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# Project Management Plan

## Peter Napier

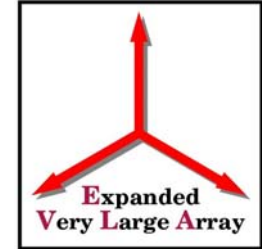
Project Organization

Schedule

Budget



# Work Breakdown Structure (WBS)



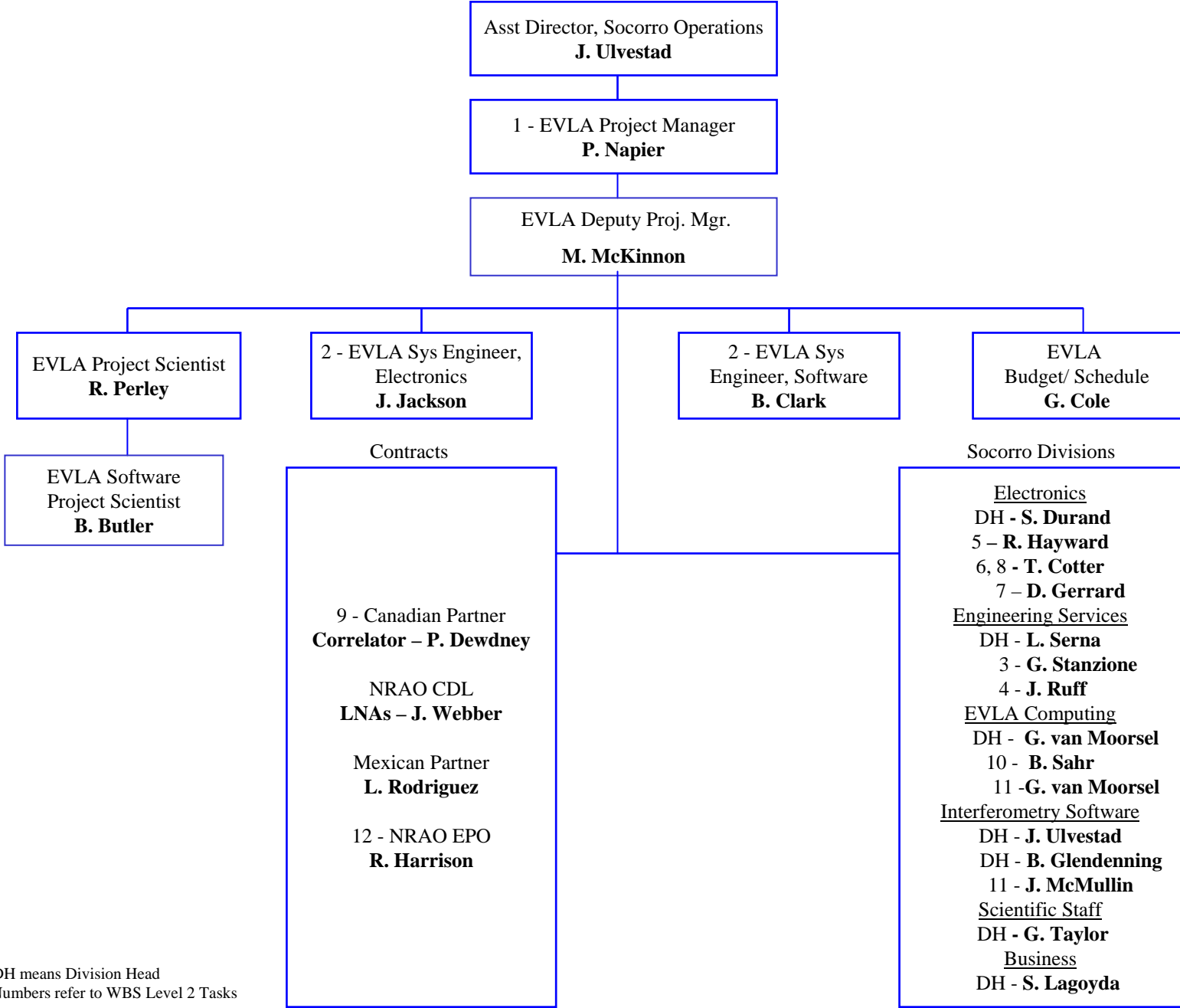
- 6.01 Project Management**
- 6.02 System Integration and Testing**
- 6.03 Civil Construction**
- 6.04 Antennas**
- 6.05 Front End Systems**
- 6.06 Local Oscillator System**
- 6.07 Fiber Optic System**
- 6.08 Intermediate Frequency System**
- 6.09 Correlator**
- 6.10 Monitor & Control System**
- 6.11 Data Management and Computing**
- 6.12 Education and Public Outreach**

**WBS is maintained at Level 3 or 4, Updated 2 times/yr. Total 162 cost data sheets.**





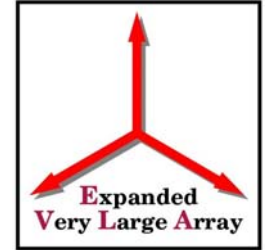
# EVLA MANAGEMENT CHART



Note: DH means Division Head  
Numbers refer to WBS Level 2 Tasks



# Schedule



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Current baseline schedule:

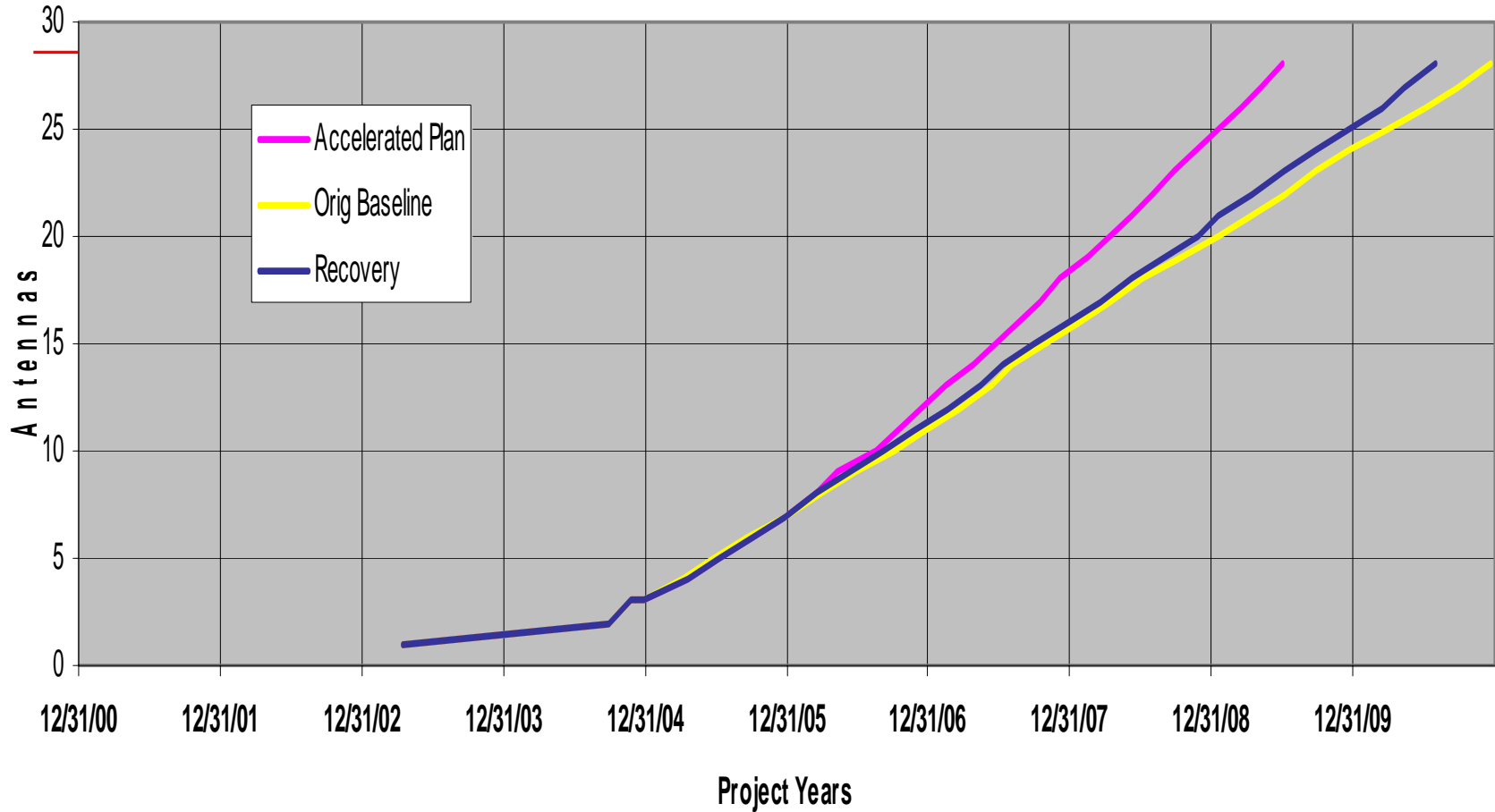
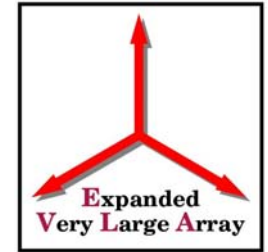
5 antennas outfitted for use in array (Antennas then outfitted at 5/year)	Dec 2005
Test Prototype correlator on VLA	Apr 2006
Correlator subset ready for first science	Apr 2008
Last antenna outfitted	Oct 2010
Last receiver installed	Jun 2012





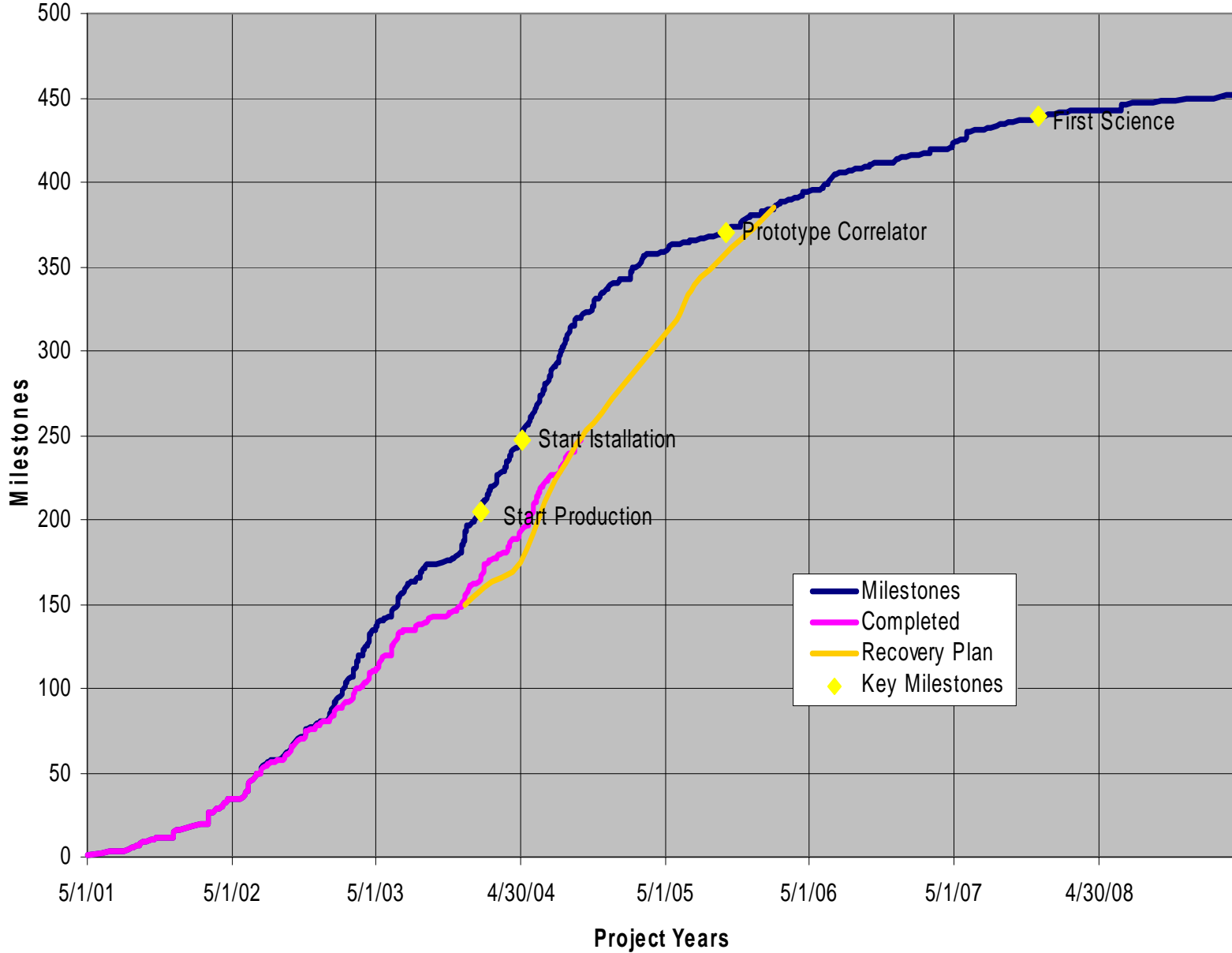
# Schedule (cont)

EVLA Project  
Antenna Outfit Plan



# EVLA PROJECT MILESTONE SUMMARY

## As of October 01, 2004





# EVLA BUDGET SUMMARY

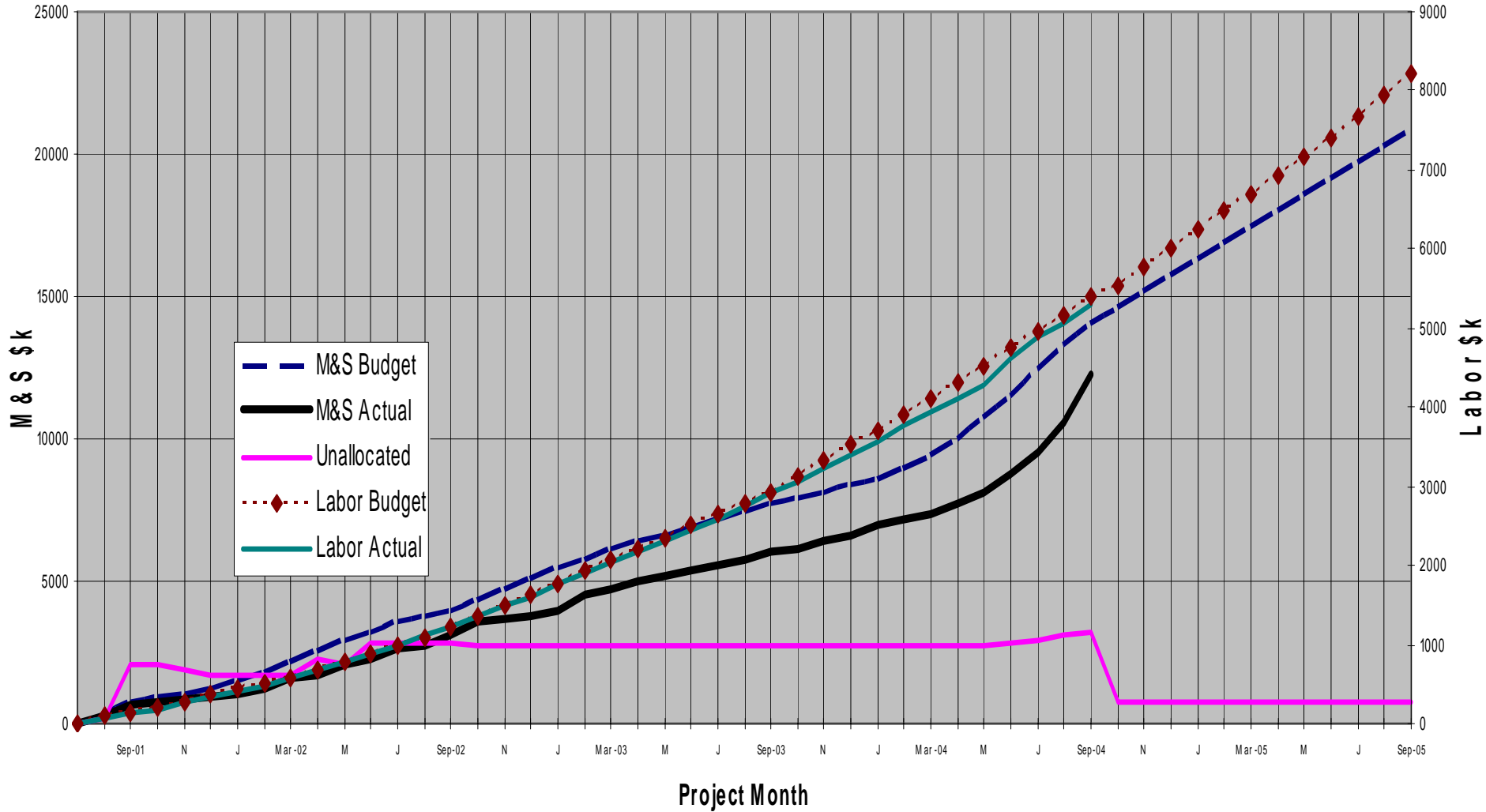
## Rollup from all 162 cost data sheets

All amounts are in \$k dollars (FY2004)

As of 11/12/2004

WBS	Task Name	Actuals	Actuals	Actuals	Actuals	Budget								
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
6.01	Project Management	77.0	203.7	124.9	279.7	261.4	320.7	279.2	267.7	277.4	221.7	140.4	0.0	2454
6.02	System Integration & Testing	212.0	478.0	236.4	746.1	1040.4	139.4	122.4	92.2	22.9	0.0	0.0	0.0	3090
6.03	Civil Construction	0.2	252.0	40.1	229.1	573.4	47.3	0.0	0.0	0.0	0.0	0.0	0.0	1142
6.04	Antennas	0.0	46.7	98.5	497.2	134.8	94.5	61.4	38.0	14.2	8.0	0.0	0.0	993
6.05	Front End Systems	385.0	114.5	596.5	1315.4	2374.2	1763.3	968.4	888.0	806.4	616.1	359.1	139.3	10326
6.06	Local Oscillator System	14.1	292.4	253.0	1188.4	504.3	548.7	506.3	225.6	52.0	0.0	0.0	0.0	3585
6.07	Fiber Optic System	4.7	603.8	735.5	1175.6	744.9	1507.8	620.3	675.3	388.6	369.2	0.0	0.0	6826
6.08	Intermediate Frequency System	0.0	105.5	327.5	205.4	726.9	418.2	382.2	333.0	78.9	68.0	0.0	0.0	2646
6.09	Correlator	149.0	362.0	155.0	618.0	37.0	4281.5	1879.0	45.0	17.0	0.0	0.0	0.0	7544
6.10	Monitor & Control System	0.0	209.2	255.8	367.0	561.9	629.1	488.0	415.5	241.7	66.6	8.0	0.0	3243
6.11	Data Management & Computing	2.8	0.2	219.0	194.9	64.0	8.0	202.0	102.0	500.0	0.0	0.0	0.0	1293
6.12	Education & Public Outreach	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	M&S Total	845	2668	3042	6817	7023	9758	5509	3082	2399	1350	507	139	43141
	Travel	8	65	67	67	78	69	64	55	48	32	0	0	554
	Direct Labor	126	1115	1689	2297	2667	2310	1911	1905	1504	200	181	0	15903
	NRAO Indirect Labor	195	1549	2317	2186	2642	2218	2057	1737	1598	393	211	198	17302
	NRAO Wages & Benefits	321	2664	4006	4483	5309	4528	3968	3641	3101	593	392	198	33205
	Canadian Labor	54	414	671	533	523	438	499	321	136	0	0	0	3589
	Sub Total	1227	5810	7787	11900	12934	14795	10040	7099	5685	1975	899	337	80489
	Contingency	0	0	0	0	0	0	0	606	1534	1951	197		4288
	Redirected NRAO Effort	-195	-1549	-2317	-2186	-2642	-2218	-2057	-1737	-1598	-393	-211	-198	-17302
	Canadian Contribution	-203	-776	-826	-1151	-560	-4720	-2378	-366	-153	0	0	0	-11133
	Mexican Contribution						-1700							-1700
	EVLA Project Funds	829	3486	4643	8563	9732	6156	5605	5603	5468	3532	885	139	54642
	Carryover to next yr	2170	3685	4363	5140	748						139		
	Carryover from prior yr		-2170	-3685	-4363	-5140	-748						-139	
	NSF Funded	3000	5000	5322	9340	5340	5408	5605	5603	5468	3532	1024	0	54642
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals

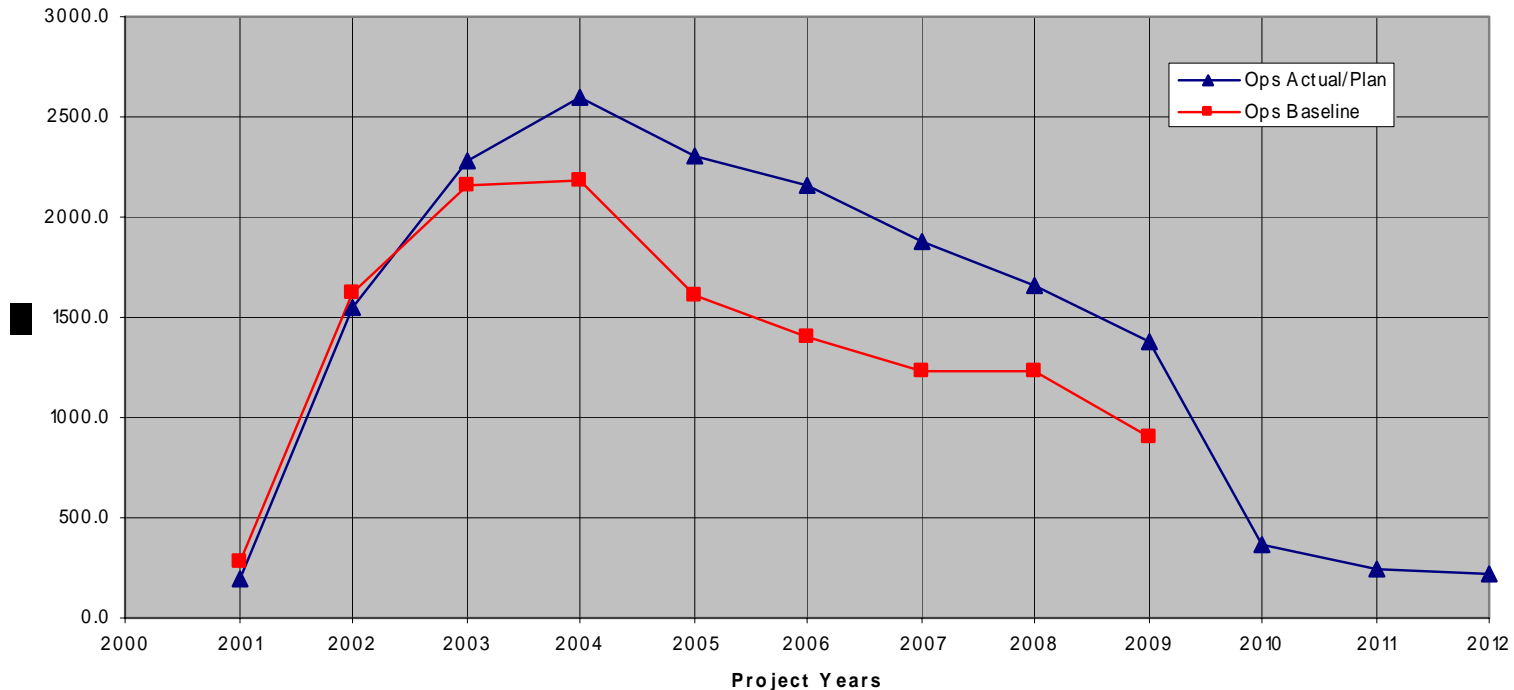
## EVLA BUDGET SUMMARY FY01-FY05



# EVLA Contributed Effort

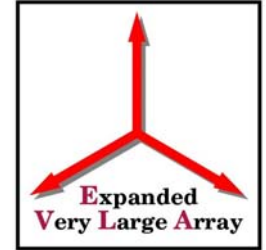
- Current Contributed Effort ~\$4 M above baseline plan.
- Approx half of this overrun is due to items not originally in baseline (schedule stretchout, e2e computing).
- Operations Budget may not be able to afford this overrun.

EVLA Contributed Effort Labor (FY2004)  
Wages & Benefits





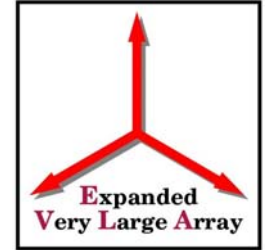
# Project Contingency



- \$500K contribution to AIPS++ in 2004/2005 covered by descoping Education and Public Outreach (EPO).
- Current unallocated contingency is \$4.3 M (~10% of cost to complete).
- Analysis of remaining risks shows contingency at this level could be needed (not including contributed effort overrun).
- If contingency above this level is needed, descopes may be required.



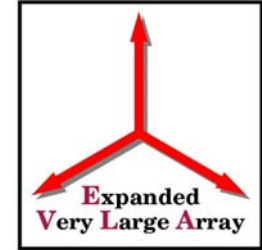
# Descopes



- 
- X (8-12 GHz) Band Receiver                   \$1.3 M
  - U (12-18) GHz Band Receiver               \$1.3 M
  - S (2-4 GHz) Band Receiver                 \$1.7 M
  - Half IF bandwidth                           \$4 M
- Hardware and labor included in costs
- 
- Another possibility – stretch out contributed effort.

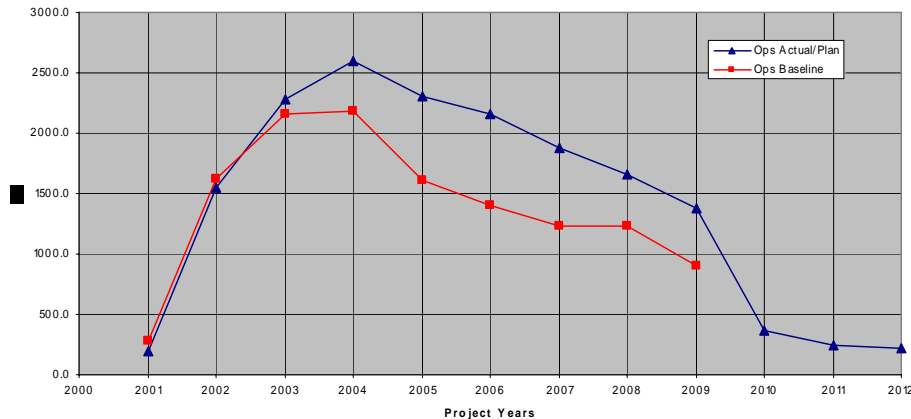


# Contributed Effort (CE) Stretchout



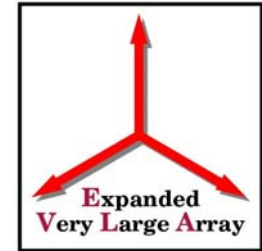
- CE probably too high for Operations Budget to cover over next few years.
- Possible solution – reduce CE in 2005-2008 by charging more labor to construction budget and delaying some work, then increase CE in 2009-2012 to recover.
- Risk – will the Operations Budget be able to support more CE in 2009-2012?

EVLA Contributed Effort Labor (FY2004)  
Wages & Benefits

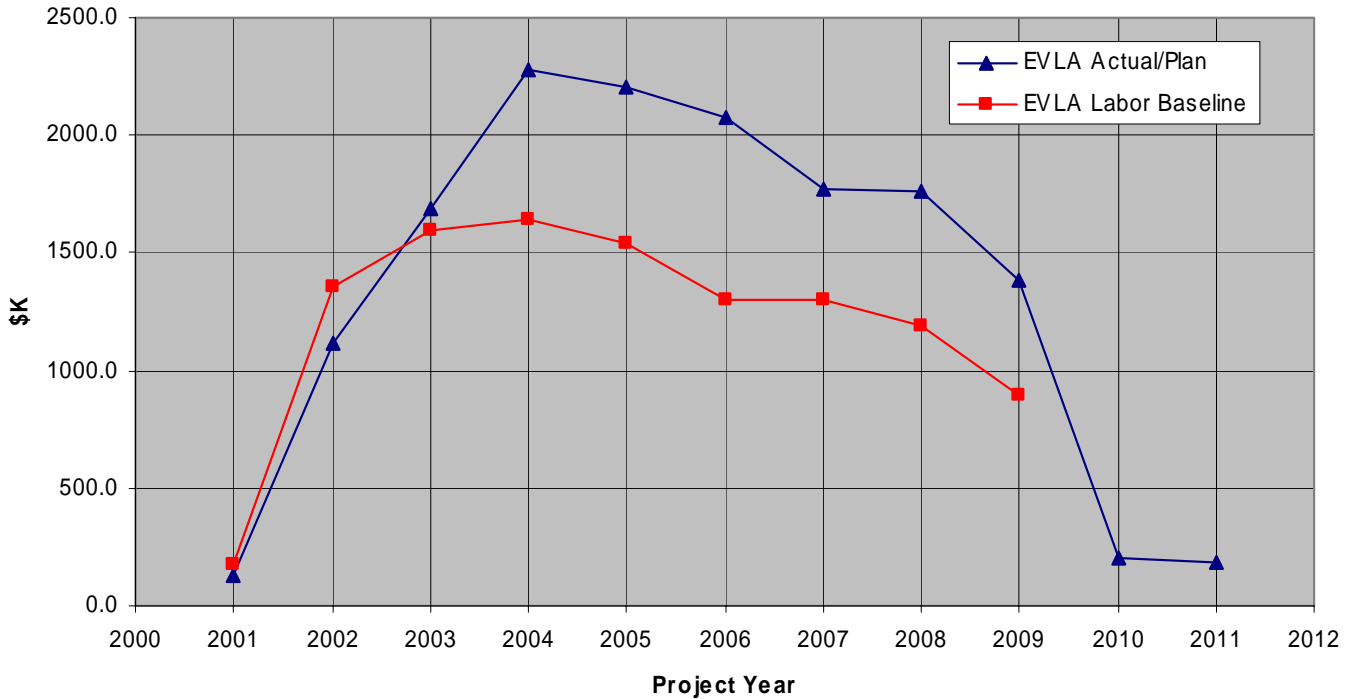




# EVLA Construction Budget Labor



EVLA Project Labor (\$k in FY2004)  
Wages & Benefits



# EVLA Staffing Plan

WBS	Task Description	Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL
<b>6.01</b>	<b>Project Management</b>		<b>1.1</b>	<b>2.8</b>	<b>2.8</b>	<b>3.3</b>	<b>3.3</b>	<b>3.3</b>	<b>3.3</b>	<b>3.3</b>	<b>3.3</b>	<b>0.8</b>	<b>0.5</b>	<b>0.0</b>	<b>27.4</b>
	EVLA FTEs'		0.85	2.5	2.5	3	3	3	3	3	3	0.75	0.5	0.0	25.1
	Off Budget FTEs'		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	2.3
<b>6.02</b>	<b>System Integration &amp; Testi</b>		<b>0.2</b>	<b>1.9</b>	<b>3.8</b>	<b>7.0</b>	<b>5.2</b>	<b>3.8</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.1</b>	<b>0.0</b>	<b>0.0</b>	<b>24.7</b>
	EVLA FTEs'		0.0	1.1	1.6	4.4	3.1	2.5	0.1	0.0	0.0	0.0	0.0	0.0	12.7
	Off Budget FTEs'		0.2	0.8	2.2	2.6	2.1	1.3	1.1	0.9	0.7	0.1	0.0	0.0	11.9
<b>6.03</b>	<b>Civil Construction</b>		<b>0.1</b>	<b>2.5</b>	<b>8.4</b>	<b>6.5</b>	<b>7.8</b>	<b>4.3</b>	<b>2.3</b>	<b>2.0</b>	<b>0.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>34.4</b>
	EVLA FTEs'		0.0	0.9	6.5	4.9	5.5	3.5	2.0	2.0	0.5	0.0	0.0	0.0	25.7
	Off Budget FTEs'		0.1	1.6	1.9	1.7	2.3	0.8	0.3	0.0	0.0	0.0	0.0	0.0	8.7
<b>6.04</b>	<b>Antennas</b>		<b>0.3</b>	<b>3.0</b>	<b>5.1</b>	<b>6.8</b>	<b>14.4</b>	<b>10.9</b>	<b>10.6</b>	<b>9.9</b>	<b>6.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>67.5</b>
	EVLA FTEs'		0.0	1.1	2.5	3.5	7.0	7.0	7.0	7.0	4.0	0.0	0.0	0.0	39.1
	Off Budget FTEs'		0.3	2.0	2.6	3.3	7.4	3.9	3.6	2.9	2.5	0.0	0.0	0.0	28.4
<b>6.05</b>	<b>Front End System</b>		<b>1.2</b>	<b>5.3</b>	<b>9.1</b>	<b>10.8</b>	<b>13.3</b>	<b>13.3</b>	<b>12.8</b>	<b>12.5</b>	<b>10.5</b>	<b>7.0</b>	<b>5.3</b>	<b>3.2</b>	<b>104.3</b>
	EVLA FTEs'		0.0	1.2	3.2	4.9	6.3	6.2	6.0	6.0	5.0	2.0	2.0	0.0	42.7
	Off Budget FTEs'		1.2	4.1	6.0	5.9	7.0	7.1	6.8	6.5	5.5	5.0	3.3	3.2	61.6
<b>6.06</b>	<b>Local Oscillator System</b>		<b>0.6</b>	<b>2.9</b>	<b>3.8</b>	<b>4.5</b>	<b>3.7</b>	<b>3.3</b>	<b>2.3</b>	<b>2.1</b>	<b>2.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>25.4</b>
	EVLA FTEs'		0.2	1.3	1.8	2.5	2.0	2.0	1.0	1.0	1.0	0.0	0.0	0.0	12.8
	Off Budget FTEs'		0.4	1.5	2.0	2.0	1.7	1.3	1.3	1.1	1.1	0.0	0.0	0.0	12.5
<b>6.07</b>	<b>Fiber Optic System</b>		<b>0.6</b>	<b>3.7</b>	<b>6.8</b>	<b>8.1</b>	<b>7.0</b>	<b>5.5</b>	<b>5.5</b>	<b>4.5</b>	<b>2.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>44.2</b>
	EVLA FTEs'		0.4	2.7	3.8	4.6	3.0	3.0	3.0	3.0	1.0	0.0	0.0	0.0	24.5
	Off Budget FTEs'		0.2	1.0	3.0	3.5	4.0	2.5	2.5	1.5	1.5	0.0	0.0	0.0	19.7
<b>6.08</b>	<b>Intermediate Frequency Sy</b>		<b>0.1</b>	<b>2.6</b>	<b>2.8</b>	<b>3.5</b>	<b>5.3</b>	<b>5.1</b>	<b>3.4</b>	<b>3.4</b>	<b>2.8</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>29.1</b>
	EVLA FTEs'		0.0	2.0	2.0	2.5	5.0	4.7	3.0	3.0	2.4	0.0	0.0	0.0	24.6
	Off Budget FTEs'		0.1	0.6	0.8	1.0	0.3	0.4	0.4	0.4	0.4	0.0	0.0	0.0	4.5
<b>6.09</b>	<b>Correllator</b>		<b>0.2</b>	<b>1.7</b>	<b>2.2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.2</b>	<b>0.2</b>	<b>0.2</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>13.0</b>
	EVLA FTEs'		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Off Budget FTEs'		0.2	1.7	2.2	2.2	2.2	2.2	2.2	0.2	0.2	0.0	0.0	0.0	13.0
<b>6.10</b>	<b>Moitor &amp; Control System</b>		<b>1.5</b>	<b>8.5</b>	<b>11.2</b>	<b>10.6</b>	<b>10.5</b>	<b>10.0</b>	<b>9.5</b>	<b>9.0</b>	<b>8.5</b>	<b>1.1</b>	<b>0.0</b>	<b>0.0</b>	<b>80.3</b>
	EVLA FTEs'		0.0	0.8	2.2	1.3	3.5	3.5	3.5	3.5	3.5	0.0	0.0	0.0	21.8
	Off Budget FTEs'		1.5	7.7	9.1	9.3	7.0	6.5	6.0	5.5	5.0	1.1	0.0	0.0	58.6
<b>6.11</b>	<b>Data Mgmt &amp; Computing</b>		<b>0.0</b>	<b>1.1</b>	<b>2.4</b>	<b>6.5</b>	<b>6.1</b>	<b>4.2</b>	<b>3.5</b>	<b>3.6</b>	<b>3.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>31.0</b>
	EVLA FTEs'		0.0	0.9	1.3	3.3	2.4	0.4	0.5	0.5	0.5	0.0	0.0	0.0	9.9
	Off Budget FTEs'		0.0	0.2	1.1	3.2	3.7	3.8	3.0	3.1	3.1	0.0	0.0	0.0	21.1
<b>6.12</b>	<b>Education &amp; Public Outrea</b>		<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.2</b>	<b>0.2</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.3</b>
	EVLA FTEs'		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Off Budget FTEs'		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.3

<b>CURRENT FTE TOTALS</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>Total</b>
EVLA Project	1.4	14.4	27.4	34.9	40.7	35.8	29.1	29.0	20.9	2.7	2.5	0.0	238.9
Off Budget	4.3	21.5	31.0	34.8	38.0	30.0	27.4	22.4	20.5	6.1	3.4	3.2	242.6

<b>BASELINE FTE TOTALS</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>Total</b>
EVLA Project	2.6	21.4	29.8	32.4	24.8	22.3	20.1	17.4	10.2	0.0			181.0
Off Budget	3.5	23.8	27.1	26.9	25.9	20.8	20.4	17.6	12.4	0.0			178.4