Estimated Cost of the Baseline ALMA Bilateral Project

WBS	Name	Task	Division of Responsibility	
			N. Amer	Europe
1	**Management/ Administration**	European Project Office; North American Project Office; Santiago Office; Joint Project Office	$12,172	$11,699
2	**Site Development**	Array Site Civil Works; OSF Civil Works; Direct OSF-Array Site Link; Santiago Office Facilities	$32,135	$52,901
3	**Antenna Subsystem**	Prototype Antenna testing; Contracting; 64 production 12m antennas; 3 antenna transporters all delivered to Chile; Acceptance testing	$103,596	$107,408
4	**Front End Subsystem**	Front End Assembly (Cryostat, refrigerator, optics) with 4 frequency band cartridges. Includes Integration and testing. 64 units and spares delivered to Chile.	$26,548	$61,907
5	**Local Oscillator Subsystem**	Central LO distribution and reference installed on array site; LO drivers 80-122 GHz at each antenna; mm/submm multipliers delivered to each frequency band cartridge.	$33,302	$0
6	**Backend Subsystem**	IF A/D system and channelization; IF F/O transmitters installed on each antenna; IF F/O receivers installed at central electronics building on array site.	$21,847	$12,549

7	**Correlator**	Baseline correlator. Designed, fabricated, delivered and installed on array site.	$16,866	$0
8	**Computing Subsystem**	End-to-end data flow system. Includes real-time instrument control, Monitor and control system; data pipline processing; correlator software; calibration software; science program scheduling; archiving.	$16,157	$16,157
9	**System Engineering and Integration**	System Engineering; Technical specifications; Configuration control; Interface specifications; Acceptance standards and testing; Integration in Chile.	$10,131	$10,131
10	**Science**	Trade-off analyses; performance testing at test interferometer and in Chile; optimization studies.	$3,480	$3,480
	TOTALS		**$276,234**	**$276,232**
	PROJECT TOTAL	**$552,466**		

Estimated Cost of the Baseline ALMA for the Tripartite Project

WBS	Name	Task	Incremental Task & Cost for the Tripartite Project	Division of Responsibility N.Amer	Europe	Japan
1	**Management/ Administration**	European Project Office; North American Project Office; Santiago Office; Joint Project Office	**Task Totals for the Bilateral Project**	**$12,172**	**$11,699**	
			NA: Project Travel	$1,265		
			NA: Share of Joint ALMA Office	($1,270)		
			EU: Project Travel		$1,265	
			EU: Share of Joint ALMA Office		($1,270)	
			JP: Management of Japan Proj			$6,734
			JP: Share of Joint ALMA Office			$2,540
2	**Site Development**	Array Site Civil Works; OSF Civil Works; Direct OSF-Array Site Link; Santiago Office Facilities	**Task Totals for the Bilateral Project**	**$32,135**	**$52,901**	
			NA: Share of Infrastructure Cost	($10,772)		
			NA: Reconcile to NA sum of $220M	($8,866)		$8,866
			EU: Share of Infrastructure Cost		($17,634)	
			JP: Share of Infrastructure Cost			$28,404
			JP: Contractors & Managers Facil.			$6,038
3	**Antenna Subsystem**	Prototype Antenna testing; Contracting; 64 production 12m antennas; 3 antenna transporters all delivered to Chile; Acceptance testing	**Task Totals for the Bilateral Project**	**$103,596**	**$107,408**	
			NA: Build 22 not 32 12m antennas	($29,330)		
			NA: Amortize NRE/Profits over 22	$3,200		
			EU: Build 22 not 32 12m antennas		($29,330)	
			EU: Amortize NRE/Profits over 22		$3,200	

			JP: Design & Build Prototype 12m			$8,000
			JP: Build 22 12m antennas			$64,526
			JP: Duplicate Ant Contr Fac @ OSF			$3,000
4	**Front End Subsystem**					
		Front End Assembly (Cryostat, refrigerator, optics) with 4 frequency band cartridges. Includes Integration and testing. 64 units and spares delivered to Chile.	**Task Totals for the Bilateral Project**	**$26,548**	**$61,907**	
			NA: Build only Band 6, not Band 3	($7,426)		
			NA: Band 3-specific Meas Equip	($1,637)		
			JP: Build Band 3 Cartridge			$7,426
			JP: Mgmt, Test Fac, Meas Equip			$9,189
5	**Local Oscillator Subsystem**					
		Central LO distribution and reference installed on array site; LO drivers 80-122 GHz at each antenna; mm/submm multipliers delivered to each frequency band cartridge.	**Task Totals for the Bilateral Project**	**$33,302**	**$0**	
			JP: Band 3 Specs--1 engin for 8 yr			$800
6	**Backend Subsystem**					
		IF A/D system and channelization; IF F/O transmitters installed on each antenna; IF F/O receivers installed at central electronics building on array site.	**Task Totals for the Bilateral Project**	**$21,847**	**$12,549**	
			JP: Subsys Mgmt and Engineering			$984

7	**Correlator**	Baseline correlator. Designed, fabricated, delivered and installed on array site.	**Task Totals for the Bilateral Project**	**$16,866**	**$0**	
			JP: Coordination only; no tasks			$0
8	**Computing Subsystem**	End-to-end data flow system. Includes real-time instrument control, Monitor and control system; data pipline processing; correlator software; calibration software; science program scheduling; archiving.	**Task Totals for the Bilateral Project**	**$16,157**	**$16,157**	
			JP: Mgmt, Require, High Level Desn			$2,423
9	**System Engineering and Integration**	System Engineering; Technical specifications; Configuration control; Interface specifications; Acceptance standards and testing; Integration in Chile.	**Task Totals for the Bilateral Project**	**$10,131**	**$10,131**	
			JP: 33% incr; Chile SE&I tasks only			$8,083
			NA: Assigned Effort to JP	($1,011)		
			EU: Assigned Effort to JP		($1,011)	
10	**Science**	Trade-off analyses; performance testing at test interferometer and in Chile; optimization studies.	**Task Totals for the Bilateral Project**	**$3,480**	**$3,480**	
			JP: 33% incr for Japanese Involvem			$3,093
			NA: Assigned Effort to JP	($387)		
			EU: Assigned Effort to JP		($387)	
	TOTALS			**$220,000**	**$231,065**	**$160,106**

PROJECT TOTAL	**$611,171**