney gun can be completely removed through a sleeve in the mounting plate.

3. It is our understanding that the support assembly for the existing Eclipse burner will allow the burner to be swung to one side to allow access to the open front of the burner housing (reference attached Figure 2). This open access to the front of the burner housing probably will be adequate for installation of the new Forney gun assembly; however, the Eclipse burner in its recessed position would block access to the burner control panel and restrict available working space on the burner platform. Due to the limited space, CLI acknowledges that the Eclipse burner may have to be disconnected from the support frame and set to one side while the Forney burner is in place.

   Note: To satisfy AMAX concern about possible need to revert to oil firing and reinstallation of the original Eclipse gun, CLI will agree to install the new Forney gun and immediately light off with fuel oil prior to dismounting the Eclipse gun assembly and any attempt to burn COM. Once it has been demonstrated to AMAX satisfaction that the new oil gun assembly will operate satisfactorily on fuel oil, we believe AMAX will be more confident in allowing CLI to proceed with the COM test burn program. If the new Forney gun does not perform satisfactorily on fuel oil, CLI will agree to remove the Forney installation and immediately reinstall the original Eclipse burner assembly.

4. CLI will provide the complete Forney oil gun assembly to include replaceable nozzle tips and mounting hardware for connecting to existing steam and oil supply lines. CLI will also arrange for rental of a portable air compressor and the necessary hose for

connecting to the oil burner assembly. The Forney oil gun can be used for burning the existing residual fuel oil as well as the COM fuel supplied by CLI.

5. Based on verbal conversations with your Mr. Harold Mott on Feb. 4, it is our understanding that the following materials/services can be provided by AMAX Phosphate for the execution of this test burn:

   a. AMAX to provide a 4' x 4' (or 48" dia.) flat sheet of 5/16" carbon steel plate for use as the rear mounting plate. CLI responsible for trimming the plate, mounting the oil gun assembly, and cutting all openings as required for burner accessories and to bolt the mounting plate to the burner housing.

   b. AMAX to provide the use of a welding machine, welding rods and cutting torch for use by qualified CLI personnel to mount the Forney burner unit.

   c. AMAX to provide use of small crane and operator as might be necessary to dismount and reinstall the Eclipse oil gun assembly.

   d. AMAX to arrange for the necessary environmental permitting requirements and stack sampling teams which will be utilized during the burning of apprixmately 5000 gallons of COM.

6. CLI proposes to provide CLI personnel to remove the existing Eclipse oil gun, install the Forney gun for the test burn, and remove the Forney gun and reinstall the Eclipse burner at the conclusion of the test burn. It is our understanding that this labor arrangement will not interfere with the local operating and maintenance program.

7. For the execution of this test burn, CLI requests adequate time for installation of the burner and test firing to calibrate and adjust the burner prior to the formal test burn program. We propose a 3 day test period, with the first two days (typically Saturday and Sunday) used to remove the Eclipse oil gun, install

the Forney gun, and conduct necessary burner adjustments, and the third and final day (Monday) devoted to continuous burning of the main fuel supply at typical dryer operating conditions.

In proposing this additional test burn, we wish to convey our sincere commitment to provide the necessary resources to adequately demonstrate that CoaLiquid COM can be burned in your dryer operation. We will complete all necessary arrangements to assure that the new burner assembly is ready to be installed as soon as the facility is made available. We anticipate that the complete burner transition can be completed within a 4 to 8 hour span which should allow adequate time over a weekend shutdown schedule to demonstrate the operation of the burner on fuel oil as well as COM. Based on an acceptable burner operation, we would propose to complete the balance of the test program in accordance with basic provisions as outlined in our previous letter of January 7.

We would like to complete the forthcoming test program as soon as possible to free our equipment presently committed to this project and to establish the basis for future application of COM as a viable alternate fuel for your phosphate dryer operation. To expedite this program we have already made arrangements for use of a Forney oil gun assembly which will be delivered to the Big Four Mine during the week of February 8.

We acknowledge your support and cooperation in this endeavor and look forward with confidence to the successful burning of COM using this new burner assembly. Please advise as to the earliest realistic date for rescheduling this test program.

Very truly yours,

Charles J. Lauer
Senior Project Engineer

CJL/ce

cc: Mr. Harold Mott - AMAX Phosphate

Enclosure

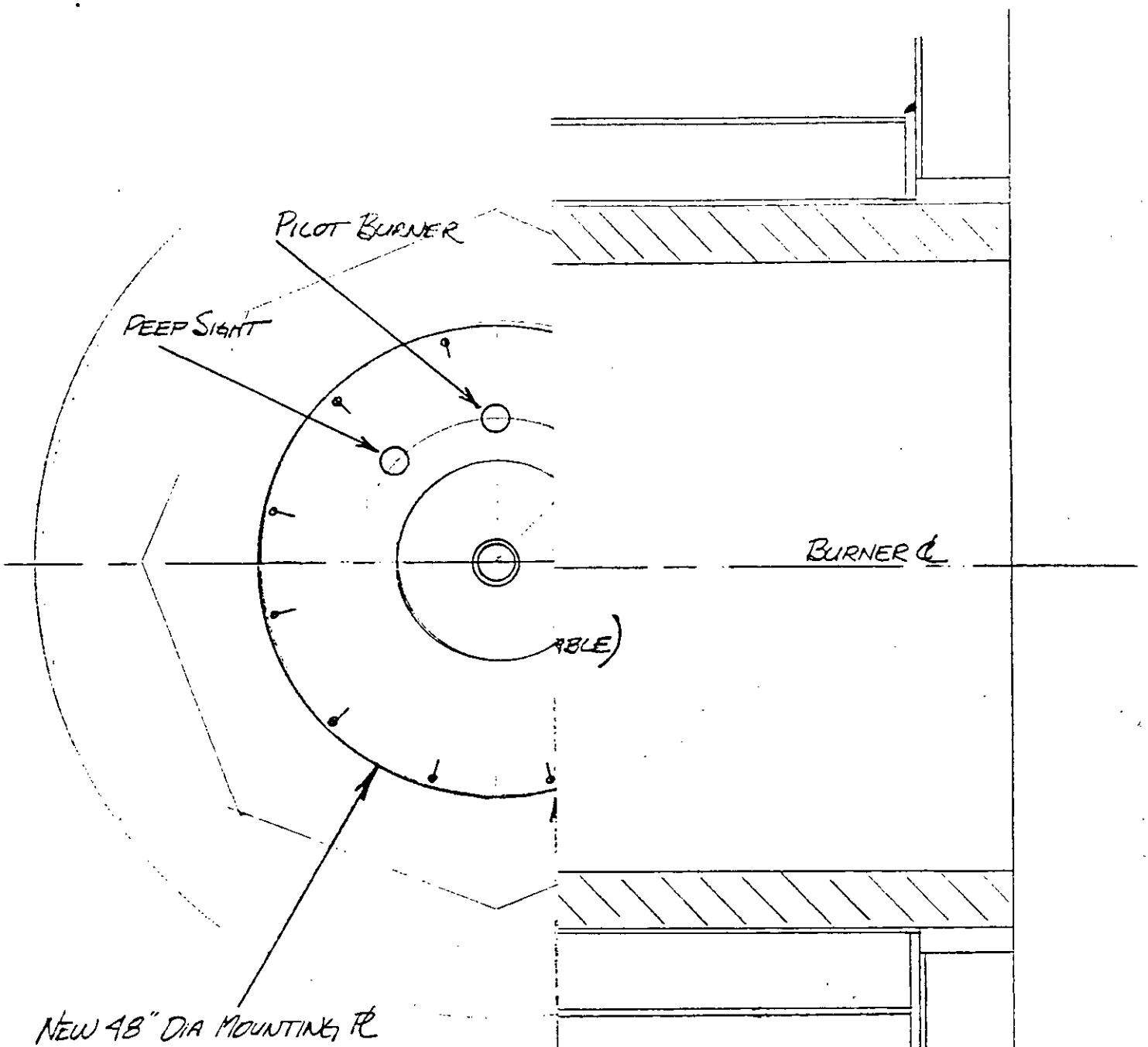


FIGURE 1
OIL GUN ASSEMBLY
EXISTING ECLIPSE BURNER HOUSING
ROCK DRYER OPERATION
PHOSPHATE, INC
PROJECT 8120

FIGUR
PLAN VIEW OF EXISTI.
TO SHOW ECLIPSE BURNER
PHOSPHATE ROCK
AMAX PHOSP
CLI PROJECT