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Tunisian Grain Storage Financial Analysis Model - Instruction Manual

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*The study provides*  
 a simple tool for evaluating "what if?" questions related to costs and economic incentives for private investment in grain storage facilities at the farm, village, mill, urban terminal and port levels in Tunisia. Permits users to examine the effect of changes in facilities costs, interest and tariff rates, loan and amortization terms, inventory turnover rates, variable costs such as labor and storage losses and government price and storage payment policy on private incentives and public cost related to investment and storage. This manual provides a brief introduction to the use of the model, analytical results are presented in the main report.

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# APIP

## Agricultural Policy Implementation Project

General Directorate for Development Planning and Agricultural Investments (DGPDIA)  
Ministry of Agriculture, Republic of Tunisia

TUNISIAN GRAIN STORAGE  
FINANCIAL ANALYSIS MODEL

INSTRUCTION MANUAL

## AGRICULTURAL MARKETING IMPROVEMENT STRATEGIES PROJECT

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**TUNISIAN GRAIN STORAGE  
FINANCIAL ANALYSIS MODEL**

**INSTRUCTION MANUAL**

Jo Anne Cohn  
Mark Newman

May 1, 1990

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**Agricultural Policy Implementation Project**

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# Tunisian Grain Storage Financial Analysis Model<sup>1</sup>

## Instruction Manual

### Summary

The Grain Storage Financial Analysis Model (GSFAM or MAFIS in French) was developed to provide a simple tool for evaluating "what If?" questions related to costs and economic incentives for private investment in grain storage facilities at the farm, village, mill, urban terminal and port levels in Tunisia. The model permits users to examine the effect of changes in facilities costs, interest and tariff rates, loan and amortization terms, inventory turnover rates, variable costs such as labor and storage losses and government price and storage payment policy on private incentives and public costs related to investment and storage. This manual provides a brief introduction to use of the model, analytical results are presented in the main report.

### Hardware and Software Requirements

The Grain Storage Financial Analysis Model is very easy to use. You need minimal familiarity of LOTUS 1-2-3 (Version 2.0 or later) and an IBM compatible computer with at least one floppy disk drive which accepts low density 3 1/2" diskettes. The model can be adapted to run with other spreadsheet programs such as Quattro, and with other diskette sizes, or from a hard disk.

### Backing up the original file

The first time you use the model, begin by listing the files on the diskette supplied with this manual. The first file, "MAFIS", is your working file. Any changes you make to the spreadsheet should be saved to this file. You'll notice that there is another file, "MAORIGIN.wk1", on the system. As the name suggests, this is the original file of the model. You should make a back up of this file on another disk, just in case your disk gets damaged. "MAORIGIN" and "MAFIS" initially contain the same information. However, as you make changes to the "MAFIS" file, they will become different. "MAORIGIN" should not be altered and should be used solely for backup in the unlikely event of damage to the original disk.

Your next step is to make a backup copy of "MAORIGIN.WK1" After this has been completed, proceed to try out the model.

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<sup>1</sup> User's Guide for Grain Storage Financial Analysis Model developed as part of the AMIS/APIP Grain Marketing Master Plan Study conducted for the Ministry of Agriculture, Government of Tunisia by Abt Associates Inc. under the Agricultural Marketing Improvement Strategies Project with financial support from USAID/Tunis.

## Getting Started

After entering the Lotus 1-2-3- program, retrieve the file "MAFIS" into your work area. You'll notice that "MAFIS" is divided into 6 tables which contain financial analysis for different sized storage units. A listing of these tables follows:

- o Table I: 250 MT/1000 MT Farm Level Storage and 5,000 MT Village Level Storage Financial Analysis
- o Table II: 5,000 MT Mill Level Storage Financial Analysis
- o Table III: 10,000 MT Mill Level Storage Financial Analysis
- o Table IV: 20,000 MT Urban Transfer System Storage Financial Analysis
- o Table V: 30,000 MT Port Silo System Storage Financial Analysis
- o Table VI: Summary of Financial Analysis for each system contained in Tables I - V.

## The Assumptions

While the particulars of each component may be different, the theory behind them is the same. They are all designed to help the user examine foreign exchange and dinar costs associated with storage and to calculate costs in Tunisian Dinars of storing a quintal of grain under various scenarios.

In order to understand how this works, we will continue with the 20,000 MT urban transit silo system example discussed in the text. As you can see from the chart which follows, this system is based on certain assumptions involving the cost of equipment, the percent of equipment cost financed, etc.

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

ASSUMPTIONS	GOV'T INCENTIVE PACKAGE	CURRENT COMMERCIAL RATES	IMPACT OF GOV'T INCENTIVES
COST OF EQUIPMENT IN DOLLARS:	1,100,500		
PERCENT EQ COST FINANCED:	70.0%		
INTEREST RATE:	10.0%	12.0%	
TERMS OF LOAN:	12 YEARS		
IMPORT TARIFF RATE:	15.0%	47.0%	
PERCENT OF IMPORT TARIFF FINANCED:	70.0%		
LIFE OF EQUIPMENT:	30 YEARS		
EXCHANGE RATE:	0.92 DT = \$1		
-----			
EQUITY INVESTMENT-EQUIPMENT:	\$330,150	\$330,150	
EQUITY INVESTMENT-IMPORT TARIFF:	\$49,523	\$155,171	(\$105,648)
TOTAL INITIAL INVEST.	\$379,673	\$485,321	(\$105,648)
OPPORTUNITY COST OF EQUITY INVESTMENT:	\$45,561	\$58,238	(\$12,678)

The first column entitled "Government Incentive Package" is built to reflect extension of advantages accorded by Tunisia's Investment Code, such as reduced interest and import tariff rates, or other incentives that policy makers may

chose to examine. The column labeled "Current Commercial Rates" reports rates and terms in the absence of incentives. The third column, "Impact of Government Incentives" shows the favorable impact the incentives will have on investment, and hence the cost of the incentive package.

As you can see from the first column, this example assumes that the cost of building a 20,000 MT Urban Transfer system is \$1,100,500. It also assumes that the investor will have to borrow 70% of this amount, at a 10% interest rate payable in 12 years. In addition, the investor will have to pay a 15% import tariff on this system which will have the same terms already mentioned. The equipment is expected to have a life of 30 years. In addition, the current exchange rate is .92 D/TD per \$US. The initial investment is the dollar amount the investor does not finance but must use as a down payment. The opportunity cost associated with this amount is the current commercial interest rate multiplied by the total initial investment and is calculated from the assumptions.

The second column reflects current commercial rates. As you would expect, the interest rate would be higher without special programs designed to encourage grain storage construction by the private sector. Similarly, the import tariff would remain at its current rate of 47% unless advantages provided by changes in the investment code are provided by the government in order to attract outside investment.

### Changing the Assumptions

Let's assume for a moment, that you want to examine the impact of changes in the assumptions. A meeting between government officials and potential investors has been called to discuss the proposed storage premium and contract terms for use of new storage facilities. You would like to find out the financial impact of the following scenarios:

1. After making a final site inspection, a potential investor reports that the cost of building a 20,000 MT urban transit silo will be \$1,700,000 and not \$1,100,500 as had been expected.
2. None of the potential investors considering building the urban transit silo project is willing or able to invest more than 15% of the necessary capital. Therefore, 85% of the project needs to be financed.
3. To provide additional incentive to the investor, the government agrees to finance the loan at 9.5% interest rate over a 14 years term.
4. Central Bank officials suggest that calculations assume an exchange rate of .89 TD = \$1 for foreign exchange costs.

In the case of the 20,000 MT silo, the first step is to go to Table IV and find the existing assumptions. Notice that Cost of Equipment in Dollars (Cell P365) currently shows that the system is expected to cost \$1,100,500. By simply typing in "1700000" in cell P365, you have changed the Cost of Equipment in Dollars to \$1,700,000. Continuing with the example, you can change the percent of Equipment Cost Financed from 70% to 85% by typing in ".85" in Cell P366. After making the appropriate changes for the other assumptions, your new assumptions should now look like this:

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

ASSUMPTIONS	GOV'T INCENTIVE PACKAGE	CURRENT COMMERCIAL RATES	IMPACT OF GOV'T INCENTIVES
COST OF EQUIPMENT IN DOLLARS:	1,700,000		
PERCENT EQ COST FINANCED:	85.0%		
INTEREST RATE:	9.5%	12.0%	
TERMS OF LOAN:	14 YEARS		
IMPORT TARIFF RATE:	15.0%	47.0%	
PERCENT OF IMPORT TARIFF FINANCED:	85.0%		
LIFE OF EQUIPMENT:	30 YEARS		
EXCHANGE RATE:	0.99 DT = \$1		
-----			
EQUITY INVESTMENT-EQUIPMENT:	\$255,000	\$255,000	
EQUITY INVESTMENT-IMPORT TARIFF:	\$38,250	\$119,850	(\$81,600)
TOTAL INITIAL INVEST.	\$293,250	\$374,850	(\$81,600)
OPPORTUNITY COST OF EQUITY INVESTMENT:	\$35,190	\$44,982	(\$9,792)

It is important to realize that not only did changing the assumptions result in changing the costs of storage in a 20,000 MT Urban transit silo, these changes automatically updated the summary table. Go to the summary table (Table VI) on line 634. You'll notice that the changes you input for the 20,000 MT Urban transit silo have been incorporated into the summary. For changes in assumptions on other silo systems changes must be made in the assumptions block of the appropriate table, and the summary table will be updated automatically.

Two important points need to be made here. First, changing the assumptions for one system does not change the assumptions for all the systems. In this instance, you changed the interest rate of the 20,000 MT Urban Transfer system to 9.5%, payable over a 14 year period. Notice that these changes are reflected only in that system. The interest rate of the other systems do not change. If you want to change the interest rate or any other assumption, you must make the changes on each individual table.

The other point which needs to be made is that the Summary Table (Table VI) cannot be changed directly. This is because information from the individual tables is transferred into the summary table. Therefore, the only way the summary table can be changed is by changing its individual components.

There are 2 other areas of the spreadsheets in which you can make changes, both of which have significant financial implications for costs. The first of these is storage loss. The current example of the 20,000 MT Urban Transfer system assumes that storage loss will be 2% of the number of metric tons processed. (See Cell D404.) In many instances this loss could be significantly higher, especially if the system continues to handle a large amount of grain in bags. In addition, the value per metric ton of the commodity varies to reflect the commodity being stored.

Continuing with this example, assume that you have just returned from a newly

constructed urban transit silo in Morocco. The actual loss for storing barley has been running at 4%. Armed with this new information, you change the percent of storage loss (Cell D404) from 2% to 4% by typing ".04". At the same time, you enter the current price of 145 TD per MT resulting in a total storage cost of 116,000 TD. Notice again this not only changes the 20,000 MT Urban Transfer system, it also changes the summary table (Table VI) for the 20,000 MT Urban Transfer system. It does not make changes to any other sized system.

The final area in which the assumptions can be changed is salary expense. Continuing with the 20,000 MT Urban Transfer system example, you'll notice that the very last part of Table IV (Line 481) lists more assumptions. This case assumes that there will be 2 full time supervisors who make an average yearly salary of 10,000 TD each. In addition, there are 10-11 full-time workers who make 3,000 TD per year, depending on the number of rotations through the system. Both the number of employees and the salaries can be changed to reflect other assumptions. For example, in order to attract good supervisors, you might decide that you have to pay them 11500 TD per year. In addition, you find that 10 people aren't enough to handle 3 rotations of grain through the system. In fact, you need 11 people for 3 and 5 rotations, and 12 people for 10 and 20 rotations. Simply by plugging in the new numbers in the appropriate cell, your changes occur both in the detail and summary pages. (See attached.)

While the example was used for the 20,000 MT Urban Transit silo system was used, the same principles apply for the other sized systems. Merely by changing your assumptions, you can quickly and easily change the rest of your calculations. One minor note which you should keep in mind. The assumptions previously mentioned are the only ones which can be changed. Any other costs have been "protected" and can not be changed.

TABLE IV

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS23-Apr  
ABT ASSOCIATES/AMIS

	GOVT INCENTIVE PACKAGE 20000 MT URBAN XFER	CURRENT COMMERCIAL RATES 20000 MT URBAN XFER	IMPACT OF GOV'T INCENTIVES
YEARLY DEPRECIATION EXPENSE (\$US)	\$33,015	\$33,015	
CAPITAL COST OF EQUIPMENT (\$US)	\$1,100,500	\$1,100,500	
SALVAGE VALUE (\$US)	\$110,050	\$110,050	
LIFE (YEARS)	30	30	
YR LOAN PAYMENT-CAPITAL EQUIP. (\$US)	\$113,059	\$124,363	(\$11,304)
LOAN PRINCIPLE (\$US)	\$770,350	\$770,350	
INTEREST RATE/YR	10.0%	12.0%	
TERMS (YEARS)	12	12	
YEARLY LOAN PAYMENT-IMPORT TARIFF (\$US)	\$16,959	\$58,451	(\$41,492)
IMPORT TAX DUE (\$US)	\$165,075	\$517,235	
LOAN PRINCIPLE (\$US)	\$115,553	\$362,065	
IMPORT TARIFF RATE	15%	47%	
INTEREST RATE/YR	10%	12%	
TERMS (YEARS)	12	12	
SUBTOTAL-FIXED COSTS (\$US)	\$163,033	\$215,828	(\$52,795)
CONVERSION TO DINARS	149990	198562	
INSURANCE (TD)	10000	10000	
TAXES (TD)	2110	2110	
SUE-TOTAL FIXED COSTS (TD)	12110	12110	
TOTAL FIXED COSTS (TD)	162100	210672	

ASSUMPTIONS	GOV'T INCENTIVE PACKAGE	CURRENT COMMERCIAL RATES	IMPACT OF GOV'T INCENTIVES
COST OF EQUIPMENT IN DOLLARS:	1,100,500		
PERCENT EQ COST FINANCED:	70.0%		
INTEREST RATE:	10.0%	12.0%	
TERMS OF LOAN:	12 YEARS		
IMPORT TARIFF RATE:	15.0%	47.0%	
PERCENT OF IMPORT TARIFF FINANCED:	70.0%		
LIFE OF EQUIPMENT:	30 YEARS		
EXCHANGE RATE:	0.92 DT = \$1		
-----			
EQUITY INVESTMENT-EQUIPMENT:	\$330,150	\$330,150	
EQUITY INVESTMENT-IMPORT TARIFF:	\$49,523	\$155,171	(\$105,648)
TOTAL INITIAL INVEST.	\$379,673	\$485,321	(\$105,648)
OPPORTUNITY COST OF EQUITY INVESTMENT:	\$45,561	\$58,238	(\$12,678)

TABLE IV

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

VARIABLE COSTS (TD)  
(NOT AFFECTED BY INV. CODE BENEFIT CHANGES)

# OF MT TONS STORED	1	3	5	10	20
	ROTATION	ROTATIONS	ROTATIONS	ROTATIONS	ROTATIONS
	20000	60000	100000	200000	400000
	MT	MT	MT	MT	MT
SALARIES (TD)	50000	50000	50000	53000	53000
UTILITIES (TD)	1900	2150	2400	2600	2850
STORAGE LOSSES (TD)	79600	238800	398000	796000	1592000
% LOSS					2%
VALUE PER MT (TD)					199
CHEMICAL TREATMENT (TD)	2480	2650	2800	3000	3300
MISCELLANEOUS (TD)	4000	4200	4500	4750	5000
MAINTENANCE (TD)	11575	12000	12500	13000	13500
TOTAL VARIABLE COSTS (TD)	149555	309800	470200	872350	1669650

	20000 MT														
	URBAN XFER 1 ROTATION			3 ROTATIONS			5 ROTATIONS			10 ROTATIONS			20 ROTATIONS		
	GOV'T INCENTIVE PACKAGE	CURRENT COMMERCIAL RATES	IMPACT OF GOV'T INCENTIVES												
TOTAL YR COSTS (TD)	311655	360227	-48572	471900	520472	-48572	632300	680872	-48572	1034450	1083022	-48572	1831750	1880322	-48572
TOTAL YR EXP PER METRIC TON (TD)	15.583	18.011	-2.429	7.865	8.675	-0.810	6.323	6.809	-0.486	5.172	5.415	-0.243	4.579	4.701	-0.121
TOTAL MONTHLY EXP (TD)	25971	30019	-4048	39325	43373	-4048	52692	56739	-4048	86204	90252	-4048	152646	156694	-4048
TOTAL MONTHLY EXP PER MT (TD)	1.299	1.501	-0.202	0.655	0.723	-0.067	0.527	0.567	-0.040	0.431	0.451	-0.020	0.382	0.392	-0.010

3 MONTH EXP PER MT PER MONTH (TD)

6 MONTH EXP PER MT PER MONTH (TD)

9 MONTH EXP PER MT PER MONTH (TD)

TOTAL YEAR EXP PER QUINTAL (TD)

TOTAL YR EXP PER MT (TD)

TOTAL YR EXP PER QUINTAL (TD)

14

TABLE IV

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

COST PER METRIC TON (\$US)				
WITH GOV'T INCENTIVES				
1 ROTATION	\$16.94			
3 ROTATIONS	\$8.55			
5 ROTATIONS	\$6.87			
10 ROTATIONS	\$5.62			
20 ROTATIONS	\$4.98			
COST PER MT (TD)				
WITH GOV'T INCENTIVES				
1 ROTATION	15.583			
3 ROTATIONS	7.865			
5 ROTATIONS	6.323			
10 ROTATIONS	5.172			
20 ROTATIONS	4.579			
COST PER QUINTAL (TD)				
WITH GOV'T INCENTIVES				
1 ROTATION	1.558			
3 ROTATIONS	0.787			
5 ROTATIONS	0.632			
10 ROTATIONS	0.517			
20 ROTATIONS	0.458			
COST PER QUINTAL (TD)				
AT CURRENT COMMERCIAL RATES				
(NO GOV'T INCENTIVES)				
1 ROTATION	1.801			
3 ROTATIONS	0.867			
5 ROTATIONS	0.681			
10 ROTATIONS	0.542			
20 ROTATIONS	0.470			
COST PER QUINTAL (TD)				
WITH GOV'T INCENTIVES				
AND OPPORTUNITY COSTS:				
1 ROTATION	1.768			
3 ROTATIONS	0.856			
5 ROTATIONS	0.674			
10 ROTATIONS	0.538			
20 ROTATIONS	0.468			
COST PER QUINTAL (TD)				
AT CURRENT COMMERCIAL RATES				
(NO GOV'T INCENTIVES)				
1 ROTATION	2.069			
3 ROTATIONS	0.957			
5 ROTATIONS	0.734			
10 ROTATIONS	0.566			
20 ROTATIONS	0.483			
		OPPORTUNITY COSTS IN \$US -	45561	
		OPPORTUNITY COSTS IN DINARS -	41916	
		OPP. COSTS PER QT -		
			0.210 1 ROTATION	
			0.070 3 ROTATIONS	
			0.042 5 ROTATIONS	
			0.021 10 ROTATIONS	
			0.010 20 ROTATIONS	
		OPPORTUNITY COSTS IN \$US -	58238	
		OPPORTUNITY COSTS IN DINARS -	53579	
		OPP. COSTS PER QT -		
			0.268 1 ROTATION	
			0.089 3 ROTATIONS	
			0.054 5 ROTATIONS	
			0.027 10 ROTATIONS	
			0.013 20 ROTATIONS	

TABLE IV

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

## ASSUMPTIONS:

SALARIES-	1	3	5	10	20	
YEARLY SALARIES FULL-TIME EMPLOYEES (DT)	ROTATION	ROTATIONS	ROTATIONS	ROTATIONS	ROTATIONS	
# OF FULL TIME SUPERVISORS	2	2	2	2	2	# OF SUPERVISORS CONSTANT
AVERAGE YR. SUPER SALARY 10000 (DT)						
YEARLY SUPER.SALARIES	20000	20000	20000	20000	20000	
# OF FULL TIME NON-SUPER EMPLOYEES	10	10	10	11	11	
AVE. YR. NON-SUPER. SALARY 3000 DINARS	30000	30000	30000	33000	33000	
TOTAL SALARIES IN DINARS	50000	50000	50000	53000	53000	

## OTHER COSTS-

COSTS FOR INSURANCE, TAXES, CHEMICAL TREATMENT, UTILITIES, STORAGE LOSSES,  
AND MISC. EXPENSES ARE BASED ON 1989 DC COST ESTIMATES.

CAPITAL EQUIPMENT COSTS BASED ON U.S. GRAIN STORAGE MANUFACTURERS' ESTIMATES. INCLUDES WEIGHSTATION OF \$38,000.

TABLE VI

SUMMARY OF FINANCIAL ANALYSIS FOR EACH SYSTEM  
CONTAINED IN TABLE I - V23-Apr  
ABT ASSOCIATES/AMIS

	GOVT INCENTIVE PACKAGE FARM LEVEL 250 MT	GOVT INCENTIVE PACKAGE FARM LEVEL 1000 MT	GOVT INCENTIVE PACKAGE VILLAGE 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 10000 MT	GOVT INCENTIVE PACKAGE URBAN XFER 20000 MT	GOVT INCENTIVE PACKAGE PORT SILO 30000 MT
FIXED COSTS:							
YEARLY DEPRECIATION EXPENSE (\$US)	\$443	\$1,770	\$7,710	\$8,850	\$16,020	\$33,015	\$39,090
CAPITAL COST OF EQUIPMENT (\$US)	\$14,750	\$59,000	\$257,000	\$295,000	\$534,000	\$1,100,500	\$1,303,000
SALVAGE VALUE (\$US)	\$1,475	\$5,900	\$25,700	\$29,500	\$53,400	\$110,050	\$130,300
LIFE (YEARS)	30	30	30	30	30	30	30
YEAR LOAN PAYMENT-CAPITAL EQUIP. (\$US)	\$1,515	\$6,061	\$26,403	\$30,307	\$54,860	\$113,059	\$133,863
LOAN PRINCIPLE (\$US)	\$10,325	\$41,300	\$179,900	\$206,500	\$373,800	\$770,350	\$912,100
INTEREST RATE/YR	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
TERMS (YEARS)	12	12	12	12	12	12	12
YEARLY LOAN PAYMENT-IMPORT TARIFF (\$US)	\$227	\$909	\$3,960	\$4,546	\$8,229	\$16,959	\$20,079
IMPORT TARIFF DUE (\$US)	\$2,213	\$8,850	\$38,550	\$44,250	\$80,100	\$165,075	\$195,450
LOAN PRINCIPLE (\$US)	\$1,549	\$6,195	\$26,985	\$30,975	\$56,070	\$115,553	\$136,815
IMPORT TARIFF RATE	15%	15%	15%	15%	15%	15%	15%
INTEREST RATE/YR	10%	10%	10%	10%	10%	10%	10%
TERMS (YEARS)	12	12	12	12	12	12	12
SUBTOTAL-FIXED COSTS (\$US)	\$2,185	\$8,741	\$38,073	\$43,703	\$79,109	\$163,033	\$193,032
CONVERSION DINARS	2010	8041	35027	40206	72780	149990	177590
INSURANCE (TD)	250	500	2500	2500	5000	10000	12000
TAXES (TD)	30	125	625	625	1055	2110	3165
TOTAL FIXED COSTS (TD)	2290	8666	38152	43331	78835	162100	192755

10.

TABLE VI

SUMMARY OF FINANCIAL ANALYSIS FOR EACH SYSTEM  
CONTAINED IN TABLE I - V

23-Apr ABT ASSOCIATES/AMIS		GOVT INCENTIVE PACKAGE FARM LEVEL 250 MT	GOVT INCENTIVE PACKAGE FARM LEVEL 1000 MT	GOVT INCENTIVE PACKAGE VILLAGE 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 10000 MT	GOVT INCENTIVE PACKAGE URBAN XFER 20000 MT	GOVT INCENTIVE PACKAGE PORT STLO 30000 MT
VARIABLE COSTS: (TD)	METRIC TONS	250	1000	5000	5000	10000	20000	30000
SALARIES (TD)		2500	8000	32000	29000	35000	50000	65000
UTILITIES (TD)		30	125	625	625	950	1900	2680
STORAGE LOSSES (TD)		995	3980	19900	19900	39800	79600	119400
% LOSS	2%							
VALUE PER MT (DT)	199							
CHEMICAL TREATMENT (DT)		30	125	625	625	1240	2480	3720
MISCELLANEOUS (DT)		250	500	2000	2000	3000	4000	5000
MAINTENANCE (DT)		125	1000	2500	2500	6000	11575	96500
TOTAL VARIABLE COSTS (TD)		3930	13730	57650	54650	85990	149555	292300
TOTAL YEARLY COSTS (TD)		6220	22396	95802	97981	164825	311655	485055
TOTAL YR EXP PER METRIC TON (TD)		24.881	22.396	19.160	19.596	16.483	15.583	16.168
TOTAL MONTHLY EXP (TD)		518	1866	7984				
TOTAL MONTHLY EXP PER MT (TD)		2.073	1.866	1.597				
3 MONTH EXP PER MT-PER MONTH (TD)		8.294	7.465	6.387				
6 MONTH EXP PER MT PER MONTH (TD)		4.147	3.733	3.193				
9 MONTH EXP PER MT PER MONTH (TD)		2.765	2.488	2.129				
YEAR EXP PER QUINTAL (TD)								
WITH GOV'T INCENTIVES		2.488	2.240	1.916				
WITHOUT GOV'T INCENTIVES		2.749	2.500	2.143				
IMPACT OF GOV'T INCENTIVES		-0.260	-0.260	-0.227				
TOTAL YR EXP PER QUINTAL INC. OPPORTUNITY COSTS								
WITH GOV'T INCENTIVES		2.713	2.464	2.112				
WITHOUT GOV'T INCENTIVES		3.036	2.787	2.790				
IMPACT OF GOV'T INCENTIVES		-0.323	-0.323	-0.679				

SUMMARY OF FINANCIAL ANALYSIS FOR EACH SYSTEM  
CONTAINED IN TABLE 1 - v

GOVT INCENTIVE PACKAGE FARM LEVEL 250 MT	GOVT INCENTIVE PACKAGE FARM LEVEL 1000 MT	GOVT INCENTIVE PACKAGE VILLAGE 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 10000 MT	GOVT INCENTIVE PACKAGE URBAN XFER 20000 MT	GOVT INCENTIVE PACKAGE PORT SILO 30000 MT
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23-Apr  
ABT ASSOCIATES/AMIS

COST PER METRIC TON (\$US) SEE DETAIL  
WITH GOV'T INCENTIVES

1 ROTATION			\$21.30	\$17.92	\$16.94	\$17.57
3 ROTATIONS			\$10.04	\$8.87	\$8.55	\$8.77
5 ROTATIONS			\$7.78	\$7.06	\$6.87	\$7.01
10 ROTATIONS			\$6.13	\$5.73	\$5.62	\$5.69
20 ROTATIONS			\$5.24	\$5.03	\$4.98	\$5.01

COST PER MT (TD)  
WITH GOV'T INCENTIVES

1 ROTATION			19.596	16.483	15.583	16.168
3 ROTATIONS			9.238	8.162	7.865	8.064
5 ROTATIONS			7.153	6.499	6.323	6.447
10 ROTATIONS			5.640	5.276	5.172	5.232
20 ROTATIONS			4.816	4.630	4.579	4.610

COST PER QUINTAL (TD)  
WITH GOV'T INCENTIVES

1 ROTATION			1.960	1.648	1.558	1.617
3 ROTATIONS			0.924	0.816	0.787	0.806
5 ROTATIONS			0.715	0.650	0.632	0.645
10 ROTATIONS			0.564	0.528	0.517	0.523
20 ROTATIONS			0.482	0.463	0.458	0.461

COST PER QUINTAL (TD)  
AT CURRENT COMMERCIAL RATES  
(NO GOV'T INCENTIVES)

1 ROTATION			2.220	1.884	1.801	1.809
3 ROTATIONS			1.011	0.895	0.867	0.870
5 ROTATIONS			0.767	0.697	0.681	0.683
10 ROTATIONS			0.590	0.551	0.542	0.542
20 ROTATIONS			0.495	0.475	0.470	0.471

COST PER QUINTAL (TD)  
WITH GOV'T INCENTIVES  
AND OPPORTUNITY COSTS:

1 ROTATION			2.184	1.852	1.768	1.797
3 ROTATIONS			0.999	0.884	0.856	0.866
5 ROTATIONS			0.760	0.691	0.674	0.681
10 ROTATIONS			0.586	0.548	0.538	0.541
20 ROTATIONS			0.493	0.473	0.468	0.470

COST PER QUINTAL (TD)  
AT CURRENT COMMERCIAL RATES  
(NO GOV'T INCENTIVES + OPP COSTS:

1 ROTATION			2.507	2.144	2.069	2.038
3 ROTATIONS			1.106	0.981	0.957	0.947
5 ROTATIONS			0.825	0.749	0.734	0.729
10 ROTATIONS			0.619	0.577	0.568	0.565
20 ROTATIONS			0.509	0.488	0.483	0.482

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TABLE IV

23-Apr  
ABT ASSOCIATES/AMIS

	GOVT	CURRENT	IMPACT OF GOV'T INCENTIVES
	INCENTIVE PACKAGE 20000 MT URBAN XFER	COMMERCIAL RATES 20000 MT URBAN XFER	
YEARLY DEPRECIATION EXPENSE (\$US)	\$51,000	\$51,000	
CAPITAL COST OF EQUIPMENT (\$US)	\$1,700,000	\$1,700,000	
SALVAGE VALUE (\$US)	\$170,000	\$170,000	
LIFE (YEARS)	30	30	
YR LOAN PAYMENT-CAPITAL EQUIP. (\$US)	\$190,838	\$218,009	(\$27,171)
LOAN PRINCIPLE (\$US)	\$1,445,000	\$1,445,000	
INTEREST RATE/YR	9.5%	12.0%	
TERMS (YEARS)	14	14	
YEARLY LOAN PAYMENT-IMPORT TARIFF (\$US)	\$28,626	\$102,464	(\$73,838)
IMPORT TAX DUE (\$US)	\$255,000	\$799,000	
LOAN PRINCIPLE (\$US)	\$216,750	\$679,150	
IMPORT TARIFF RATE	15%	47%	
INTEREST RATE/YR	10%	12%	
TERMS (YEARS)	14	14	
SUBTOTAL-FIXED COSTS (\$US)	\$270,464	\$371,473	(\$101,009)
CONVERSION TO DIRHRS	267760	367758	
INSURANCE (TD)	10000	10000	
TAXES (TD)	2110	2110	
SUB-TOTAL FIXED COSTS (TD)	12110	12110	
TOTAL FIXED COSTS (TD)	279870	379868	

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

ASSUMPTIONS	GOV'T INCENTIVE PACKAGE	CURRENT COMMERCIAL RATES	IMPACT OF GOV'T INCENTIVES
COST OF EQUIPMENT IN DOLLARS:	1,700,000		
PERCENT EQ COST FINANCED:	85.0%		
INTEREST RATE:	9.5%	12.0%	
TERMS OF LOAN:	14 YEARS		
IMPORT TARIFF RATE:	15.0%	47.0%	
PERCENT OF IMPORT TARIFF FINANCED:	85.0%		
LIFE OF EQUIPMENT:	30 YEARS		
EXCHANGE RATE:	0.99 DT = \$1		
-----			
EQUITY INVESTMENT-EQUIPMENT:	\$255,000	\$255,000	
EQUITY INVESTMENT-IMPORT TARIFF:	\$38,250	\$119,850	(\$81,600)
TOTAL INITIAL INVEST.	\$293,250	\$374,850	(\$81,600)
OPPORTUNITY COST OF EQUITY INVESTMENT:	\$35,190	\$44,982	(\$9,792)

TABLE IV

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

VARIABLE COSTS (TD)  
(NOT AFFECTED BY INV. CODE BENEFIT CHANGES)

# OF MT TONS STORED	1	3	5	10	20
	ROTATION	ROTATIONS	ROTATIONS	ROTATIONS	ROTATIONS
	20000	60000	100000	200000	400000
	MT	MT	MT	MT	MT
SALARIES (TD)	53000	56000	56000	59000	59000
UTILITIES (TD)	1900	2150	2400	2600	2850
STORAGE LOSSES (TD)	116000	348000	580000	1160000	2320000
% LOSS					4%
VALUE PER MT (TD)					145
CHEMICAL TREATMENT (TD)	2480	2650	2800	3000	3300
MISCELLANEOUS (TD)	4000	4200	4500	4750	5000
MAINTENANCE (TD)	11575	12000	12500	13000	13500
TOTAL VARIABLE COSTS (TD)	188955	425000	658200	1242350	2403650

20000 MT

	1 ROTATION			3 ROTATIONS			5 ROTATIONS			10 ROTATIONS			20 ROTATIONS		
	GOV'T	CURRENT	IMPACT	GOV'T	CURRENT	IMPACT	GOV'T	CURRENT	IMPACT	GOV'T	CURRENT	IMPACT	GOV'T	CURRENT	IMPACT
	INCENTIVE	COMMER.	OF GOV'T	INCENTIVE	COMMER.	OF GOV'T	INCENTIVE	COMMER.	OF GOV'T	INCENTIVE	COMMER.	OF GOV'T	INCENTIVE	COMMER.	OF GOV'T
	PACKAGE	RATES	INCENTIVES	PACKAGE	RATES	INCENTIVES	PACKAGE	RATES	INCENTIVES	PACKAGE	RATES	INCENTIVES	PACKAGE	RATES	INCENTIVES
TOTAL YR COSTS (TD)	468825	568823	-99999	704870	804868	-99999	938070	1038068	-99999	1522220	1622218	-99999	2683520	2783518	-99999
TOTAL YR EXP PER METRIC TON (TD)	23.441	28.441	-5.000	11.748	13.414	-1.667	9.381	10.381	-1.000	7.611	8.111	-0.500	6.709	6.959	-0.250
TOTAL MONTHLY EXP (TD)	39069	47402	-8333	58739	67072	-8333	78172	85506	-8333	126852	135185	-8333	223627	231960	-8333
TOTAL MONTHLY EXP PER MT (TD)	1.953	2.370	-0.417	0.979	1.118	-0.139	0.782	0.865	-0.083	0.634	0.676	-0.042	0.559	0.580	-0.021

3 MONTH EXP PER MT PER MONTH (TD)

6 MONTH EXP PER MT PER MONTH (TD)

9 MONTH EXP PER MT PER MONTH (TD)

TOTAL YEAR EXP PER QUINTAL (TD)

TOTAL YR EXP PER MT (TD)

TOTAL YR EXP PER QUINTAL (TD)

TABLE IV

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

COST PER METRIC TON (\$US)			
WITH GOV'T INCENTIVES			
1 ROTATION	\$23.68		
3 ROTATIONS	\$11.87		
5 ROTATIONS	\$9.48		
10 ROTATIONS	\$7.69		
20 ROTATIONS	\$6.78		
COST PER MT (TD)			
WITH GOV'T INCENTIVES			
1 ROTATION	23.441		
3 ROTATIONS	11.748		
5 ROTATIONS	9.381		
10 ROTATIONS	7.611		
20 ROTATIONS	6.709		
COST PER QUINTAL (TD)			
WITH GOV'T INCENTIVES			
1 ROTATION	2.344		
3 ROTATIONS	1.175		
5 ROTATIONS	0.938		
10 ROTATIONS	0.761		
20 ROTATIONS	0.671		
COST PER QUINTAL (TD)			
AT CURRENT COMMERCIAL RATES			
(NO GOV'T INCENTIVES)			
1 ROTATION	2.844		
3 ROTATIONS	1.341		
5 ROTATIONS	1.038		
10 ROTATIONS	0.811		
20 ROTATIONS	0.696		
COST PER QUINTAL (TD)			
WITH GOV'T INCENTIVES			
AND OPPORTUNITY COSTS:			
1 ROTATION	2.518		
3 ROTATIONS	1.233		
5 ROTATIONS	0.973		
10 ROTATIONS	0.779		
20 ROTATIONS	0.680		
COST PER QUINTAL (TD)			
AT CURRENT COMMERCIAL RATES			
(NO GOV'T INCENTIVES)			
1 ROTATION	3.067		
3 ROTATIONS	1.416		
5 ROTATIONS	1.083		
10 ROTATIONS	0.833		
20 ROTATIONS	0.707		
		OPPORTUNITY COSTS IN \$US -	35190
		OPPORTUNITY COSTS IN DINARS -	34838
		OPP. COSTS PER QT -	
			0.174 1 ROTATION
			0.058 3 ROTATIONS
			0.035 5 ROTATIONS
			0.017 10 ROTATIONS
			0.009 20 ROTATIONS
		OPPORTUNITY COSTS IN \$US -	44982
		OPPORTUNITY COSTS IN DINARS -	44532
		OPP. COSTS PER QT -	
			0.223 1 ROTATION
			0.074 3 ROTATIONS
			0.045 5 ROTATIONS
			0.022 10 ROTATIONS
			0.011 20 ROTATIONS

TABLE IV

20,000 MT URBAN TRANSFER SYSTEM STORAGE  
FINANCIAL ANALYSIS

## ASSUMPTIONS:

SALARIES-	1	3	5	10	20	
YEARLY SALARIES FULL-TIME EMPLOYEES (DT)	ROTATION	ROTATIONS	ROTATIONS	ROTATIONS	ROTATIONS	
# OF FULL TIME SUPERVISORS	2	2	2	2	2	# OF SUPERVISORS CONSTANT
AVERAGE YR. SUPER SALARY 11500 (DT)						
YEARLY SUPER. SALARIES	23000	23000	23000	23000	23000	
# OF FULL TIME NON-SUPER EMPLOYEES	10	11	11	12	12	
AVE. YR. NON-SUPER. SALARY 3000 DINARS	30000	33000	33000	36000	36000	
TOTAL SALARIES IN DINARS	53000	56000	56000	59000	59000	

## OTHER COSTS-

COSTS FOR INSURANCE, TAXES, CHEMICAL TREATMENT, UTILITIES, STORAGE LOSSES,

AND MISC. EXPENSES ARE BASED ON 1989 DC COST ESTIMATES.

CAPITAL EQUIPMENT COSTS BASED ON U.S. GRAIN STORAGE MANUFACTURERS' ESTIMATES. INCLUDES WEIGHSTATION OF \$38,000.

TABLE VI

SUMMARY OF FINANCIAL ANALYSIS FOR EACH SYSTEM  
CONTAINED IN TABLES 1 - V23-Apr  
ABT ASSOCIATES/AMIS

	GOVT INCENTIVE PACKAGE FARM LEVEL 250 MT	GOVT INCENTIVE PACKAGE FARM LEVEL 1000 MT	GOVT INCENTIVE PACKAGE VILLAGE 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 10000 MT	GOVT INCENTIVE PACKAGE URBAN XFER 20000 MT	GOVT INCENTIVE PACKAGE PORT SILO 30000 MT
FIXED COSTS:							
YEARLY DEPRECIATION EXPENSE (\$US)	\$443	\$1,770	\$7,710	\$8,850	\$16,020	\$51,000	\$39,090
CAPITAL COST OF EQUIPMENT (\$US)	\$14,750	\$59,000	\$257,000	\$295,000	\$534,000	\$1,700,000	\$1,303,000
SALVAGE VALUE (\$US)	\$1,475	\$5,900	\$25,700	\$29,500	\$53,400	\$170,000	\$130,300
LIFE (YEARS)	30	30	30	30	30	30	30
YEAR LOAN PAYMENT-CAPITAL EQUIP. (\$US)	\$1,515	\$6,061	\$26,403	\$30,307	\$54,860	\$190,838	\$133,863
LOAN PRINCIPLE (\$US)	\$10,325	\$41,300	\$179,900	\$206,500	\$373,800	\$1,445,000	\$912,100
INTEREST RATE/YR	10.0%	10.0%	10.0%	10.0%	10.0%	9.5%	10.0%
TERMS (YEARS)	12	12	12	12	12	14	12
YEARLY LOAN PAYMENT-IMPORT TARIFF (\$US)	\$227	\$909	\$3,960	\$4,546	\$8,229	\$28,626	\$20,079
IMPORT TARIFF DUE (\$US)	\$2,213	\$8,850	\$38,550	\$44,250	\$80,100	\$255,000	\$195,450
LOAN PRINCIPLE (\$US)	\$1,549	\$6,195	\$26,985	\$30,975	\$56,070	\$216,750	\$136,815
IMPORT TARIFF RATE	15%	15%	15%	15%	15%	15%	15%
INTEREST RATE/YR	10%	10%	10%	10%	10%	10%	10%
TERMS (YEARS)	12	12	12	12	12	14	12
SUBTOTAL-FIXED COSTS (\$US)	\$2,185	\$8,741	\$38,073	\$43,703	\$79,109	\$270,464	\$193,032
CONVERSION DIFERS	2010	8041	35027	40206	72780	267760	177590
INSURANCE (TD)	250	500	2500	2500	5000	10000	12000
TAXES (TD)	30	125	625	625	1055	2110	3165
TOTAL FIXED COSTS (TD)	2290	8666	38152	43331	78835	279870	192755

TABLE VI

SUMMARY OF FINANCIAL ANALYSIS FOR EACH SYSTEM  
CONTAINED IN TABLES I - V

23-Apr ABT ASSOCIATES/AMIS		GOVT	GOVT	GOVT	GOVT	GOVT	GOVT	GOVT
		INCENTIVE PACKAGE FARM LEVEL 250 MT	INCENTIVE PACKAGE FARM LEVEL 1000 MT	INCENTIVE PACKAGE VILLAGE 5000 MT	INCENTIVE PACKAGE MILL LEVEL 5000 MT	INCENTIVE PACKAGE MILL LEVEL 10000 MT	INCENTIVE PACKAGE URBAN XFER 20000 MT	INCENTIVE PACKAGE PORT SILO 30000 MT
VARIABLE COSTS* (TD)	METRIC TONS	250	1000	5000	5000	10000	20000	30000
SALARIES** (TD)		2500	8000	32000	29000	35000	53000	65000
UTILITIES (TD)		30	125	625	625	950	1900	2680
STORAGE LOSSES (TD)		995	3980	19900	19900	39800	116000	119400
% LOSS	2%							
VALUE PER MT (DT)	199							
CHEMICAL TREATMENT (DT)		30	125	625	625	1240	2480	3720
MISCELLANEOUS (DT)		250	500	2000	2000	3000	4000	5000
MAINTENANCE (DT)		125	1000	2500	2500	6000	11575	96500
TOTAL VARIABLE COSTS (TD)		3930	13730	57650	54650	85990	188955	292300
TOTAL YEARLY COSTS (TD)		6220	22396	95802	97981	164825	468825	485055
TOTAL YR EXP PER METRIC TON (TD)		24.881	22.396	19.160	19.596	16.483	23.441	16.168
TOTAL MONTHLY EXP (TD)		518	1866	7984				
TOTAL MONTHLY EXP PER MT (TD)		2.073	1.866	1.597				
3 MONTH EXP PER MT-PER MONTH (TD)		8.294	7.465	6.387				
6 MONTH EXP PER MT PER MONTH (TD)		4.147	3.733	3.193				
9 MONTH EXP PER MT PER MONTH (TD)		2.765	2.488	2.129				
YEAR EXP PER QUINTAL (TD)								
WITH GOV'T INCENTIVES		2.488	2.240	1.916				
WITHOUT GOV'T INCENTIVES		2.749	2.500	2.143				
IMPACT OF GOV'T INCENTIVES		-0.260	-0.260	-0.227				
TOTAL YR EXP PER QUINTAL INC. OPPORTUNITY COSTS								
WITH GOV'T INCENTIVES		2.713	2.464	2.112				
WITHOUT GOV'T INCENTIVES		3.036	2.787	2.790				
IMPACT OF GOV'T INCENTIVES		-0.323	-0.323	-0.679				

TABLE VI

SUMMARY OF FINANCIAL ANALYSIS FOR EACH SYSTEM  
CONTAINED IN TABLES I - V

	GOVT INCENTIVE PACKAGE FARM LEVEL 250 MT	GOVT INCENTIVE PACKAGE FARM LEVEL 1000 MT	GOVT INCENTIVE PACKAGE VILLAGE 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 5000 MT	GOVT INCENTIVE PACKAGE MILL LEVEL 10000 MT	GOVT INCENTIVE PACKAGE URBAN XFER 20000 MT	GOVT INCENTIVE PACKAGE PORT SILO 30000 MT
23-Apr ABT ASSOCIATES/AMIS							
COST PER METRIC TON (\$US) SEE DETAIL							
WITH GOV'T INCENTIVES							
1 ROTATION				\$21.30	\$17.92	\$23.68	\$17.57
3 ROTATIONS				\$10.04	\$8.87	\$11.87	\$8.77
5 ROTATIONS				\$7.78	\$7.06	\$9.48	\$7.01
10 ROTATIONS				\$6.13	\$5.73	\$7.69	\$5.69
20 ROTATIONS				\$5.24	\$5.03	\$6.78	\$5.01
COST PER MT (TD)							
WITH GOV'T INCENTIVES							
1 ROTATION				19.596	16.483	23.441	16.168
3 ROTATIONS				9.238	8.162	11.748	8.064
5 ROTATIONS				7.153	6.499	9.381	6.447
10 ROTATIONS				5.640	5.276	7.611	5.232
20 ROTATIONS				4.816	4.630	6.709	4.610
COST PER QUINTAL (TD)							
WITH GOV'T INCENTIVES							
1 ROTATION				1.960	1.648	2.344	1.617
3 ROTATIONS				0.924	0.816	1.175	0.806
5 ROTATIONS				0.715	0.650	0.938	0.645
10 ROTATIONS				0.564	0.528	0.761	0.523
20 ROTATIONS				0.482	0.463	0.671	0.461
COST PER QUINTAL (TD)							
AT CURRENT COMMERCIAL RATES (NO GOV'T INCENTIVES)							
1 ROTATION				2.220	1.884	2.844	1.809
3 ROTATIONS				1.011	0.895	1.341	0.870
5 ROTATIONS				0.767	0.697	1.038	0.683
10 ROTATIONS				0.590	0.551	0.811	0.542
20 ROTATIONS				0.495	0.475	0.696	0.471
COST PER QUINTAL (TD)							
WITH GOV'T INCENTIVES AND OPPORTUNITY COSTS:							
1 ROTATION				2.184	1.852	2.518	1.797
3 ROTATIONS				0.999	0.884	1.233	0.866
5 ROTATIONS				0.760	0.691	0.973	0.681
10 ROTATIONS				0.586	0.548	0.779	0.541
20 ROTATIONS				0.493	0.473	0.680	0.470
COST PER QUINTAL (TD)							
AT CURRENT COMMERCIAL RATES (NO GOV'T INCENTIVES + OPP COSTS:							
1 ROTATION				2.507	2.144	3.067	2.038
3 ROTATIONS				1.106	0.981	1.416	0.947
5 ROTATIONS				0.825	0.749	1.083	0.729
10 ROTATIONS				0.619	0.577	0.833	0.565
20 ROTATIONS				0.509	0.488	0.707	0.482

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