WBS 3.4
RF (RIA Driver)

RIA DRIVER

		K$
SIGNAL SOURCE		
Frequency Generation		$ 43.80
Transmission		$ 148.00
Miscellaneous Hardware		$ 10.00
TOTAI		**$ 201.80**
RFQ (1 System)		
High Level RF Power		$ 198.00
Low Level RF		$ 39.00
Miscellaneous Hardware		$ 39.00
TOTAL		**$ 276.00**
BUNCHER (2 Systems)		
High Level RF Power		$ 190.00
Low Level RF		$ 84.00
Miscellaneous Hardware		$ 80.00
TOTAL		**$ 354.00**
SC LINAC INJECTION SECTION (79 System		
High Level RF Power		$ 879.12
Low Level RF		$ 3,081.00
Miscellaneous Hardware		$ 729.19
TOTAL		**$ 4,689.31**
SC LINAC MID SECTION (168 SYSTEMS)		
High Level RF Power		$ 3,150.03
Low Level RF		$ 4,676
Miscellaneous Hardware		$ 1,538.41
TOTAL		**$ 9,364.84**
SC LINAC FINAL SECTION (188 SYSTEMS)		
High Level RF Power		$ 17,108
Low Level RF		$ 4,089
Miscellaneous Hardware		$ 3,064
TOTAL		**$ 24,261.40**
SYSTEM TOTAL		**$ 39,147.35**

Work Sheet (Notes)

INJECTION SECTION	INJECTION RF AMP	VENDOR QUOTES			
	57.5MHz - 500W Amp	$8K			
	115MHz - 700W Amp	$10.2K			
	Engineering Judgement	$8K			
	Energy Onix	$5K			
	QEI	$7.795K			
	Selected Cost	$8K			
					SUB
		HIGH LEVEL RF	LOW LEVEL RF	MISCELLANEOUS	TOTAL
		$879	$3,081	$ 729.19	$ 4,689.31
MID SECTION	MID RF AMP	VENDOR QUOTES			
	1kW @ 172.5MHz	$216K			
	1kW @ 345MHz	$480K			
	Engineering Judgement	$16.25K			
	Energy Onix(-circ)	$15.5K			
	QEI 172.5(-circ)	$12.5K			
	QEI 345(-circ)	$23.7K			
	SNS Quote	$20k			
	Selected Cost	$16.25K			
		HIGH LEVEL RF	LOW LEVEL RF	MISCELLANEOUS	SUB TOTAL
		$ 3,150.03	$ 4,676.40	$ 1,538.41	$ 9,364.84
FINAL SECTION	FINAL RF AMP	VENDOR QUOTES			
	RF Power @ 805MHz	$20K			
	Engineering Judgement	$77.25K			
	IGOR	$35K			
	Energy Onix	$200K			
	Continental	$162K			
		HIGH LEVEL RF	LOW LEVEL RF	MISCELLANEOUS	SUB TOTAL
		$ 17,108.00	$ 4,089.00	$ 3,064.40	$ 24,261.40
	TOTAL	$ 21,137.15	$ 11,846.40	$ 5,332.00	$ 38,315.55

INJECTION SECTION RIA DRIVER

		ENGINEERING JUDGEMENT			INSTALLATION AND COMMISSIONING				
	HIGH-LEVEL RF	COMPONENTS	TECH. LABOR	SUB		DAVIS BACON	TECH. LABOR	SUB	
QTY.	57.5MHz/115/MHz		at $68/MH	TOTAL	TASK	at $55/MH	at $68/MH	TOTAL	TOTAL
39	500W amp, 57MHz	$8		$ 312.00	RQ Racks	$20		$ 20.00	
40	700W amp, 115MHz	$10		$ 408.00	Cable Tray	$20		$ 20.00	
					Cable Pulls	$20		$ 20.00	
					Burn-in Test		$5.50	$ 5.50	
					Installation		$5.50	$ 5.50	
					Cavity Test		$88.12	$ 88.12	
	Total each RF amp = 8.4K			**$ 720.00**	**Total Installation each = $2K**			**$ 159.12**	**$ 879.12**
	LOW-LEVEL RF								
79	Fast Tuners	$5		$ 395.00					
79	Slow Tuners Controls Crate	$5		$ 395.00					
79	CPU	$6.50		$ 513.50					
79	a/d Boards	$2		$ 158.00					
79	d/a Boards	$2		$ 158.00					
79	I/o Boards	$2		$ 158.00					
79	Tuners (Fast & Slow)	$4		$ 316.00			711	$ 711.00	
79	Interlock Boards	$2		$ 158.00					
79	Interface Boards	$1		$ 79.00					
79	Pre-made Cables	$0.50		$ 39.50					
	Total each LLRF System = 26.8K			**$ 2,370.00**	**Total Installation each = 9K**			**$ 711.00**	**$ 3,081.00**
	MISC. HARDWARE								
79	Equipment Racks	$2K		$158					
79	Cable Tray	$1.5K		$118.50					
79	RF Cables	$1K		$79					
79	Tuner Cables	$1.5K		$118.50	EQ Racks &				
79	Ctrl/Inst. Cables	$1K		$79	Cable Tray	$139.K		$139	
1	2430' Heliax			$10	Cable Pulls	$20K		$20	
1	158 Heliax Conn.			$7					
	Total each Misc. Hardware = 7.13K			**$ 570.19**	**Total Installation each = 2K**			**$ 159.00**	**$ 729.19**
	TOTAL								**$ 4,689.31**

MID SECTION RIA DRIVER

	HIGH-LEVEL RF	ENGINEERING JUDGEMENT			INSTALLATION AND COMMISSIONING				
	POWER 175MHz and 345MHz	COMPONENTS	TECH. LABOR	SUB		DAVIS BACON	TECH. LABOR	SUB	
QTY.	Triode or Tetrode		at $68/MH	TOTAL	TASK	at $55/MH	at $68/MH	TOTAL	TOTAL
72	RF Amp, 1kW @ 172.5MHz	$4.00	$95.04	$ 383.04	Rigging	$5.70		$ 5.70	
96	RF Amp, 1kW @ 345MHz	$5.00	$146.88	$ 626.88	Water	$88.63		$ 88.63	
168	HVPS	$1.50	$276.60	$ 528.60	Electrical	$37.86		$ 37.86	
168	Controls	$1.00	$276.60	$ 444.60	Load Test		$22.80	$ 22.80	
96	Water System	$1.00	$49.50	$ 145.50	Install		$11.42	$ 11.42	
168	Misc. Hardware	$1.00	$85	$ 253.00	Cav. Test		$182	$ 182.00	
168	350MHz Circ.	$2.50		$ 420.00					
	Total each RF amp = 16.25			$ 2,801.62	Total Installation each = $2K			$ 348.41	$ 3,150.03
	LOW-LEVEL RF								
72	Fast Tuners	$5.00		$ 360.00			$9	$ 1,512.00	
72	Slow Tuners & Control Crate	$5.00		$ 360.00					
84	CPU	$6.50		$ 546.00					
168	a/d Boards	$2.00		$ 336.00					
168	d/a Boards	$2.00		$ 336.00					
168	I/o Boards	$2.00		$ 336.00					
72	Tuners (Fast & Slow)	$4.20		$ 302.40					
168	Interlock Boards	$2.00		$ 336.00					
168	Interface Boards	$1.00		$ 168.00					
168	Pre-made Cables	$0.50		$ 84.00					
	Total each LLRF System = 18.75			$ 3,164.40	Total Installation each = 9K			$ 1,512.00	$ 4,676.40
	MISC. HARDWARE								
168	EQ Racks	$2		$ 336.00					
168	Cable Tray	$1.50		$ 252.00					
168	RF Cables	$1		$ 168.00					
168	Tuner Cables	$1.50		$ 252.00	Cable Tray				
168	Control/Inst. Cable	$1		$ 168.00	& EQ Racks	$295.63		$ 295.63	
1	6560', 7/8 Heliax	$ 25.50		$ 25.50	Cable Pulls	$18.48		$ 18.48	
1	328 Heliax Conn.	$ 22.80		$ 22.80					
	Total each Misc. Hardware = 7.46			$ 1,224.30	otal Installation each = 1.86			$ 314.11	$ 1,538.41
	TOTAL								$ 9,364.84

FINAL SECTION RIA DRIVER

		ENGINEERING JUDGEMENT			INSTALLATION AND COMMISSIONING				
	HIGH-LEVEL RF	COMPONENTS	TECH. LABOR	SUB		DAVIS BACON	TECH. LABOR	SUB	
QTY.	POWER @805MHz		at $68/MH	TOTAL	TASK	at $55/MH	at $68/MH	TOTAL	TOTAL
	(Klystron based)								
188	RF Amp	20	3.5	$ 4,418.00	Rigging	188 (1K)		$ 188.00	
188	HVPS	20	3.5	$ 4,418.00	Water	225.6 (1.2K)		$ 225.60	
188	Controls	4	3.5	$ 1,410.00	Electrical	338.4 (1.8K)		$ 338.40	
188	Cabinets	3	2.25	$ 987.00	Load Test		413.6 (2.2K)	$ 413.60	
188	Water System	5	2.25	$ 1,363.00	Install		817.8 (4.35K)	$ 817.80	
188	Misc. Hardware	5	2.25	$ 1,363.00	Cav. Test		601.6 (3.2K)	$ 601.60	
188	Circulators & Loads	3		$ 564.00					
	Total each RF amp = 77.25K			**$ 14,523.00**				**$ 2,585.00**	**$ 17,108.00**
	LOW-LEVEL RF								
94	CPU	6.5		$ 611.00					
188	a/d Boards	2		$ 376.00					
188	d/a Boards	2		$ 376.00					
188	1/o Boards	2		$ 376.00					
188	Interlock Boards	2		$ 376.00					
188	Interface Boards	1		$ 188.00					
188	Premade Cables	0.5		$ 94.00			9	$ 1,692.00	
	Total each LLRF System = 12.25K			**$ 2,397.00**	**Total Installation each = 9K**			**$ 1,692.00**	**$ 4,089.00**
	MISC. HARDWARE								
188	Equipment Racks	2		$ 376.00					
188	Cable Tray	0.5		$ 94.00					
188	RF Cables	1		$ 188.00					
188	Ctrl/Interlock Cabes	2.5		$ 470.00	Cable Tray				
					& EQ Racks	1.8		$ 338.40	
188	3 1/8" Hardline	3.5		$ 658.00	Install Hardline	5		$ 940.00	
	Total each Misc. Hardware = 9.5K			**$ 1,786.00**	**Total Installation each = 6.8K**			**$ 1,278.40**	**$ 3,064.40**
	TOTAL								**$ 24,261.40**