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LA MINOTERIE D'HAITI

WHEAT BLEND STUDY



**KANSAS  
STATE  
UNIVERSITY**

**FOOD & FEED GRAIN INSTITUTE  
MANHATTAN, KANSAS 66506**

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LA MINOTERIE D'HAITI  
WHEAT BLEND STUDY

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for the  
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## EXECUTIVE SUMMARY

This study was initiated by USAID/Haiti in order to recommend the most suitable blending ratio of Soft Red Winter wheat with Hard Red Winter wheat to produce the most acceptable flour to market in Haiti.

At the request of the mission, it was also decided that the compliance activities initiated by the management of La Minoterie D'Haiti to comply with the "Memorandum Of Understanding" also be verified concurrently.

In consultation with the technical staff of the mill, it was decided that a composite mix of Hard Red Winter wheats from the three shipments that are being unloaded, be prepared to represent the cross section of available Hard Red Winter wheats. This lot was tempered to the usual 14.5 percent moisture level. This was then mixed with 10 percent, 13 percent, 15 percent, and 20 percent of Soft Red Winter wheat in the laboratory and the blends were prepared. These blends were then milled on a "Chopin Experimental Mill" in the laboratory. Experimental loaves were baked with flours obtained from milling experiments. Based on the visual and physical inspection of these loaves, it was recommended to the director general of La Minoterie D 'Haiti that 15 percent Soft Red Winter wheat be blended with Hard Red Winter wheat and that the blend be tempered to 14 percent (1/2 percent less than the 14 1/2 percent tempered wheat moisture generally used) moisture subject to changes to suit any special conditions. It was mutually agreed that this blending ratio be adopted and that it would produce acceptable flour.

Regarding the compliance actions taken to comply with the "Memorandum Of Understanding", the following observations were made.

1. In general, there are indications that some reductions have been made in the temporary work force compared to the last visit.
2. Regarding the status of safety and sanitary conditions in the mill, it was verified that quite a few minor jobs have been executed but the major causes of these conditions have not been addressed yet.
3. The receiving wharf scale is still not operational. The cleaning house scale is now operational along with the tempered wheat to mill scale and finished flour scale. The new load out weigh bridge is presently operating. The Son du Ble dump scale in the mill is not operational.
4. It was stated by the mill management that a French consulting team had made a visit to the mill in order to study the power factor conditions in the mill and propose a project for the power factor correction.
5. The major problems relating to the pneumatic system of the mill have not been tackled at present. The mill management expressed concern regarding this matter. During discussions with the resident French milling technicians, it was indicated that they were aware of the situation and are trying to formulate some remedies.

### Conclusions and Recommendations

In conclusion, it was decided in consultation with the technical staff of La Minoterie D'Haiti that 15 percent of Soft Red Winter wheat blended with Hard Red Winter wheat and tempered to 1/2 percent less than the 14.5 percent tempered wheat moisture that is normally used at present would be appropriate for the present milling conditions. The above blending percentage is subject to being raised or lowered within the range of 20 percent - 10 percent as suited to particular situations in the future. For the blending ratio suggested, no changes are expected to be made in the mill flow sheet.

In order to maintain the present mill load or higher, the flour extraction rate might have to be slightly adjusted.

Efforts are being made to improve the safety and sanitary conditions in the mill. But, the major causes of the present conditions have not been addressed yet. Work on the pneumatic system to improve the choke situation also has not been started. The wharf scale is still not operational and management needs to better motivate itself to bring all the scales into operation faster. On the basis of some observations made during the visit, it appears that some reductions have been made in the temporary work force.

SECTION I  
INTRODUCTION

The purpose of this visit to Haiti was to study and recommend the most suitable blending ratio of Soft Red Winter wheat with Hard Red Winter wheat to produce the most acceptable flour to markets in Haiti.

Concurrently, it was also the purpose of this visit to verify how well the "Memorandum of Understanding" signed earlier was being complied with.

The following sections of the report present a description of the receiving, cleaning, and tempering system of the mill; explanation of wheat blending and conclusions made; concise report on the compliance activities; and specific conclusions and recommendations.

Daily visits were made to La Minoterie D'Haiti. The information presented herein was given by the mill's technical staff. Due to the very short duration of the visit, the observations made were based on impressions made on inspection tours and discussions with the mill's technical staff.

Also, due to the lack of adequate testing facilities locally to perform standardized milling or baking evaluation of blending samples of different rates considered, it was decided in consultation with USAID/Haiti that duplicate blending samples be sent to Kansas State University (KSU) for full evaluation. Pending that evaluation, which could form the baseline reference for future blending, this report should be considered as interim.

## SECTION II

### DESCRIPTION OF WHEAT RECEIVING, CLEANING, AND TEMPERING SYSTEM

La Minoterie D'Haiti has a total wheat storage capacity of 36,000 short tons (st). Silos connected to the mill can hold 15,195 st. The flat storage can hold 10,000 st and the national grain storage facility, CNSG, can hold 11,640 st.

The pneumatic wheat unloading system at the wharf has a capacity of 160 metric tons/hour (mt/hr). At present, due to a lack of maintenance, the unloading capacity has dropped to almost half of the original capacity.

The cleaning house is equipped with 10 wheat holding bins of a total 675 st capacity. The first temper bins can hold 280 st and the second temper bins can hold 50 st.

Even though it was designed to have dosing feeders under all holding bins as per the cleaning house renovation program, only four bins were fitted with dosing feeders. Also, it was reported that none of the bins were designed to be "FIFO" bins and actually work as "last in first out". This aggravates the blending situation. Consequently, the mill staff is using the four bins equipped with dosing feeders as a nest and are trying to draw from the four bins at the same time to minimize the segregation of the wheat. This arrangement works fine as long as 100 percent of one variety of wheat is used in the mill. If two varieties or more are used to blend and these varieties are to be tempered separately to minimize the problems of mixed tempering, then the second and third variety of wheats will not have any dosing feeders to accurately measure out the blending ratios. So, at best, by trial and error, the millers achieve an approximate blending ratio of the wheats being blended.

On the other hand, the second variety could be blended from one of the four holding bins with a dosing feeder, with the first variety feeding from the other three dosing feeders. Such an arrangement would require the blend be made before cleaning and tempering. Because of their different physical and structural nature, blending Soft Red Winter wheats with Hard Red Winter wheats before tempering and then tempering the mix creates a different set of problems. This brings out the inadequacies in the cleaning house system at La Minoterie D'Haiti and underlines the importance of having either dosing feeders or inverter controlled variable speed screw conveyor feeders installed under all the holding bins, and at least some of the first temper bins, in order to insure accurate and consistent blending of the varieties necessary to produce consistent quality flour.

### SECTION III

#### BLENDING STUDY

Before reaching a decision, the blending ratios to be considered were discussed extensively with the chief miller, Mr. Lionel Pedriel, and the deputy chief miller, Mr. Raoul Perpignan. It was decided to try Soft Red Winter wheat to Hard Red Winter wheat blending ratios of 10:90, 13:87, 15:85, and 20:80. This decision is also supported by an earlier study by Professor J.G. Ponte, Jr., et al. on Chinese Soft Red Winter Wheat blends with Hard Red Winter wheats.

Since the Soft Red Winter wheats need less temper moisture and less tempering time compared to Hard Red Winter wheats, it would be appropriate to clean and temper them separately and then blend the wheats to the ratio. Unfortunately, the existing facilities in the cleaning house do not have the capability to do so accurately. So, it was decided to use the composite blend of 100 percent Hard Red Winter wheats which had been tempered to 14.5 percent moisture and blend it with specific amounts of Soft Red Winter wheat with "as is" moisture in the laboratory and prepare Soft Red Winter:Hard Red Winter blending samples of 10:90, 13:87, 15:85, and 20:80 ratios, respectively. Duplicate samples were also prepared to send to KSU for full evaluation.

Blending samples were ground on a Chopin experimental mill. The flour from each sample was baked experimentally to evaluate the best blending ratio. The aim was to select the maximum blending ratio possible within the limits of acceptable bread quality. From visual and physical characteristics inspection, it was found that with a 20 percent blend of Soft Red Winter wheat, there was a decrease in loaf volume. While maintaining all other characteristics, a 15 percent blend of Soft Red Winter wheat showed only a marginal difference in volume compared to a 10 percent Soft Red Winter wheat blend which was found to be acceptable in the market earlier.

On the basis of these rudimentary tests done locally, it was decided that a starting blend ratio of 15 percent Soft Red Winter to 85 percent Hard Red Winter wheat should be tried. Also, the ratio should be increased or decreased within 20 to 10 percent of the Soft Red Winter wheat as the conditions dictate in the future.

## SECTION IV

### COMPLIANCE WITH "MEMORANDUM OF UNDERSTANDING"

In order to comply with the Memorandum of Understanding, an inspection of the facilities was conducted in the presence of the mill's mechanical engineer with the specific aim of verifying the correctional program initiated by the management of La Minoterie D'Haiti.

It was evident from the "Schedule of Correction of Operational Problems" charts included in Appendix I that an effort was being made towards that goal. From the initial and subsequent inspections, it was evident from a major part of the list of completed jobs presented that a welcome and long needed, correctional program to reduce dust flying out of the machines in the cleaning house and mill had been initiated. This will go a long way in making the work place a safe environment. But, the sources of the unsanitary conditions have not yet been eliminated. For example, the second filter dust collector and some other needed machines are still not operating. Unless these sources of dust production and dispersion into the mill are eliminated, the real benefits of the correctional work being done at present will not be realized. Installation of guards for the manlift wells and maintenance of the manlift are also still on the future correction list.

Due to the very short duration of this visit, it was difficult to gather much supporting evidence in writing. But, on first impression, it appears that some reductions have been made in the temporary work force. The situation regarding the existing/new contracts for competitive pricing of bags could not be verified in this visit due to a shortage of time.

The director general of La Minoterie D'Haiti stated that a French consulting team was at the mill during the week of October 9, 1989 to survey the power factor situation and submit a proposal/quotation for correction of the power factor.

The scale at the wharf is not operational yet. It was reported that the delay was due to the contractor's inability to finish the work on time. The same contractor is also to repair all the other scales at the mill. The new 100 short-ton weigh bridge at the entrance of product load out was operational but the electronic monitoring system for this scale was not.

The project for repairing the pneumatic system and its upkeep has not been initiated yet. None of the suggested repair jobs have been attempted and it was found that required materials for beginning the repair also have not yet been purchased.

Even though the wharf scale and dump scale for Son Du Ble have not been repaired yet, new platform scales were in place at the Son Du Ble packer. Mechanical counters were also installed on the belt conveyors, which will help keep count of the number of bags packed at any given time during the day. But, it was found

that the belt conveyors do not always work and the counters are bypassed. It was suggested that more mechanical counters be installed on each individual packer.

# LIGHT AND SCANNING ELECTRON PHOTOMICROGRAPHS

## SECTION V

### CONCLUSIONS AND RECOMMENDATIONS

In consultation with the director general and the millers, it was concluded that 15 percent Soft Red Winter wheat could be blended with 85 percent Hard Red Winter wheat to produce an acceptable quality of flour. This blending ratio could be increased or decreased to suit specific conditions.

The duplicate samples prepared for the blending ratios should be evaluated for milling and baking characteristics at Kansas State University, Department of Grain Science and Industry. The results should be used as a baseline for future recommendations.

Although the mill's management has invested a considerable amount of time and labor into correcting operational problems, in order to fulfill the "Memorandum of Understanding", the management should follow a more aggressive approach so that they can meet time schedules. Management should realize the severity of damage the nonoperational scales do to mill control procedures and exert more pressure on the scale repair contractor to complete repairs. As soon as feasible, the cost of bags should be reduced by competitive pricing. As for the correction and repair of the pneumatic system, materials needed for repair should be purchased as advised during this visit and a repair program with a target date for completion initiated immediately. As soon as feasible, based on the power factor survey, the power factor correction program should be initiated.

APPENDIX I

REFERENCES

1. He, H., and J. Ponte, Jr. Evaluation of Chinese and U.S. Wheats and Their Blends for Breadmaking. Published in Cereal Foods World, Vol. 33, No. 6, pp 506-510.

APPENDIX II  
ACKNOWLEDGMENTS

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APPENDIX III

SCHEDULE OF CORRECTION  
OF OPERATIONAL PROBLEMS

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SCHEDULE OF OPERATIONAL PROBLEMS CORRECTION

JOB	LOCATION	STARTING DATE	DURATION	TECHNICIANS	OBSERVATIONS
Wheat Scale to tare	7 <sup>th</sup> floor smutt	August 89	3 days	Fabrice / Simeon	Executed on time
Scale cover to replace	7 <sup>th</sup> floor smutt	October 89	2 days	Bornelus / Derilien	in process
Manufacture of falling	7 <sup>th</sup> floor smutt	Oct. 89	30 days	Brutus / Godeus Blaze / Macenat	in process
Inspection stairs on storage bins to repair	6 <sup>th</sup> floor smutt	Sept. 89	10 days	Gabriel Romy / Kelly J	Executed on time
chain cover	6 <sup>th</sup> floor mill	Sept. 89	2 days	Macenat + 1 helper	" "
Son de blé Scale to make working	5 <sup>th</sup> floor mill	Oct. 89	10 days	Fabrice / Simeon	in process
Counter to install on flour bag conveyor	Packing	Sept. 89	1 day	Vincent / Daniel	Executed on time
Counter to install on son de blé bag conveyor	Packing	Sept. 89	1 day	Vincent / Daniel	" " "
All cover to replace	5 <sup>th</sup> floor mill	August 89	1 day	Jean Luckner	" " "
Repairing conveyor cover	4 <sup>th</sup> floor smutt	August 89	1 day	Macenat	Executed on time

SCHEDULE OF OPERATIONAL PROBLEMS CORRECTION

JOB	LOCATION	STARTING DATE	DURATION	TECHNICIANS	OBSERVATIONS
Pipe from Magnetic divider to repair	5 <sup>th</sup> floor Smutt	5 <sup>th</sup> Mill stopping	1 day	Metalworking team	Executed on time
Repairing of conveyor P12	6 <sup>th</sup> floor Smutt	5 <sup>th</sup> mill stopping	2 days	" "	" " "
Manufacture of 55 elbow for the Mill	Machine Shop	1 October 89	10 days	Porubus / Bornelus	in Process
Cyclone for Precleaning	Wharf	Sept. 89	15 days	Gardeus / Bornelus Brutus	Executed
Glass to change on Mill	2 <sup>nd</sup> floor Mill	one-Mill stopping	1 day	Adelson	Glass ordered from Sangati not delivered yet
Pipe feeding the Simpacator	2 <sup>nd</sup> floor Mill	July 89	4	Merilien / Maceuat	Executed on time
Electronic System on truck scale	Main Entrance	Sept. 89	2 weeks	Industrial Service Company	Executed
Repairing of pneum. lifts	1st to 6 <sup>th</sup> floor Mill	Dec. 89		Metalworking team	

SCHEDULE OF OPERATIONAL PROBLEMS CORRECTION

JOB	LOCATION	STARTING DATE	DURATION	TECHNICIANS	OBSERVATIONS
fixation of pipes	4 <sup>th</sup> floor mill	July 89	4 days	Gedeus / Merilien	in process
Getting out of unusung pipes	4 <sup>th</sup> floor mill	July 89	4 days	Gedeus / Macenat	Executed
Manufacture of exit for P63 - P80	Machine shop	September 89	4 days	Brutus / Bornelus	Executed
Manufacture of 8 inches elbow	Machine Shop	Sept. 89	6 days	Macenat / Brutus	Executed
Repairing of P04/P05	4 <sup>th</sup> floor Smutt	2 <sup>nd</sup> Mill Stopping		Metalworking Team	"
Repairing of dist. P 23	4 <sup>th</sup> floor Smutt	3 <sup>rd</sup> Mill Stopping		Metalworking Team	Executed on time
Repairing of Stoner P 36	3 <sup>rd</sup> floor Smutt	2 <sup>nd</sup> Mill Stopping	3 days	Metalworking Team	" " "
Pipe to repair	5 <sup>th</sup> floor Smutt	4 <sup>th</sup> Mill Stopping	2	" "	" " "
Pipe feeding Bins to repair	5 <sup>th</sup> floor Smutt	4 <sup>th</sup> Mill Stopping	1	" "	" " "
Pipe from the elevator to repair	5 <sup>th</sup> floor Smutt	4 <sup>th</sup> Mill Stopping	1	Metalworking team	Executed on time