



**72 HOUR STORAGE**

	<b>Harris Group Inc.</b>	
	NATIONAL RENEWABLE ENERGY LABORATORY GOLDEN, CO	
	PROCESS DESIGN AND COST ESTIMATE OF CRIT EQUIPMENT IN THE BIOMASS TO ETHANOL PROC	
	CORN STOVER BALE STORAGE	6/28/00

HARRIS GROUP INC. PROJECT NO: 99-10600 REVISION B 13-Oct-00		NATIONAL RENEWABLE ENERGY LABORATORY GOLDEN, COLORADO WASH TABLE/SHREDDER CORN STOVER FEED & HANDLING SYSTEM						MECHANICAL EQUIPMENT LIST
EQUIP # REV MOTOR #	DESCRIPTION	VENDOR P.O. ISSUED	SIZE CAPACITY HEAD	GEAR RATIO	EQUIP STATUS	HORSEPOWER RPM VOLTS	ENCLOSURE FRAME MODEL NO.	REMARKS
M-101	TRUCK SCALES #1							
M-202	TRUCK SCALES #2							
M-102	FORK LIFT #1							TRUCK UNLOADING
M-202	FORK LIFT #2							TRUCK UNLOADING
M-302	FORK LIFT #3							TRUCK UNLOADING
M-402	FORK LIFT #4							TRUCK UNLOADING
M-103	FORK LIFT #5							PILE UNLOADING
M-203	FORK LIFT #6							PILE UNLOADING
M-303	FORK LIFT #7							PILE UNLOADING
M-403	FORK LIFT #8							PILE UNLOADING
C-101	BALE TRANSPORT CONVEYOR #1		8' BELT X 400' LONG			50 HP		
C-201	BALE TRANSPORT CONVEYOR #2		8' BELT X 400' LONG			50 HP		
C-102	BALE UNWRAPPING #1		90 BALES / HOUR					
C-202	BALE UNWRAPPING #2		90 BALES / HOUR					
WT-102	CORN STOVER WASHER #1		55 TONS/HOUR			75 HP		
WT-202	CORN STOVER WASHER #2		55 TONS/HOUR			75 HP		
C-104	SHREDDER FEED CONVEYOR #1	LAMB	8' BELT X 30' LONG 6000 LBS 30 FPM			5 HP		
C-204	SHREDDER FEED CONVEYOR #2	LAMB	8' BELT X 30' LONG 6000 LBS 30 FPM			5 HP		
C-304	SHREDDER FEED CONVEYOR #3	LAMB	8' BELT X 30' LONG 6000 LBS 30 FPM			6 HP		
C-404	SHREDDER FEED CONVEYOR #2	LAMB	8' BELT X 30' LONG 6001 LBS			7 HP		

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EQUIP # REV MOTOR #	DESCRIPTION	VENDOR P.O. ISSUED	SIZE CAPACITY HEAD	GEAR RATIO	EQUIP STATUS	HORSEPOWER RPM VOLTS	ENCLOSURE FRAME MODEL NO.	REMARKS
S-101	SHREDDER #1	AMEICAN PULVERIZER	31 FPM 28 TONS/HOUR			500 HP		
S-201	SHREDDER #2	AMEICAN PULVERIZER	28 TONS/HOUR			500 HP		
	SHREDDER #3	AMEICAN PULVERIZER	28 TONS/HOUR			500 HP		
	SHREDDER #4	AMEICAN PULVERIZER	28 TONS/HOUR			500 HP		
T-101	WATER TANK		20' DIA X 22' H 50,000 GALLONS					CARBON STEEL
CT-101	CLARIFIER THICKENER	PHOENIX/ WESTEC	5000 GPM					
BP-101	BELT PRESS	PHOENIX	1.5 METER					
CF-101	POLYMER FEED SYSTEM	CALGON						
P-105	BELT PRESS UNDER FLOW FEED PUMP		MOD SRL 2X3-10 100 GPM 50 TDH			7.5 HP 1800		RUBBER LINED
CT-101	CLARIFIER THICKENER	PHOENIX/ WESTEC	80' DIAMETER 5000 GPM			10 HP		
P-106	CLARIFIED WATER PUMP		MOD 3410 12X14-15 5000 GPM 50 FT TDH			100 HP 1200 RPM		316 SS TRIM
P-107	BELT PRESS SUMP PUMP		VJC 1.5X2.11 100 GPM 40 FT TDH			3 HP 1200 RPM		HARD METAL IMPELLER VARIABLE SPEED DRIVE
C-105	BELT PRESS DISCHARGE CONVEYOR		3' X 50'			5 HP		
							EQUIPMENT TOTAL	\$3,508,000



EQUIP. OR ACCOUNT NUMBER	DESCRIPTION	MATERIAL					CONTRACTOR LABOR				SUBCONTR TOTAL (Lab & Mat)	GRAND TOTAL	
		QTY	UNIT	UNIT PRICE	OWNER FURN. TOTAL	CONTR. FURN TOTAL	L.H. UNIT	LABOR HOURS	RATE	TOTAL			
	<b>SUMMARY BY WORK CATEGORY</b>	% of Direct Cost							80%				
		<u>Risk</u>											0
1	Site Prep	12.9%		20%	0	450,655		12,241	44.18	540,862	0		991,517
2	Buildings	5.2%		20%	0	0		-		0	400,000		400,000
3	Equipment Foundations	10.6%		20%	0	382,442		9,134	47.28	431,876	0		814,319
4	Equipment	56.6%		20%	3,686,319	0		11,937	54.32	648,418	0		4,334,737
5	Mechanical Services	0.0%		20%	0	0		-		0	0		0
6	Instrumentation	4.8%		20%	191,205	19,631		3,051	50.52	154,150	0		364,985
7	Piping	5.3%		20%	0	171,974		4,595	51.61	237,134	0		409,107
8	Electrical	4.6%		20%	90,150	78,687		3,448	52.40	180,691	0		349,528
	<b>Total Direct Cost</b>				3,967,674	1,103,388		44,407	49.39	2,193,131	400,000		7,664,193
	Contractor Premium Pay	0.0%		20%						0			0
	Contractor's Indirects as % of labor	0.0%		20%						0			0
	Contractor's markup as % of matls & subs	0.0%		20%						0			0
	<b>Total Construction Cost</b>				3,967,674	1,103,388		44,407	49.39	2,193,131	400,000		7,664,193
	Engineering (Consultant)	10.0%		20%									766,419
	Owner Engineering	5.0%		20%									383,210
	Pre-Project Cost	0.4%		20%									30,657
	Other Outside Engineering Services	0.5%		20%									38,321
	Environmental or Legislative Costs	*** NOT included ***											0
	Capitalized Spares	3.0%		20%									119,030
	Sales Taxes	0.0%		20%									0
	Construction Insurance	0.0%		20%									0
	Freight	3.0%		20%									119,030
	Total Indirects												1,456,667
	<b>Sub-Total Direct and Indirects</b>												9,120,860
	Contingency	21%											1,923,096
	<b>Total PP&amp;E</b>												11,043,956
	Escalation	3%											273,626
	Capitalized Interest	0%											0
	Deferred Start-Up Costs	0%											0
	Working Capital	0%											0
	Operator Training	1%											91,209
	Start-Up	1%											91,209
	<b>Grand Total</b>												11,500,000
					[Range: Lower -15% = \$9,800,000; Upper +30% = \$14,900,000]								



