ACCELERATOR DESIGN & INTEGRATION MEETING

CONVENTIONAL FACILITIES AND SITING GROUP

OVERVIEW OF CFS EVALUATION PROCESS AND NEAR TERM PLANNING

V. Kuchler

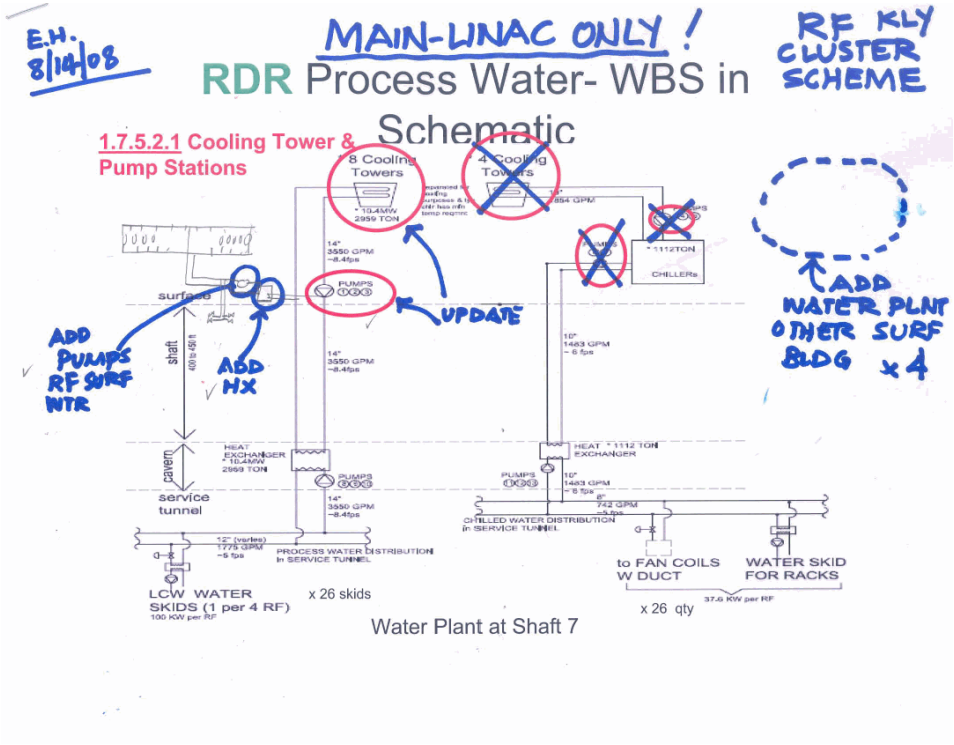
CFS Alternative Evaluation Process

- CFS and Area System Points-of-Contact Work Together to Identify Changes in Criteria and Requirements Between the RDR Design and the Proposed Alternative
- This May Require Interaction Between One or More Area/Technical Systems and One or More Iterations
- Once Criteria is Firm, the CFS Design is Reviewed and an Alternative Design Solution is Generated and Cost Estimate Developed
- CFS Has Separate WBS Cost Estimates for Each Area System and a New Alternative WBS Cost Estimate will be Generated, Compared to the RDR Cost, for Each Affected Area System
- CFS WSB Cost Sheets Will Contain Both the RDR Base Cost and Alternative Cost with Unchanged, Changed, New and Deleted Line Items Distinctly Identified
- Cost Information Will be Available to Each Affected Area System and forwarded to PM's and P.Garbincius

Klystron Cluster Alternative

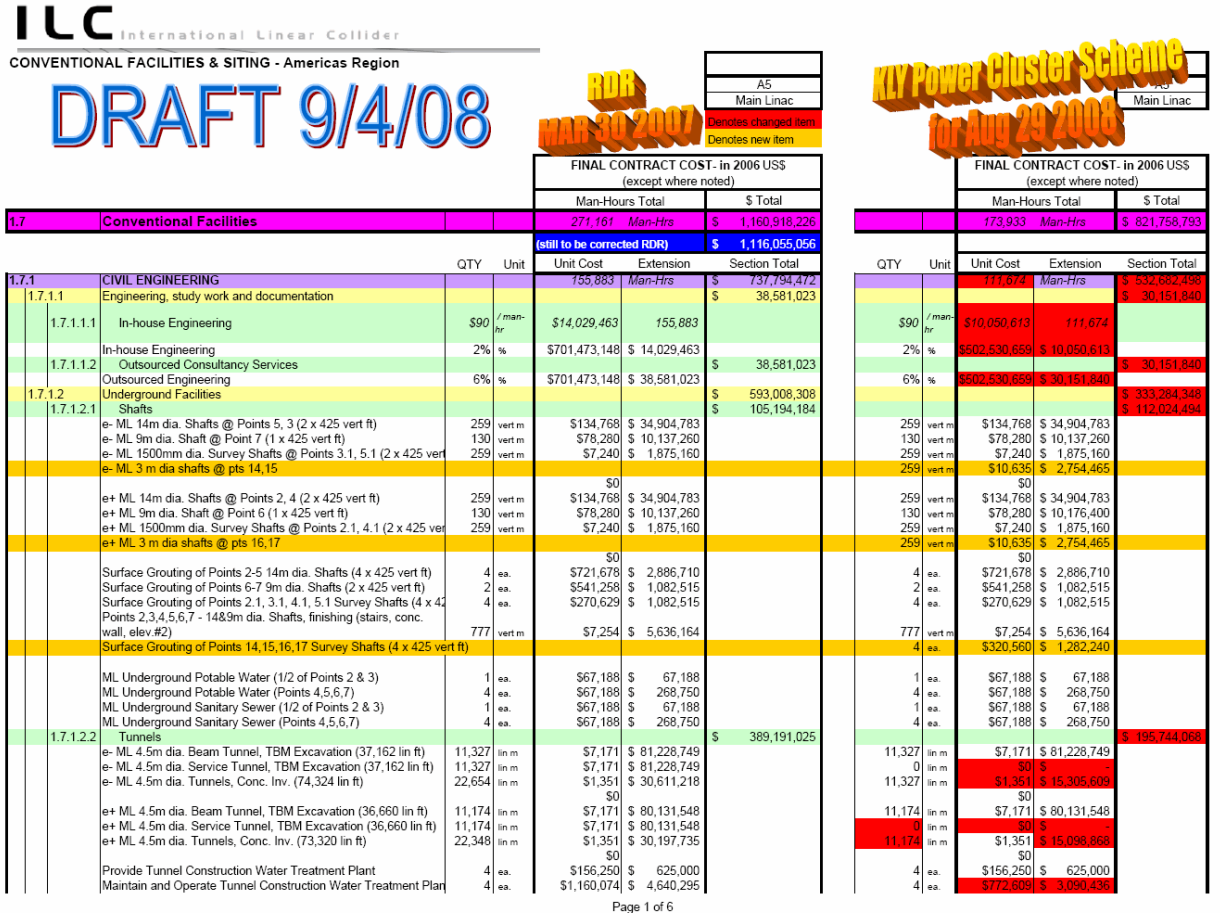
- *This Was the Process Used to Evaluate the Klystron Cluster Alternative*

1.7			Conventional Facilities		
			Notes on the cost anaysis for the KLYCluster Estimate dated 9-4-08		DRAFT 9-11-08
				Cost Direction	- Denotes decrease in cost + denotes increase in cost
1.7.1			CIVIL ENGINEERING		
	1.7.1.1		Engineering, study work and documentation		
		1.7.1.1.1	In-house Engineering		
			In-house Engineering	-	Engineering cost changed as % of contruction
		1.7.1.1.2	Outsourced Consultancy Services		
			Outsourced Engineering	-	Engineering cost changed as % of contruction
	1.7.1.2		Underground Facilities		
		1.7.1.2.1	Shafts		
			e- ML 3 m dia shafts @ pts 14,15	+	Added shafts for waveguide
			e+ ML 3 m dia shafts @ pts 16,17	+	Added shafts for waveguide
			Surface Grouting of Points 14,15,16,17 Survey Shafts (4 x 425 vert ft)	+	Added grouting @ addional shafts
		1.7.1.2.2	Tunnels		
			e- ML 4.5m dia. Service Tunnel, TBM Excavation (37,162 lin ft)	-	Eliminated Service Tunnel
			e- ML 4.5m dia. Tunnels, Conc. Inv. (74,324 lin ft)	-	Reduced invert by half to account for elimination of Service Tunnel
			e+ ML 4.5m dia. Service Tunnel, TBM Excavation (36,660 lin ft)	-	Reduced invert by half to account for elimination of Service Tunnel
			Maintain and Operate Tunnel Construction Water Treatment Plant	-	Reduced water treatment due to reduction in tunnel
			Treatment of Tunnel Construction Water	-	Reduced water treatment due to reduction in tunnel
		1.7.1.2.3	Halls		
		1.7.1.2.4	Caverns		
			(STILL TO BE CORRECTED IN RDR) e- ML Shaft Base Caverns D&B Excavation @ Points 2, 4, 6 (3 x 20,056 CY)	- -	Base RDR cavern excavation volume corrected; covern vreduced by 25%
			(STILL TO BE CORRECTED IN RDR) e+ ML Shaft Base Caverns D&B Excavation @ Points 2, 4, 6 (3 x 20,056 CY)	- -	Base RDR cavern excavation volume corrected; covern vreduced by 25%
		1.7.1.2.5	Miscellaneous works		
			e- Refuge Areas (14 ea @ 10' x 20' x 10')	+	Added Rufuge Areas for Life Safety
			e+ Refuge Areas	+	Added Rufuge Areas for Life Safety
			e- ML Personnel Crossovers, D&B Excavation (23 X 295.5 CY)	-	Eliminated Crossovers
			e- ML Waveguides, Drill Excavation (968)	-	Eliminated waveguide penitrations
			e+ ML Personnel Crossovers, D&B Excavation (23 X 295.5 CY)	-	Eliminated Crossovers
			e+ ML Waveguides, Drill Excavation (968)	-	Eliminated waveguide penitrations
	1.7.1.3		Surface Structures		
			Points 2-7 Cooling Towers & Pump Stations Bldgs. (6 x 7,500 sq ft)	+	Added Service Building Area for KlyCluster RF Equipment Cooling at 4 sites
			KLY Cluster Buildings (no of klystron in surface average 60 to 64)		
			Points ,16,4,17,6,7,14,5,15,		Added Service Building Area for KlyCluster RF Equipment at 8 sites
			Points 2,3		Added Service Building Area for KlyCluster RF Equipment at 2 sites
	1.7.1.4		Site Development		
		1.7.1.4.4	Site Preparation		
			Points 2 - 7, Clearing, Grubbing, and Initial Site Preparation (6 sites)	+	Added 4 additional sites
		1.7.1.4.5	Utility Distribution		
			Points 2 - 7, Utility Corridors (Gas, DWS, San., Storm, Elec., Comm.)	+	Added 4 additional sites
			Points 2 - 7, Septic Field / Tank or Sanitary Sewer	+	Added 4 additional sites
			Points 2 - 7, Wells or DWS	+	Added 4 additional sites
			Points 4 - 7, Elevated Water Tank	+	Added 4 additional sites
			Points 4 - 7, Water Pump House	+	Added 4 additional sites
		1.7.1.4.6	Road, Sidewalks & Parking Areas		
			Points 2 - 7, Service Roads (6 sites x 1260 lin ft / site)	+	Added 4 additional sites
			Points 2 - 7, Paved Areas (6 sites x 8750 sy / site)	+	Added 4 additional sites
			Points 2 - 7, Flatwork (6 sites x 2,500 sq ft / site)	+	Added 4 additional sites
		1.7.1.4.7	Landscaping		
			Points 2 - 7, Landscaping	+	Added 4 additional sites
			Points 4 - 7, Security Fencing (4 sites x 5,000 lin ft / site)	+	Added 4 additional sites
		1.7.1.4.8	Environmental		
			Points 2 - 7, Sediment & Erosion Control (6 sites)	+	Added 4 additional sites
		1.7.1.4.9	Miscellaneous Site Works		



Klystron Cluster Alternative

- These are Back-Up Detail Sheets of the CFS Cost Estimate



ILC International Linear Collider

CONVENTIONAL FACILITIES & SITING - Americas Region

DRAFT 9/4/08

RDR MAR 30 2007

KLY Power Cluster Scheme for Aug 29 2008

A5 Main Linac

Denotes changed item

Denotes new item

					FINAL CONTRACT COST- in 2006 US$ (except where noted)				FINAL CONTRACT COST- in 2006 US$ (except where noted)			
					Man-Hours Total		$ Total		Man-Hours Total		$ Total	
1.7	Conventional Facilities				271,161 Man-Hrs		$ 1,160,918,226		173,933 Man-Hrs		$ 821,758,793	
					(still to be corrected RDR)		$ 1,116,055,056					
		QTY	Unit		Unit Cost	Extension	Section Total	QTY	Unit		Unit Cost	Extension	Section Total
1.7.1	CIVIL ENGINEERING				155,883	Man-Hrs	$ 737,794,472				111,674	Man-Hrs	$ 532,682,498
1.7.1.1	Engineering, study work and documentation						$ 38,581,023						$ 30,151,840
1.7.1.1.1	In-house Engineering	$90	/ man-hr		$14,029,463	155,883		$90	/ man-hr		$10,050,613	111,674	
	In-house Engineering	2%	%		$701,473,148	$ 14,029,463		2%	%		$502,530,659	$ 10,050,613	
1.7.1.1.2	Outsourced Consultancy Services						$ 38,581,023						$ 30,151,840
	Outsourced Engineering	6%	%		$701,473,148	$ 38,581,023		6%	%		$502,530,659	$ 30,151,840	
1.7.1.2	Underground Facilities						$ 593,008,308						$ 333,284,348
1.7.1.2.1	Shafts						$ 105,194,184						$ 112,024,494
	e- ML 14m dia. Shafts @ Points 5, 3 (2 x 425 vert ft)	259	vert m		$134,768	$ 34,904,783		259	vert m		$134,768	$ 34,904,783	
	e- ML 9m dia. Shaft @ Point 7 (1 x 425 vert ft)	130	vert m		$78,280	$ 10,137,260		130	vert m		$78,280	$ 10,137,260	
	e- ML 1500mm dia. Survey Shafts @ Points 3.1, 5.1 (2 x 425 vert	259	vert m		$7,240	$ 1,875,160		259	vert m		$7,240	$ 1,875,160	
	e- ML 3 m dia shafts @ pts 14,15							259	vert m		$10,635	$ 2,754,465	
					$0						$0		
	e+ ML 14m dia. Shafts @ Points 2, 4 (2 x 425 vert ft)	259	vert m		$134,768	$ 34,904,783		259	vert m		$134,768	$ 34,904,783	
	e+ ML 9m dia. Shaft @ Point 6 (1 x 425 vert ft)	130	vert m		$78,280	$ 10,137,260		130	vert m		$78,280	$ 10,176,400	
	e+ ML 1500mm dia. Survey Shafts @ Points 2.1, 4.1 (2 x 425 ver	259	vert m		$7,240	$ 1,875,160		259	vert m		$7,240	$ 1,875,160	
	e+ ML 3 m dia shafts @ pts 16,17							259	vert m		$10,635	$ 2,754,465	
					$0						$0		
	Surface Grouting of Points 2-5 14m dia. Shafts (4 x 425 vert ft)	4	ea.		$721,678	$ 2,886,710		4	ea.		$721,678	$ 2,886,710	
	Surface Grouting of Points 6-7 9m dia. Shafts (2 x 425 vert ft)	2	ea.		$541,258	$ 1,082,515		2	ea.		$541,258	$ 1,082,515	
	Surface Grouting of Points 2.1, 3.1, 4.1, 5.1 Survey Shafts (4 x 42	4	ea.		$270,629	$ 1,082,515		4	ea.		$270,629	$ 1,082,515	
	Points 2,3,4,5,6,7 - 14&9m dia. Shafts, finishing (stairs, conc. wall, elev.#2)	777	vert m		$7,254	$ 5,636,164		777	vert m		$7,254	$ 5,636,164	
	Surface Grouting of Points 14,15,16,17 Survey Shafts (4 x 425 vert ft)							4	ea.		$320,560	$ 1,282,240	
	ML Underground Potable Water (1/2 of Points 2 & 3)	1	ea.		$67,188	$ 67,188		1	ea.		$67,188	$ 67,188	
	ML Underground Potable Water (Points 4,5,6,7)	4	ea.		$67,188	$ 268,750		4	ea.		$67,188	$ 268,750	
	ML Underground Sanitary Sewer (1/2 of Points 2 & 3)	1	ea.		$67,188	$ 67,188		1	ea.		$67,188	$ 67,188	
	ML Underground Sanitary Sewer (Points 4,5,6,7)	4	ea.		$67,188	$ 268,750		4	ea.		$67,188	$ 268,750	
1.7.1.2.2	Tunnels						$ 389,191,025						$ 195,744,068
	e- ML 4.5m dia. Beam Tunnel, TBM Excavation (37,162 lin ft)	11,327	lin m		$7,171	$ 81,228,749		11,327	lin m		$7,171	$ 81,228,749	
	e- ML 4.5m dia. Service Tunnel, TBM Excavation (37,162 lin ft)	11,327	lin m		$7,171	$ 81,228,749		0	lin m		$0	$ -	
	e- ML 4.5m dia. Tunnels, Conc. Inv. (74,324 lin ft)	22,654	lin m		$1,351	$ 30,611,218		11,327	lin m		$1,351	$ 15,305,609	
					$0						$0		
	e+ ML 4.5m dia. Beam Tunnel, TBM Excavation (36,660 lin ft)	11,174	lin m		$7,171	$ 80,131,548		11,174	lin m		$7,171	$ 80,131,548	
	e+ ML 4.5m dia. Service Tunnel, TBM Excavation (36,660 lin ft)	11,174	lin m		$7,171	$ 80,131,548		0	lin m		$0	$ -	
	e+ ML 4.5m dia. Tunnels, Conc. Inv. (73,320 lin ft)	22,348	lin m		$1,351	$ 30,197,735		11,174	lin m		$1,351	$ 15,098,868	
					$0						$0		
	Provide Tunnel Construction Water Treatment Plant	4	ea.		$156,250	$ 625,000		4	ea.		$156,250	$ 625,000	
	Maintain and Operate Tunnel Construction Water Treatment Plan	4	ea.		$1,160,074	$ 4,640,295		4	ea.		$772,609	$ 3,090,436	

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Klystron Cluster Alternative

- These are Back-Up Detail Sheets of the CFS Cost Estimate

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RDR MAR 30 2007

A5 Main Linac

Denotes changed item

Denotes new item

KLY Power Cluster Scheme for Aug 29 2008

A5 Main Linac

						FINAL CONTRACT COST- in 2006 US$ (except where noted)				FINAL CONTRACT COST- in 2006 US$ (except where noted)			
						Man-Hours Total		$ Total				Man-Hours Total		$ Total	
	1.7.5.1.1	In-house Engineering	$90	/ man-hr		$3,442,384	38,249			$90	/ man-hr	$1,568,940	17,433	
		In-house Engineering	2%	%		$172,119,198	$ 3,442,384			2%	%	$78,446,983	$ 1,568,940	
	1.7.5.1.2	Outsourced Consultancy Services						$ 15,490,728						$ 7,060,228
		Outsourced Engineering	9%	%		$172,119,198	$ 15,490,728			9%	%	$78,446,983	$ 7,060,228	
1.7.5.2		Primary Stations						$ 29,863,815						$ 22,961,983
	1.7.5.2.1	Cooling Towers & Pumping Stations						$ 19,875,852						$ 19,234,983
		Cooling Towers for Process Water	1	ls		$9,636,281	$ 9,636,281			1	ls	$12,081,000	$ 12,081,000	
		Cooling Towers for Chilled Water	1	ls		$5,200,237	$ 5,200,237			1	ls	$0	$ -	
		Tower Pump and Accessories for Process Water	1	ls		$1,842,963	$ 1,842,963			1	ls	$1,639,000	$ 1,639,000	
		Tower Pump and Accessories for Chilled Water	1	ls		$1,220,138	$ 1,220,138			1	ls	$0	$ -	
		Chilled Water Pump	1	ls		$1,191,250	$ 1,191,250			1	ls	$0	$ -	
		Controls	1	ls		$784,983	$ 784,983			1	ls	$784,983	$ 784,983	
		Pump for RF Surface water system (for 10 plants)	1	ls						1	ls	$2,416,000	$ 2,416,000	
		Heat Exchanger for RF Surface water system (for 10 plants)	1	ls						1	ls	$2,314,000	$ 2,314,000	
	1.7.5.2.2	Primary Stations and Piping						$ 9,987,962						$ 3,727,000
		Chillers	1	ls		$5,347,115	$ 5,347,115			1	ls	$0	$ -	
		Tower Piping for Process Water (surface)	1	ls		$821,952	$ 821,952			1	ls	$650,000	$ 650,000	
		Tower Piping for Chilled Water (surface)	1	ls		$489,039	$ 489,039			1	ls	$0	$ -	
		Tower Piping for Process Water (shaft)	1	ls		$1,679,547	$ 1,679,547			1	ls	$951,000	$ 951,000	
		Chilled Water Piping (surface)	1	ls		$286,335	$ 286,335			1	ls	$0	$ -	
		Chilled Water Piping (shaft)	1	ls		$1,363,974	$ 1,363,974			1	ls	$0	$ -	
		Piping RF Surface Water System (for 10 plants)	1	ls						1	ls	$2,126,000	$ 2,126,000	
	1.7.5.3	Secondary Stations						$ 142,255,383						$ 55,485,000
	1.7.5.3.1	Demineralized Water Stations and Distribution Piping						$ 69,245,357						$ 34,882,000
		Demineralized Pump/Skid System w/ Materials & Installation	1	ls		$69,245,357	$ 69,245,357			1	ls	$34,882,000	$ 34,882,000	
	1.7.5.3.2	Chilled Water Stations and Distribution Piping						$ 32,456,126						$ -
		Heat Exchangers (cavern)	1	ls		$1,726,838	$ 1,726,838			1	ls	$0	$ -	
		Distribution Pumps (cavern)	1	ls		$1,649,580	$ 1,649,580			1	ls	$0	$ -	
		Piping (cavern)	1	ls		$399,846	$ 399,846			1	ls	$0	$ -	
		Piping (tunnel)	1	ls		$19,274,532	$ 19,274,532			1	ls	$0	$ -	
		Piping Connections to End Equipment	1	ls		$9,405,330	$ 9,405,330			1	ls	$0	$ -	
	1.7.5.3.3	Water Stations and Distribution Piping						$ 14,473,690						$ -
		Water Stations and Distribution Piping	1	ls		$14,473,690	$ 14,473,690			1	ls	$0	$ -	
	1.7.5.3.4	Compressed Air						$ 2,404,000						$ 2,404,000
		Compressed Air	1	ls		$2,404,000	$ 2,404,000			1	ls	$2,404,000	$ 2,404,000	
	1.7.5.3.5	Process Water Distribution						$ 23,676,210						$ 18,199,000
		Heat Exchangers (cavern)	1	ls		$2,772,791	$ 2,772,791			1	ls	$1,845,000	$ 1,845,000	
		Distribution Pumps (cavern)	1	ls		$1,879,121	$ 1,879,121			1	ls	$1,601,000	$ 1,601,000	
		Piping (cavern)	1	ls		$661,007	$ 661,007			1	ls	$316,000	$ 316,000	
		Piping (tunnel)	1	ls		$16,515,925	$ 16,515,925			1	ls	$14,437,000	$ 14,437,000	
		Piping Connections to End Equipment	1	ls		$1,847,365	$ 1,847,365			1	ls	$0	$ -	
1.7.6		HANDLING EQUIPMENT						$ 11,300,000				2,511	Man-Hrs	$ 11,300,000

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Klystron Cluster Alternative

- This is the High Level Roll-Up of CFS Costs for the Main Linac

ILC International Linear Collider

CONVENTIONAL FACILITIES & SITING - Americas Region

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RDR MAR 30 2007

KLY Power Cluster Scheme for Aug 29 2008

					A5 Main Linac							A5 Main Linac		
					Denotes changed item									
					Denotes new item									
					FINAL CONTRACT COST- in 2006 US$ (except where noted)							FINAL CONTRACT COST- in 2006 US$ (except where noted)		
					Man-Hours Total		$ Total					Man-Hours Total		$ Total
1.7	Conventional Facilities				271,161	Man-Hrs	$ 1,160,918,226					173,933	Man-Hrs	$ 821,758,793
					(still to be corrected RDR)		$ 1,116,055,056							
		QTY	Unit		Unit Cost	Extension	Section Total		QTY	Unit		Unit Cost	Extension	Section Total
1.7.1	CIVIL ENGINEERING				155,883	Man-Hrs	$ 737,794,472					111,674	Man-Hrs	$ 532,682,498
1.7.1.1	Engineering, study work and documentation						$ 38,581,023							$ 30,151,840
1.7.1.2	Underground Facilities						$ 593,008,308							$ 333,284,348
1.7.1.3	Surface Structures						$ 75,914,855							$ 122,001,510
1.7.1.4	Site Development						$ 30,290,286							$ 47,244,801
1.7.2	ELECTRICAL				37,585	Man-Hrs	$ 169,134,000					28,189	Man-Hrs	$ 126,850,500
1.7.3	AIR TREATMENT EQUIPMENT				2,561	Man-Hrs	$ 12,328,035					4,283	Man-Hrs	$ 20,618,471
1.7.3.1	Engineering, study work and documentation						$ 806,507							$ 1,348,872
1.7.3.2	HVAC Equipment						$ 11,521,528							$ 19,269,599
1.7.4	PIPED UTILITIES				266	Man-Hrs	$ 1,300,792					1,255	Man-Hrs	$ 6,153,112
1.7.4.1	Engineering, study work and documentation						$ 107,405							$ 508,055
1.7.4.2	Plumbing						$ 1,193,388							$ 1,988,979
1.7.4.3	Fire Suppression													$3,656,078
1.7.4.4	Fuel System Distribution													
1.7.5	PROCESS (COOLING) WATER				38,249	Man-Hrs	$ 187,609,926					17,433	Man-Hrs	$ 85,507,211
1.7.5.1	Engineering, study work and documentation						$ 15,490,728							$ 7,060,228
1.7.5.2	Primary Stations						$ 29,863,815							$ 22,961,983
1.7.5.3	Secondary Stations						$ 142,255,383							$ 55,485,000
1.7.6	HANDLING EQUIPMENT						$ 11,300,000					2,511	Man-Hrs	$ 11,300,000
1.7.7	SAFETY EQUIPMENT						$ 14,020,000					2,492	Man-Hrs	$ 11,216,000
1.7.8	SURVEY AND ALIGNMENT						$ 27,431,000					6,096	Man-Hrs	$ 27,431,000

CFS Proposed Points-of-Contact

Electron Source

Axel Brachman & John Sheppard - Tom Lackowski
(supported by M+W Zander)

Positron Source

Jim Clarke - John Osborne

Damping Ring

Susanna Guiducci - Tom Lackowski

Ring to Main Linac

Nikolay Solyak - Vic Kuchler (supported by M+W Zander)

Main Linac

Chris Adolphsen (Klystron Cluster) - Tom Lackowski

Shigeki Fukuda (DRFS) - Atsushi Enomoto

Beam Delivery System

Andrei Seryi - John Osborne

Working Assumptions (WA) for SB2009 - 2a

"Single tunnel solution for the Main Linacs and RTML, with two possible variants for the HLRF (a. Klystron Cluster Scheme)

- *This Evaluation has been Completed*
- *Civil Costs were reduced ~25% (~$300M)*
- *3 Shafts were Added*
- *4 Surface Sites were Added*
- *10 Buildings for Klystron Cluster Surface Equipment were Added*
- *28 Refuge Areas were Added in Accelerator Tunnel*
- *Other Cavern Volume was Reduced 25%*
- *Air Treatment Increased 25%*
- *Process Water Decreased by 54%*
- *Electrical Decreased 25%*
- *Piped Utilities Increased by 370% for Sprinklers in Tunnel*

Working Assumptions (WA) for SB2009 - 1

"A Main Linac length consistent with an optimal choice of average accelerating gradient (currently 31.3 MV/m, to be re-evaluated)"

- ***Difficulty Rating - Straightforward***
- ***Area Systems Affected - Main Linac***
- ***Change in Linac Lengths (Based on e- and e+ Linacs with both Accelerator and Service Tunnel) Will Result in a Potential Cost Difference of ~$54K - $80K/m of Main Linac Length Change***

Working Assumptions (WA) for SB2009 - 2b

"Single tunnel solution for the Main Linacs and RTML, with two possible variants for the HLRF (b. DRFS Scheme)

- Difficulty Rating - Straightforward
- The Asian Region Will Lead This Evaluation
- Area Systems Affected - Main Linac
- It Will be Completed Using the Same Process as the Klystron Cluster Alternative Effort
- This Alternative Could be More Suitable for Specific Regional Conditions

Working Assumptions (WA) for SB2009 - 3

"Undulator-based e+ source located at the end of the electron Main Linac (250 GeV)"

- Difficulty Rating - Straightforward
- Affected Area Systems - e+ Source, Main Linacs, BDS
- Change in Linac Length (Based on e- Linac with both Accelerator and Service Tunnel) Will Result in a Potential Difference of ~$27 - $40K/m of Main Linac Length Change
- How Will BDS and e+ Main Linac be Affected ?

Working Assumptions (WA) for SB2009 - 5

"~3.2 km circumference damping rings at 5GeV, 6mm bunch length"

- Difficulty Rating - Straightforward
- Reduction in the Damping Ring Length Will Result in a Potential Savings of ~$51K/m of Damping Ring Length Change
- Will Technical Criteria Change ?
- Will the Change Scale with the Tunnel Length ?

Working Assumptions (WA) for SB2009 - 6

"Single-stage bunch compressor with a compression factor of 20"

- Difficulty Rating - Straightforward
- This Rating is Based on a Direct Comparison to the RDR Solution
- Area Systems Affected - RTML, Main Linac
- Location and Position of RTML Equipment is Dependent on the Reconfiguration of Other Area Systems as Well
- How Much Will Technical Criteria Change ?

Working Assumptions (WA) for SB2009 - 7

"Integration of the e+ and e- sources into a common 'central region beam tunnel' together with the BDS"

- Difficulty Rating - Moderately Complex
- Rating is Based on the Fact that a Very Organized Effort is Already Underway to Address this Alternative
- Area Systems Affected - Potentially All Area Systems will be Affected

Working Assumptions (WA) for SB2009 - 4

"Reduced parameter set (with respect to the RDR)with n_b=1312 and a 2ms RF pulse"

- *Difficulty Rating - Most Complex*
- *Area Systems Affected - Potentially All Area Systems Would be Affected*
- *For the CFS Standpoint, This Alternative is the Least Understood with Regard to Impact on Space Requirements, Utility Support and Technical Criteria*
- *A Similar Effort Comparable to the Accelerator Integration & Design is Likely to be Required*

Summary

- All Will Agree that There is A lot of Work to Do
- Successful Completion of this Work will Require Direct and Frequent Communication Between All of the Affected Area Systems for the Stated Parameters as Well as with the CFS Group Through the Points-of-Contact
- This was Directly Stated in the AAP Report

  "The AAP encourages further exchange between the various area groups. In many cases, guidance from the project managers is necessary for systematic application across the project. For these CFS efforts to be most useful, it is important to define clearly the main assumptions and technical choices ."
- The CFS Group will Utilize it's Weekly Video/Webex Meeting to Devote to Specific Topics and Ask Area System Representatives to Participate as Needed (current Invitees include the Project Managers)

More Summary

- It is Essential that Milestones and Associated Completion Dates are Developed and Met
- The Remaining Working Sessions for this Meeting Should Devote Some Time for Initial Planning and Scope Development
- Pressure to Reduce Travel Notwithstanding, Face to Face Meetings Like this one are Extremely Useful and Necessary
- Future Meetings Should Concentrate on Reporting Progress, Addressing Issues and Resolving Problems
- PM Facilitation (Refereeing) Will Prove Useful
- CFS Points-of-Contact will Make Themselves Available to Participate in Any Coordination Meetings with Area Systems Individually or in Groups
- We All Need to Work Together