Atacama Large Millimeter Array

Memorandum

2003-Sep-16

TO: ALMA IPT Leaders and Deputies

FROM: Richard Simon

SUBJ: ALMA Milestones 2003-Sep-16

This document contains the following memoranda:

(1) ALMA Milestone Performance through 2003-Sep-12

This 17-page memo summarizes the overall project status, comparing our current progress to the baseline adopted in February 2003. It includes various charts and tables summarizing our progress, as well as a 6 page table listing all Level 1 and Level 2 milestones, as currently scheduled.

(2) ALMA Milestone Issues

This 6-page memo identifies critical issues and problems that were identified during the recent review of ALMA milestones. This list is not necessarily complete – there may be some critical issues not listed. It is also possible that some of the problems identified are not critical issues, since they have either been resolved or represent a misunderstanding which should be clarified.

Memorandum

2003-Sep-12

TO: ALMA Management IPT

FROM: Richard Simon

SUBJ: ALMA Milestone Performance through 2003-Sep-12

The attached charts and tables summarize the milestone performance to date of the ALMA project, compared to the baseline plan adopted in 2003 February. This memo focuses primarily on Level 1 and 2 milestones. The statistical summaries should be interpreted with care, since they do not fully account for the relative importance of various milestones – some Level 2 milestones, for example, are more critical than others. Following the statistical summaries, a table summarizing all scheduled and completed milestones for 2002 through 2004 is included.

Briefly, the ALMA project has achieved 44 of the 70 Level 1 and Level 2 milestones originally scheduled to have been accomplished by now. Performance to date graphs imply that the project is now ~5 months behind the baseline schedule adopted 7 months ago. The current schedule predicts that this schedule deficit will be essentially eliminated by late 2004.

The ALMA Baseline: Level 1 milestones for ALMA were tentatively agreed upon during the third quarter of 2002 (initial drafts of the ALMA Project Plan). At that point, detailed planning and scheduling started in earnest. Formal adoption of the Plan occurred in February of 2003. At that time, the baseline milestone plan for ALMA was formally adopted, consisting of

- 10 Level 1 milestones (specified in the Project Plan),
- 324 Level 2 milestones (controlled at the JAO level), and
- 142 Level 3 milestones (internal milestones used by the IPTs).

At the time of adoption, 11 of the Level 2 milestones and 9 of the Level 3 milestones had been accomplished. The smaller number of Level 3 milestones, as compared to Level 2, is due to two factors: detailed planning at Level 3 is still on going, and Level 3 milestones are intended to focus only on the next 12 months or so.

Current planning: As of this writing, the current milestone plan incorporates 521 milestones: 10 Level 1 milestones (unchanged), 306 Level 2 milestones, and 205 Level 3 milestones. Changes in the milestone plan occur for many reasons, including on going planning, adjustments in the assigned level of various milestones, and adoption of new milestones as detailed planning proceeds. The milestone plan for ALMA is actively maintained, so that it presents as accurate a picture as possible of the project planning. For each milestone there is a one-page description,

with a log kept of any changes or adjustments made to each milestone. More detailed comments on particular milestones are also incorporated into the plan, as they are received.

Statistical measures of performance: The attached charts and tables summarize the performance of the project to date, as compared to the baseline plan adopted in February. Each of the charts and tables is explained briefly below.

(1) ALMA: Performance Compared to Plan

This chart compares the Level 1 and 2 milestones accomplished thus far, and the schedule for future Level 1 and 2 milestones, to the schedule initially adopted in 2003 February. The top (blue) line presents the number of milestones scheduled to be accomplished as a function of time from the baseline plan. The solid (green) line shows the current (2003 August) milestone plan. The difference between the two curves is caused by delays or rescheduling of various milestones. The red dotted curve shows the actual milestones accomplished to date (through 2003-Aug-28).

(2) ALMA Milestones: Difference between Actual Date and Scheduled Date

This bar chart summarizes the delays experienced for completed milestones. 18 milestones were accomplished within one week of their baseline schedule; other milestones were delayed various amounts. The average delay for all milestones completed to date is 30 days. The average delay for milestones completed since the adoption of the baseline in mid 2003 February is 43 days.

(3) Milestone Changes and Revisions

The 4 tables on this page and the following page summarize the Level 1 and 2 milestones which have been rescheduled or otherwise changed, as compared to a selected reference plan and/or the February 2003 baseline. Thus, the first table, **(Delayed Milestones (Level 1& 2 only, excluding completed milestones)**, lists all milestones which have been delayed as compared to the baseline, and shows both recent changes (since 2003-June) and the total effect of all changes since the baseline was adopted. The remaining 3 tables list milestones which have been deleted, added, or changed to a different level. For example, milestone 5.260.9104 was deleted because it essentially duplicated a milestone in the Management IPT.

(4) Milestone Progress by IPT

This table presents 9 charts (two pages) which break down the performance compared to the baseline, by IPT.

(5) ALMA: EU Milestones Compared to Plan

This is the first of 4 charts which break down the performance compared to the baseline, according to which executive is responsible for which milestone. This chart summarizes performance and plans for milestones identified as European responsibilities. For the sake of clarity, the responsibility for each milestone was assigned to one of the following: Europe, North America, Shared (by Europe and North America), or the Joint ALMA Office.

Note: The formal assignment of responsibility for individual milestones may be subject to change.

(6) ALMA: NA Milestones Compared to Plan

This chart summarizes performance and plans for milestones identified as North American responsibilities.

(7) ALMA: Shared Milestones Compared to Plan

This chart summarizes performance and plans for milestones identified as having shared responsibility between Europe and North America.

(8) ALMA: JAO Milestones Compared to Plan

This chart summarizes performance and plans for milestones for which the Joint ALMA Office has primary responsibility.

(9) Scheduled Milestones

This table summarizes all milestones in the current (2003aug28a) milestone plan, sorted by year scheduled and by Level. The large concentration of Level 3 milestones in 2003 is a natural consequence of the short term focus of Level 3 milestones.

(10) Completed Milestones

This table summarizes the milestones which have been completed to date. A total of 41 Level 1 and Level 2 milestones have been accomplished thus far by ALMA. 3 Level 2 milestones have been accomplished in the past month.

(11) Late Milestones

"Late" milestones are those which have not been completed, and for which the scheduled date is past. While in principle there should never be any late milestones, in practice the necessary updating and adjustments may lag slightly. In some cases, the milestones are being carried as "late" until a reliable date is available.

(12) Level 1 and 2 Milestones accomplished

The IPTs in ALMA are responsible to the Management IPT and the JAO for Level 2 milestones, just as the Executives and the JAO are responsible to the Board for Level 1 milestones. Thus, from the perspective of the JAO and the Management IPT, performance on Level 1 and 2 milestones is or paramount importance. This table summarizes the completion dates for the 41 Level 1 and 2 milestones which have been accomplished thus far, with the average delay (compared to the baseline plan) for completed milestones.

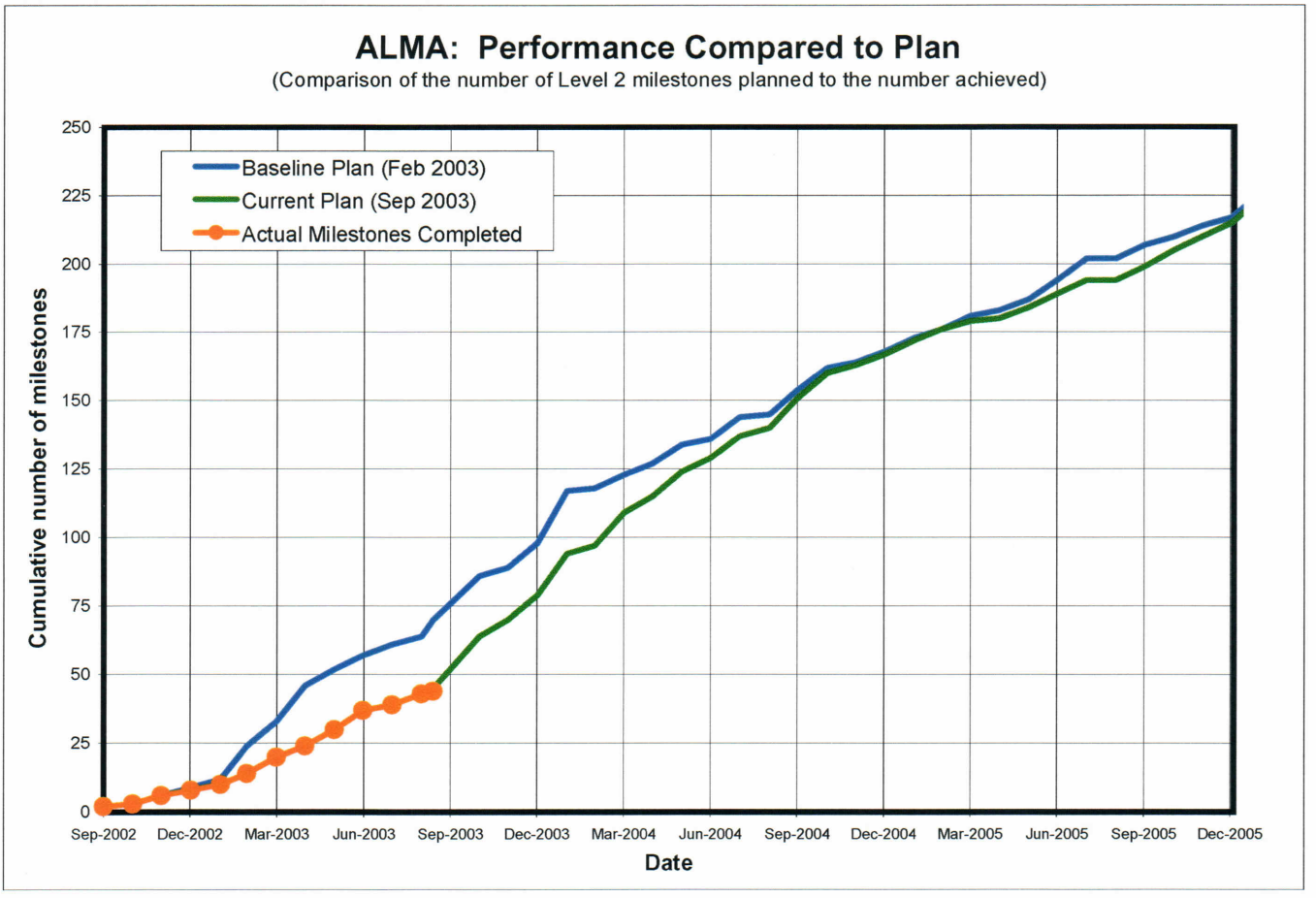
(13) Milestone delays (Compared to 2003-Feb Baseline)

This table summarizes the delays for ALMA milestones in the current milestone plan, as compared to the baseline plan. For example, of the 33 milestones accomplished thus far this year, 9 of them were delayed between 31 and 60 days. For the remainder of 2003, 13 of the milestones scheduled are expected to be delayed by 121 days or more, as compared to the 2003 February baseline. This table also shows the effect that the current plan has on future milestones.

(14) ALMA Milestone Summary

This 7 page table presents a one line summary for all Level 1 and Level 2. The assignment of "Responsibility" is tentative and subject to review. The "Delay" listed is relative to the baseline plan adopted 2003 February.

The current plan brings the overall plan back on schedule, as compared with the project baseline, by roughly 2005. However, an additional schedule gap opens during mid-2005, predicting that the project will fall temporarily behind schedule, by several months, during the latter half of 2005.


ALMA: Performance Compared to Plan
(Comparison of the number of Level 2 milestones planned to the number achieved)
Baseline Plan (Feb 2003)
Current Plan (Sep 2003)
Actual Milestones Completed
Cumulative number of milestones
250
225
200
175
150
125
100
75
50
25
0
Sep-2002
Dec-2002
Mar-2003
Jun-2003
Sep-2003
Dec-2003
Mar-2004
Jun-2004
Sep-2004
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Mar-2005
Jun-2005
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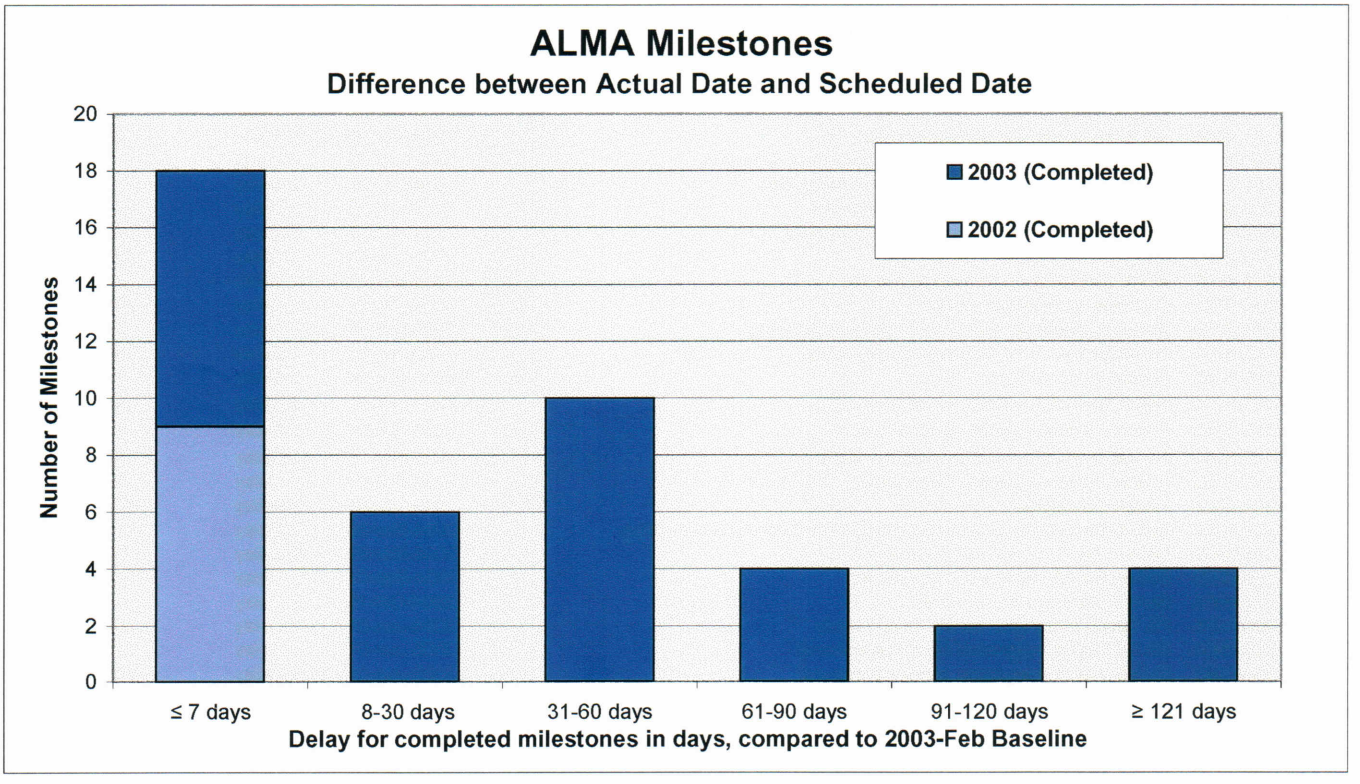
ALMA Milestones
Difference between Actual Date and Scheduled Date
2003 (Completed)
2002 (Completed)
Number of Milestones
20
18
16
14
12
10
8
6
4
2
0
≤ 7 days
8-30 days
31-60 days
61-90 days
91-120 days
≥ 121 days
Delay for completed milestones in days, compared to 2003-Feb Baseline

Milestone Changes and Revisions:

Current Plan (2003sep12b) compared to selected reference plan (2003jun01b) and Baseline plan

Delayed Milestones (Level 1 & 2 only, excluding completed milestones):

Index	WBS	Milestone	Current Plan 2003sep12b	Level	Status	Relative Delay (days) 2003jun01b	Baseline
1	1.010.8105	Designation of responsibility for Phase 2 development work elements in Europe	2003-Sep-15	2	Delay	94	137
2	1.010.8122	Executives submit 2004 budget and financial projections to JAO	2003-Sep-01	2	Late	-	-
3	2.025.8222	AOS Foundations NA CDR	2003-Sep-30	2	Delay	127	213
4	2.025.8224	AOS Foundations NA Central Cluster Construction Tender Docs Complete	2004-May-30	2	Delay	320	411
5	2.025.8226	AOS Foundations NA Central Cluster Construction Contract Signed	2004-Nov-30	2	Delay	426	426
6	2.025.8228	AOS Foundations NA Central Cluster Provisional Acceptance	2007-Jun-30	2	Delay	730	730
7	2.025.8250	AOS Buildings NA Foundations/Envelope CDR Complete	2003-Oct-31	2	Delay	123	213
8	2.025.8252	AOS Buildings NA Foundations/Envelope Construction / Tender Docs Complete	2004-Mar-15	2	Delay	-	289
9	2.025.8254	AOS Buildings NA Foundations/Envelope Construction Contract Signed	2004-Sep-15	2	Delay	259	259
10	2.025.8258	AOS Buildings NA Foundations/Envelope Provisional Acceptance	2005-May-15	2	Delay	257	257
11	2.025.8260	AOS Buildings Finish & Installations NA CDR Complete	2004-Apr-30	2	Delay	243	243
12	2.025.8262	AOS Buildings Finish & Installations NA Construction / Tender Docs Complete	2004-Aug-31	2	Delay	275	275
13	2.025.8264	AOS Buildings Finish & Installations NA Construction Contract Signed	2005-Feb-28	2	Delay	242	242
14	2.025.8266	AOS Buildings Finish & Installations NA Provisional Acceptance	2005-Dec-31	2	Delay	184	184
15	2.025.8294	Construction Road Opening EU Provisional Acceptance	2003-Nov-30	2	Delay	61	61
16	2.025.8306	Access Road EU Construction / Tender Docs Complete	2003-Oct-15	2	Delay	91	91
17	2.025.8334	Contractors Camp Initial Occupancy	2004-Jan-01	2	Delay	63	63
18	2.025.8340	OSF Facilities Phase 1 (Tech area) EU Design/Eng Contract Awarded	2003-Oct-01	2	Delay	122	122
19	2.025.8342	OSF Facilities Phase 1 (Tech area) EU CDR Complete	2004-Jan-15	2	Delay	122	122
20	2.025.8344	OSF Facilities Phase 1 (Tech area) EU Construction / Tender Docs Complete	2004-May-01	2	Delay	122	122
21	2.025.8346	OSF Facilities Phase 1 (Tech area) EU Construction Contract Signed	2004-Oct-01	2	Delay	183	183
22	2.025.8348	OSF Facilities Phase 1 (Tech area) EU Provisional Acceptance	2006-Feb-01	2	Delay	185	185
23	2.025.8360	Freeze Fiber Optics and Electrical Specifications	2003-Dec-31	2	Delay	184	274
24	2.025.8362	Fiber Optic Cables and Electrical Cables in Chile, N.A.	2004-Sep-30	2	Delay	15	15
25	2.025.8372	ALMA Project Power Supply Plan Approved	2004-Jan-31	2	Delay	153	153
26	2.025.8374	ALMA Permanent Power Supply Tender Docs Complete	2004-Mar-31	2	Delay	91	91
27	2.025.8376	ALMA Permanent Power Supply Contract Signed	2004-Aug-31	2	Delay	92	92
28	2.025.8378	Provisional Acceptance Power Supply Contract Phase 1	2005-Sep-30	2	Delay	92	92
29	3.035.8510	Complete Technical Performance Report-VertexRSI Antenna	2003-Dec-10	2	Delay	153	265
30	3.035.8530	Shared Access AEC Antenna (Preliminary Acceptance)	2003-Oct-10	2	Delay	95	135
31	3.035.8540	Provisional Acceptance of AEC Antenna	2003-Nov-21	2	Delay	85	120
32	3.035.8545	Complete Technical Performance Report-AEC Antenna	2004-Jan-21	2	Delay	82	120
33	3.045.8524	Prototype Antenna released to Contractor for Refurbishment / Transport to Chile	2004-Aug-28	2	Delay		31
34	3.045.8525	CFT/RFQ Bid Package Submitted to Project Office (AEC/VertexRSI)	2003-Sep-30	2	Delay	35	122
35	3.045.8535	Issue CFT/RFQ for Production Antenna Design(s)	2003-Oct-31	2	Delay	35	123
36	3.045.8550	Closing Date for Production Antenna Bids (Competitive Tender)	2004-Feb-28	2	Delay	36	121
37	3.045.8560	Bid Evaluations Due to Project Office	2004-Apr-30	2	Delay	35	94
38	3.050.8565	Sign Contract for 31+1 North Am. Production Antennas	2004-Jul-28	2	Delay	-	61
39	3.050.8575	Sign Contract for 32-Euro Production Antennas	2004-Jul-28	2	Delay	-	59
40	3.065.8555	Nutator Critical Design Review Completed	2004-Oct-28	2	Delay	-	386
41	3.070.8569	Transporter Critical Design Review Complete	2003-Dec-17	2	Delay	26	277
42	4.075.8990	Front end sub-system Delta PDR	2003-Dec-01	2	Delay	91	91
43	4.075.8995	All FE Contracts / Agreements in place	2003-Nov-01	2	Delay	124	214
44	4.080.8750	Cartridge body design frozen	2003-Dec-01	2	Delay	91	91
45	4.085.8730	Receiver Dewar #1 delivered to integration centre	2004-Mar-15	2	Delay	74	74
46	4.085.8755	Cartridge bodies for first receiver delivered	2004-Apr-01	2	Delay	91	91
47	4.090.8765	Freeze optics design	2003-Sep-30	2	Delay	92	153
48	4.095.8775	Warm optics for receiver #1 delivered	2004-Feb-01	2	Delay	31	31
49	4.100.8845	Freeze hardware design M&C circuit	2004-Jan-01	2	Delay	92	92
50	4.100.8860	Deliver receiver control software to users	2004-Mar-15	2	Delay	74	74
51	4.100.8920	Freeze the design of the FE chassis	2003-Dec-01	2	Delay	61	61
52	4.100.8922	Freeze FE Design	2004-Jul-01	2	Delay	182	182
53	4.105.8850	Deliver the monitor and control module for front-end number one	2004-Mar-15	2	Delay	14	14
54	4.105.8925	Deliver the FE chassis for receiver #1	2004-Mar-01	2	Delay	60	60
55	4.105.8930	Deliver the FE chassis for receiver #8	2004-Sep-01	2	Delay	62	62
56	4.175.8955	Band 7 Cartridge #1 delivered	2004-Oct-15	2	Delay	14	14
57	4.220.8975	FE Test & Integration centre design ready	2004-Jun-01	2	Delay	244	244
58	4.230.8980	NA FE Test & Integration centre operational	2005-Jun-01	2	Delay	243	243
59	4.230.8985	EU FE Test & Integration centre operational	2005-Jun-01	2	Delay	243	243
60	4.230.9000	Deliver Receiver #1 to the ATF	2005-Oct-01	2	Delay	92	92
61	4.230.9005	Deliver receiver #2 to OSF/AOS	2006-Jan-01	2	Delay	90	90
62	4.240.9030	FE Service & exchange vehicle #1 available	2005-Oct-01	2	Delay	183	183
63	4.258.8890	Freeze LO design	2004-Jan-01	2	Delay	92	92
64	4.258.8895	Deliver LO chain(s) for cartridge #1	2004-Apr-01	2	Delay	91	91

65	5.305.8030	First Antenna based Back End Subsystem Ready for Installation at OSF	2005-Nov-01	1 Delay	-	124
66	6.315.9215	Pass Critical Design Review	2003-Oct-31	2 Delay	70	137
67	6.320.9220	Contract signed for Custom Correlator chips	2003-Oct-31	2 Delay	60	60
68	6.320.9230	Begin assembly of first quadrant	2003-Oct-31	2 Delay	60	60
69	6.320.9235	Begin board testing for first quadrant	2004-May-01	2 Delay	180	180
70	6.320.9240	Begin integrated testing for first quadrant	2004-Jun-01	2 Delay	61	61
71	6.320.9250	First quadrant shipped to Chile	2005-Dec-31	2 Delay	153	153
72	6.320.9255	Begin Integration of second quadrant*	2005-Oct-01	2 Delay	267	267
73	6.320.9265	Begin integrated testing for second quadrant	2006-Jan-01	2 Delay	245	245
74	6.320.9275	Second quadrant shipped to Chile	2006-Dec-31	2 Delay	358	358
75	6.320.9280	Begin Integration of third quadrant*	2006-Oct-01	2 Delay	267	267
76	6.320.9290	Begin integrated testing for third quadrant	2007-Jan-01	2 Delay	245	245
77	6.320.9300	Third quadrant shipped to Chile	2007-Dec-31	2 Delay	358	358
78	6.320.9305	Begin integration of fourth quadrant*	2007-Oct-01	2 Delay	267	267
79	6.320.9315	Begin integrated testing for fourth quadrant	2008-Jan-01	2 Delay	245	245
80	6.320.9320	Fourth quadrant shipped to Chile	2008-Dec-31	2 Delay	359	359
81	6.325.9355	2GC System Requirements Review	2003-Nov-30	2 Delay	-	194
82	8.365.9602	System Requirements Review (SRR) - System Requirements Finalized	2003-Oct-31	2 Delay	60	60
83	8.365.9605	ALMA System Design Review	2004-Mar-31	2 Delay	121	121
84	8.370.9650	Prototype Integration & Verification Plan (Q4 2003 through Q4 2004) approved for	2003-Oct-13	2 Delay	73	73
85	8.370.9718	NA Prototype Evaluation Report	2004-Mar-12	2 Delay	71	71
86	8.370.9721	EU Prototype Evaluation Report	2004-May-31	2 Delay	105	151
87	9.380.9820	Calibration strategy submitted	2003-Oct-31	2 Delay	31	31
88	9.380.9825	Science aspects of operations plan complete	2004-Jun-30	2 Delay	182	182

Note: "Relative Delay" reflects changes in the schedule since the selected reference schedule or since the Baseline was adopted, as indicated.

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Deleted Milestones since 2003jun01b (Level 1 & 2 only):

Index	WBS	Milestone	Reference Date	Level
1	3.035.8515	Interim Antenna Technical Performance Report-AEC Antenna	2003-Jul-10	2
2	3.045.8520	Submit RFQ to Vertex/RSI	2003-Jun-27	2
3	3.045.8522	Receive firm fixed-price Quotation from Vertex/RSI	2003-Sep-25	2
4	3.045.8536	Receive Firm fixed-price Quotation from AEC	2003-Oct-18	2
5	3.050.8564	Earliest possible Single Source Contract for 31+1 North Am. Ant.	2004-Jan-30	2
6	5.260.9104	Contracts for BE Prototypes in Eur	2003-Sep-30	2
7	6.320.9245	Begin ordering parts for second quadrant	2004-Oct-01	2
8	6.320.9270	Begin ordering parts for third quadrant	2005-Oct-01	2
9	6.320.9295	Begin ordering parts for fourth quadrant	2006-Oct-01	2

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New Milestones (Level 1 & 2 only):

Index	WBS	Milestone	Scheduled Date	Level	Status	Baseline Date
1	3.045.8524	Prototype Antenna released to Contractor for Refurbishment / Transport to Chile	2004-Aug-28	2	Delay	2004-Jul-28
2	3.070.8571	Transporter Contract signed	2004-Mar-31	2		2004-Mar-31
3	5.295.9117	End to End LO Demonstration	2004-Dec-31	2		2004-Dec-31
4	5.295.9119	Pre production LO Review	2005-Mar-31	2		2005-Mar-31
5	6.320.9222	Contract signed for Correlator PCB assembly	2003-Oct-31	2		2003-Oct-31
6	7.340.9422	Submit Computing Communications Study	2004-Jan-01	2		2004-Jan-01

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Milestones with a different Level in 2003sep12b as compared to 2003jun01b :

Index	WBS	Milestone	Scheduled Date	New Level	Status	Baseline Date
1	3.070.8570	Issue CFT for Transporter	2004-Jan-31	3	Delay	2004-Jan-10
2	6.315.9210	Hold Critical Design Review	2003-Oct-03	3	Delay	2003-Jun-02

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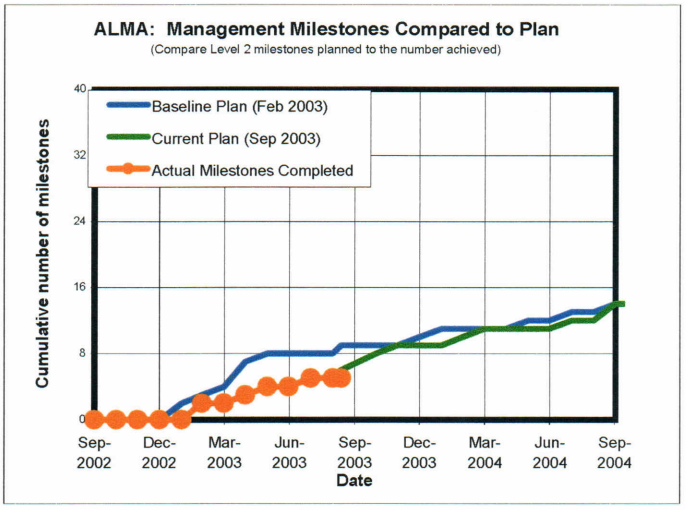
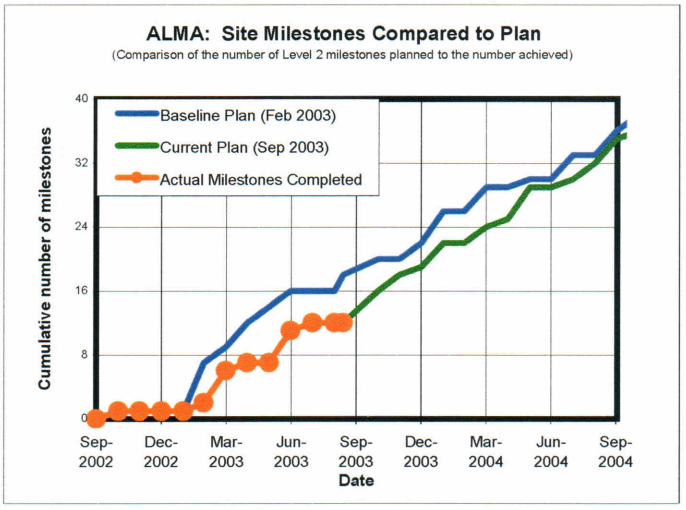
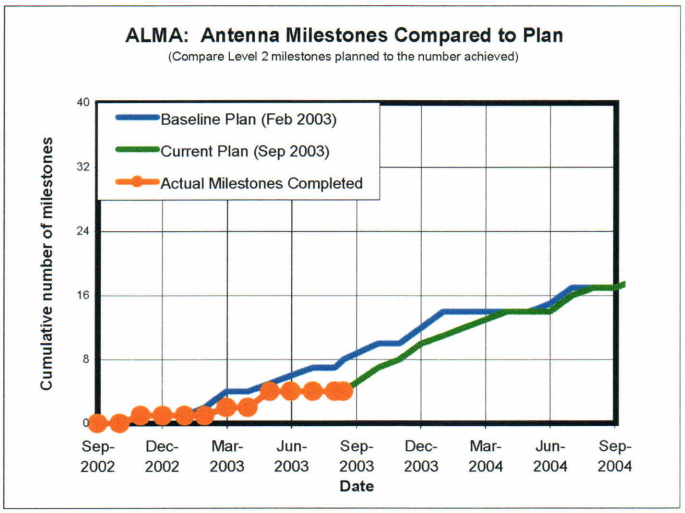
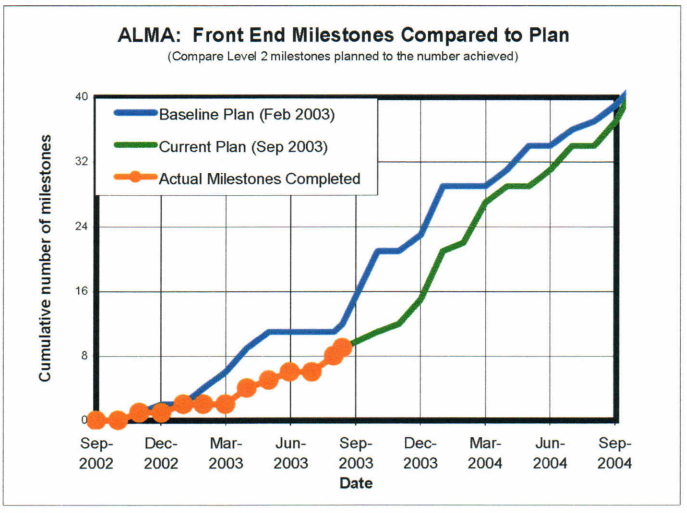
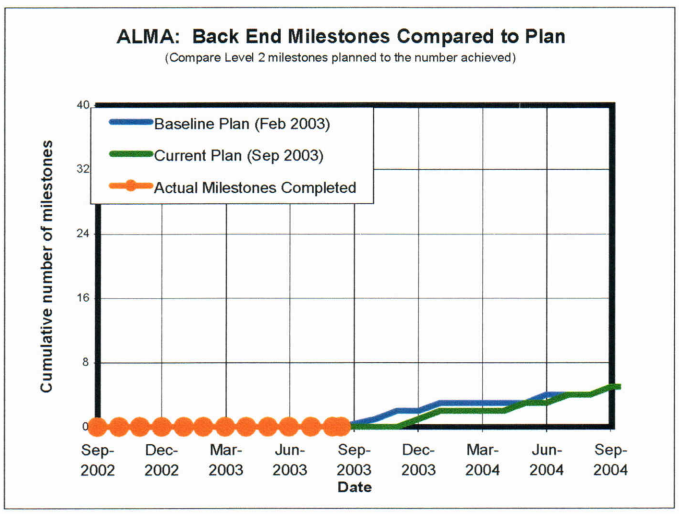
Milestone Progress, by IPT

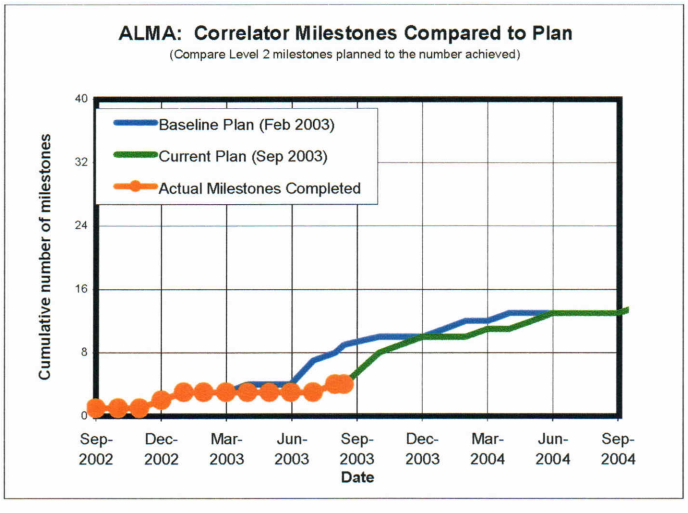




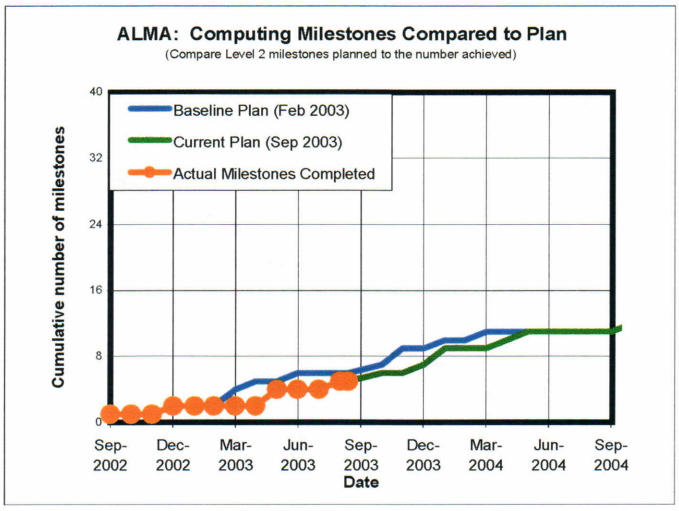


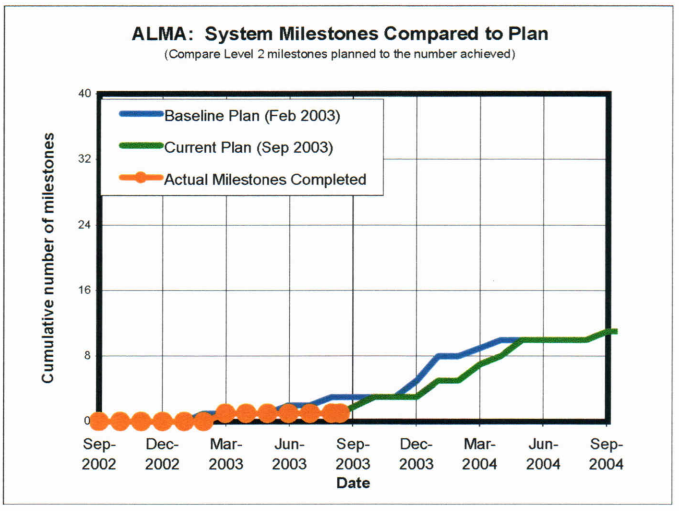


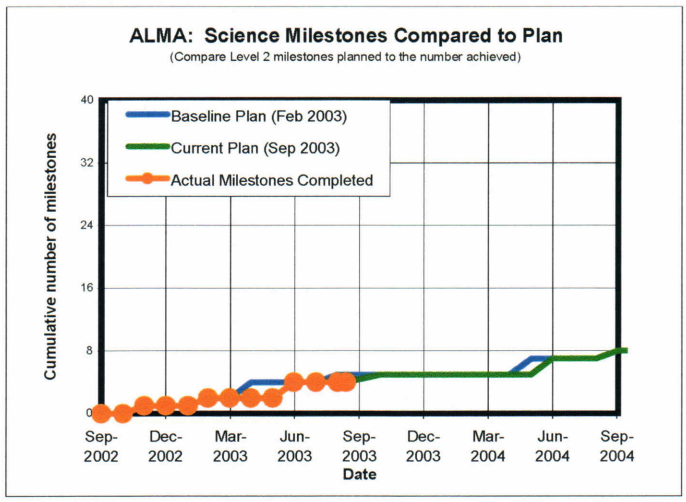




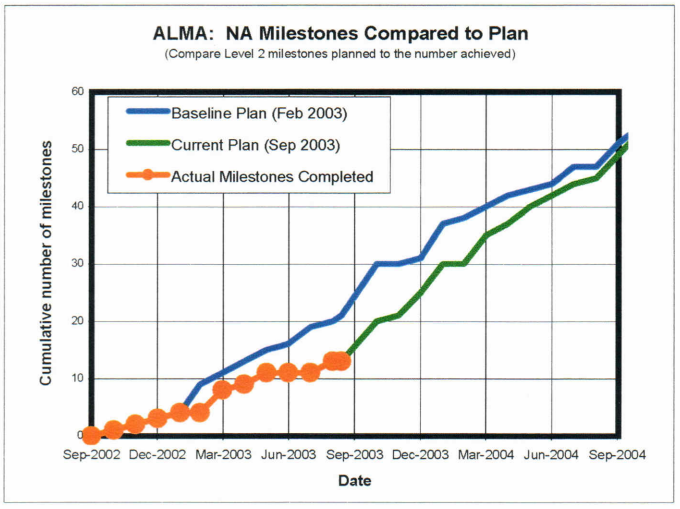
Milestone Progress, by IPT (continued)

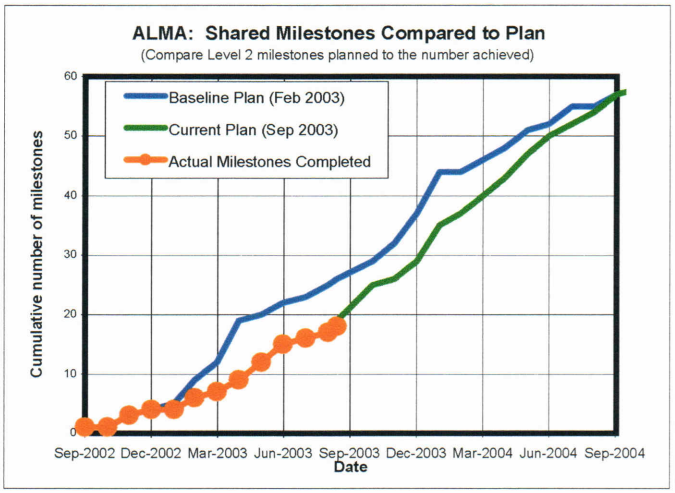


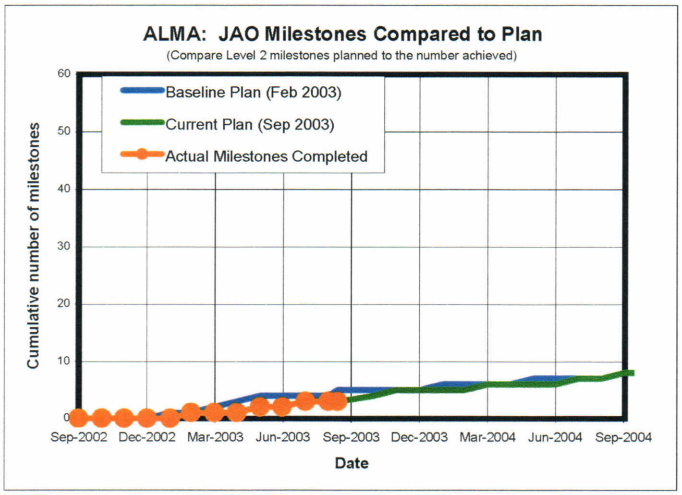




Milestone Progress, by Executive







ALMA Milestones: Statistical Summary (Version: 2003sep12b)

Baseline: **70** *Level 1 and 2 milestones* ***scheduled*** *for completion as of current date*
Current Plan: **44** *Level 1 and 2 milestones* ***achieved*** *as of current date*

Scheduled Milestones (Current Plan):

Milestone Level	Year -> 2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	TBD	Total
1		2		5		1				1	1		10
2	8	69	88	43	38	21	13	10	6	10			306
3	3	149	31	6	3	5	4	2	2				205
Totals	11	220	119	54	41	27	17	12	8	11	1	0	521

Completed Milestones:

Milestone Level	Year -> 2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	TBD	Total
1		2											2
2	8	34											42
3	3	93											96
Totals	11	129											140

Late Milestones (Current Plan):

Milestone Level	Year -> 2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	TBD	Total
1													0
2		1											1
3		5											5
Totals		6											6

Level 1 and 2 Milestones accomplished:

Month	Baseline Milestones (scheduled)	Current Plan Milestones (scheduled)	Milestones Accomplished	Average Delay (days) (** ⇒ planned)
Jan-2003 & earlier	12	10	10	-
2003-Feb	12	4	4	6
2003-Mar	9	6	6	39
2003-Apr	13	4	4	30
2003-May	6	6	6	55
2003-Jun	5	7	7	56
2003-Jul	4	2	2	-22
2003-Aug	3	4	4	103
2003-Sep	11	7	1	139
2003-Oct	11	14	-	79 **
2003-Nov	3	6	-	22 **
2003-Dec	9	9	-	118 **
Total	98	79	44	

Level 1 and 2 Milestone delays (Compared to 2003-Feb Baseline)

	Number of milestones (Binned by Delay in days) ≤ 7	8-30	31-60	61-90	91-120	≥ 121
2002 (Completed)	9	0	0	0	0	0
2003 (Completed)	9	6	10	4	2	4
2003 (Scheduled)	21	0	5	4	7	17
2004 (Scheduled)	38	3	3	6	5	15
2005 (Scheduled)	38	0	0	0	2	9
2006 (Scheduled)	31	0	0	1	0	3

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Milestone #	WBS #	Milestone Name	Due Date	Level	Status	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Responsible	Delay (days)
8105	1.010.8105	Designation of responsibility for Phase 2 development work elements in Europe	2003-Sep-15	2	Delay		XX										EU	137
8110	1.010.8110	Designation of responsibility for Phase 2 production work elements in Europe	2004-Jul-01	2				X									EU	0
8120	1.010.8120	Executives submit 2003 budget and financial projections to JAO	2003-Feb-05	2	Done		X										Both	0
8121	1.010.8121	Executives submit 2002 financial report (actual expenditures and value earned) to JAO	2003-Apr-28	2	Done		XX										Both	59
8122	1.010.8122	Executives submit 2004 budget and financial projections to JAO	2003-Sep-01	2	Late		X										Both	0
8123	1.010.8123	Executives submit 2003 financial report (actual expenditures and value earned) to JAO	2004-Feb-28	2				X									Both	0
8124	1.010.8124	Executives submit 2005 budget and financial projections to JAO	2004-Sep-01	2				X									Both	0
8410	1.010.8410	Start Operations Budget	2005-Jan-01	2					X		X						Both	-911
8125	1.010.8125	Executives submit 2004 financial report (actual expenditures and value earned) to JAO	2005-Feb-28	2					X								Both	0
8126	1.010.8126	Executives submit 2006 budget and financial projections to JAO	2005-Sep-01	2					X								Both	0
8127	1.010.8127	Executives submit 2005 financial report (actual expenditures and value earned) to JAO	2006-Feb-28	2						X							Both	0
8128	1.010.8128	Executives submit 2007 budget and financial projections to JAO	2006-Sep-01	2						X							Both	0
8129	1.010.8129	Executives submit 2006 financial report (actual expenditures and value earned) to JAO	2007-Feb-28	2							X						Both	0
8130	1.010.8130	Executives submit 2008 budget and financial projections to JAO	2007-Sep-01	2							X						Both	0
8131	1.010.8131	Executives submit 2007 financial report (actual expenditures and value earned) to JAO	2008-Feb-28	2								X					Both	0
8132	1.010.8132	Executives submit 2009 budget and financial projections to JAO	2008-Sep-01	2								X					Both	0
8133	1.010.8133	Executives submit 2008 financial report (actual expenditures and value earned) to JAO	2009-Feb-28	2									X				Both	0
8134	1.010.8134	Executives submit 2010 budget and financial projections to JAO	2009-Sep-01	2									X				Both	0
8135	1.010.8135	Executives submit 2009 financial report (actual expenditures and value earned) to JAO	2010-Feb-28	2										X			Both	0
8136	1.010.8136	Executives submit 2011 budget and financial projections to JAO	2010-Sep-01	2										X			Both	0
8137	1.010.8137	Executives submit 2010 financial report (actual expenditures and value earned) to JAO	2011-Feb-28	2											X		Both	0
8050	1.015.8050	Completion of Construction Project	2011-Dec-31	1											1		Both	0
8165	1.015.8165	Site available for Work	2003-Jul-25	2	Done		XX										JAO	115
8170	1.015.8170	Submit 2003 budget and financial projections to ALMA Board	2003-Feb-11	2	Done		X										JAO	0
8171	1.015.8171	Submit 2002 financial report (actual expenditures and value earned) to ALMA Board	2003-May-26	2	Done		XX										JAO	56
8227	1.015.8227	ALMA Groundbreaking	2003-Nov-03	2			X										JAO	0
8172	1.015.8172	Submit 2004 budget and financial projections to ALMA Board	2003-Sep-30	2			X										JAO	0
8173	1.015.8173	Submit 2003 financial report (actual expenditures and value earned) to ALMA Board	2004-Mar-31	2				X									JAO	0
8174	1.015.8174	Submit 2005 budget and financial projections to ALMA Board	2004-Sep-30	2				X									JAO	0
8175	1.015.8175	Submit 2004 financial report (actual expenditures and value earned) to ALMA Board	2005-Mar-31	2					X								JAO	0
8176	1.015.8176	Submit 2006 budget and financial projections to ALMA Board	2005-Sep-30	2					X								JAO	0
8177	1.015.8177	Submit 2005 financial report (actual expenditures and value earned) to ALMA Board	2006-Mar-31	2						X							JAO	0
8178	1.015.8178	Submit 2007 budget and financial projections to ALMA Board	2006-Sep-30	2						X							JAO	0
8179	1.015.8179	Submit 2006 financial report (actual expenditures and value earned) to ALMA Board	2007-Mar-31	2							X						JAO	0
8180	1.015.8180	Submit 2008 budget and financial projections to ALMA Board	2007-Sep-30	2							X						JAO	0
8181	1.015.8181	Submit 2007 financial report (actual expenditures and value earned) to ALMA Board	2008-Mar-31	2								X					JAO	0
8182	1.015.8182	Submit 2009 budget and financial projections to ALMA Board	2008-Sep-30	2								X					JAO	0
8183	1.015.8183	Submit 2008 financial report (actual expenditures and value earned) to ALMA Board	2009-Mar-31	2									X				JAO	0
8184	1.015.8184	Submit 2010 budget and financial projections to ALMA Board	2009-Sep-30	2									X				JAO	0
8185	1.015.8185	Submit 2009 financial report (actual expenditures and value earned) to ALMA Board	2010-Mar-31	2										X			JAO	0
8186	1.015.8186	Submit 2011 budget and financial projections to ALMA Board	2010-Sep-30	2										X			JAO	0
8187	1.015.8187	Submit 2010 financial report (actual expenditures and value earned) to ALMA Board	2011-Mar-31	2											X		JAO	0
8208	2.025.8208	Final Approval of Architectural program for all AOS buildings	2003-Mar-03	2	Done		X										NA	30
8212	2.025.8212	Draft Joint Antenna Foundation Interface	2003-Mar-06	2	Done		X										Both	33
8213	2.025.8213	Freeze Joint Antenna Foundation Interface	2003-Jun-30	2	Done		XX										Both	135
8216	2.025.8216	Freeze Central Cluster Configuration	2003-Mar-01	2	Done		X										NA	0
8220	2.025.8220	Award Contract Design / Engineering for AOS Facilities NA	2002-Oct-09	2	Done	X											NA	0
8222	2.025.8222	AOS Foundations NA CDR	2003-Sep-30	2	Delay		X X										NA	213
8224	2.025.8224	AOS Foundations NA Central Cluster Construction Tender Docs Complete	2004-May-30	2	Delay		X	X									NA	411
8226	2.025.8226	AOS Foundations NA Central Cluster Construction Contract Signed	2004-Nov-30	2	Delay			X X									NA	426
8010	2.025.8010	Begin initial Phase of Civil Work in Chile	2003-Jul-26	1	Done		1 1										Both	-158
8228	2.025.8228	AOS Foundations NA Central Cluster Provisional Acceptance	2007-Jun-30	2	Delay				X		X						NA	730
8230	2.025.8230	AOS Foundations NA Remaining Construction / Tender Docs Complete	2003-Nov-30	2			X		X								NA	-457
8232	2.025.8232	AOS Foundations NA Remaining Construction Contract Signed	2004-May-31	2				X	X								NA	-458
8234	2.025.8234	AOS Foundations NA Remaining Provisional Acceptance	2006-May-31	2						X	X						-	-366
8236	2.025.8236	AOS Foundations EU Design/Eng Contract Awarded	2007-Jan-01	2							X						-	0
8238	2.025.8238	AOS Foundations EU CDR Complete	2007-Apr-01	2							X						-	0
8240	2.025.8240	AOS Foundations EU Construction / Tender Docs Complete	2007-Jul-01	2							X						-	0

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Milestone #	WBS #	Milestone Name	Due Date	Level	Status	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Responsible	Delay (days)
8242	2.025.8242	AOS Foundations EU Construction Contract Signed	2008-Mar-01	2								X					-	0
8244	2.025.8244	AOS Foundations EU Provisional Acceptance	2011-Oct-01	2											X		-	0
8250	2.025.8250	AOS Buildings NA Foundations/Envelope CDR Complete	2003-Oct-31	2	Delay		X	X									NA	213
8252	2.025.8252	AOS Buildings NA Foundations/Envelope Construction / Tender Docs Complete	2004-Mar-15	2	Delay		X	X									NA	289
8254	2.025.8254	AOS Buildings NA Foundations/Envelope Construction Contract Signed	2004-Sep-15	2	Delay			X	X								NA	259
8258	2.025.8258	AOS Buildings NA Foundations/Envelope Provisional Acceptance	2005-May-15	2	Delay			X	X								NA	257
8260	2.025.8260	AOS Buildings Finish & Installations NA CDR Complete	2004-Apr-30	2	Delay		X	X									NA	243
8262	2.025.8262	AOS Buildings Finish & Installations NA Construction / Tender Docs Complete	2004-Aug-31	2	Delay			X	X								NA	275
8264	2.025.8264	AOS Buildings Finish & Installations NA Construction Contract Signed	2005-Feb-28	2	Delay			X	X								NA	242
8266	2.025.8266	AOS Buildings Finish & Installations NA Provisional Acceptance	2005-Dec-31	2	Delay				X	X							-	184
8025	2.025.8025	Initial Phase of Civil Work in Chile Complete	2005-Jun-30	1					1								Both	0
20701	2.025.20701	AOS Interconnect Roads & Trenches NA Provisional Acceptance	2007-Jun-30	2							X						-	0
8284	2.025.8284	AOS Interconnect Roads & Trenches EU Provisional Acceptance	2011-Oct-01	2											X		-	0
8286	2.025.8286	Complete AOS Construction	2011-Oct-01	2											X		-	0
8290	2.025.8290	Construction Road Opening EU Construction / Tender Docs Complete	2003-Feb-26	2	Done		X										EU	11
8292	2.025.8292	Construction Road Opening EU Construction Contract Signed	2003-Jun-25	2	Done		X										EU	85
8294	2.025.8294	Construction Road Opening EU Provisional Acceptance	2003-Nov-30	2	Delay		XX										EU	61
8300	2.025.8300	Access Road EU Design/Eng Contract Awarded	2003-Mar-17	2	Done		X										EU	32
8302	2.025.8302	Access Road to OSF EU CDR Complete	2003-Jun-09	2	Done		XX										EU	70
8304	2.025.8304	Access Road OSF to AOS EU CDR Complete	2003-Jun-09	2	Done		X										EU	55
8306	2.025.8306	Access Road EU Construction / Tender Docs Complete	2003-Oct-15	2	Delay		XX										EU	91
8308	2.025.8308	Access Road EU Construction Contract Signed	2004-May-30	2				X									EU	0
8310	2.025.8310	Access Road OSF-AOS ready to accommodate transporter	2005-Jun-30	2					X								-	0
8312	2.025.8312	Access Road EU Provisional Acceptance	2008-Dec-31	2								X					-	0
8334	2.025.8334	Contractors Camp Initial Occupancy	2004-Jan-01	2	Delay			XX									EU	63
8340	2.025.8340	OSF Facilities Phase 1 (Tech area) EU Design/Eng Contract Awarded	2003-Oct-01	2	Delay		X	X									EU	122
8342	2.025.8342	OSF Facilities Phase 1 (Tech area) EU CDR Complete	2004-Jan-15	2	Delay		X	X									EU	122
8344	2.025.8344	OSF Facilities Phase 1 (Tech area) EU Construction / Tender Docs Complete	2004-May-01	2	Delay			X	X								EU	122
8346	2.025.8346	OSF Facilities Phase 1 (Tech area) EU Construction Contract Signed	2004-Oct-01	2	Delay			X	X								EU	183
8348	2.025.8348	OSF Facilities Phase 1 (Tech area) EU Provisional Acceptance	2006-Feb-01	2	Delay				X	X								185
8350	2.025.8350	OSF Facilities Phase 2 (Res. / Visitor) EU Design/Eng Contract Awarded	2008-Oct-01	2								X					-	0
8352	2.025.8352	OSF Facilities Phase 2 (Res. / Visitor) EU CDR Complete	2009-Mar-31	2									X				-	0
8354	2.025.8354	OSF Facilities Phase 2 (Res. / Visitor) EU Construction / Tender Docs Complete	2009-Jul-01	2										X			-	0
8356	2.025.8356	OSF Facilities Phase 2 (Res. / Visitor) EU Construction Contract Signed	2010-Jan-01	2										X			-	0
8358	2.025.8358	OSF Facilities Phase 2 (Res. / Visitor) EU Provisional Acceptance	2011-Oct-01	2											X		-	0
8360	2.025.8360	Freeze Fiber Optics and Electrical Specifications	2003-Dec-31	2	Delay		X	X									Both	274
8362	2.025.8362	Fiber Optic Cables and Electrical Cables in Chile, N.A.	2004-Sep-30	2	Delay				X								NA	15
8364	2.025.8364	OSF-AOS Fiber Optics Link Installed	2006-Dec-31	2						X							-	0
8366	2.025.8366	Fiber Optic Cables and Electrical Cables in Chile, Eur.	2008-Sep-01	2								X					-	0
8370	2.025.8370	Power Feasibility Study Completed	2003-Apr-07	2	Done		XX										EU	7
8372	2.025.8372	ALMA Project Power Supply Plan Approved	2004-Jan-31	2	Delay		X	X									Both	153
8374	2.025.8374	ALMA Permanent Power Supply Tender Docs Complete	2004-Mar-31	2	Delay			XX									Both	91
8376	2.025.8376	ALMA Permanent Power Supply Contract Signed	2004-Aug-31	2	Delay			X	X								Both	92
8378	2.025.8378	Provisional Acceptance Power Supply Contract Phase 1	2005-Sep-30	2	Delay				XX								Both	92
8380	2.025.8380	Provisional Acceptance Power Supply Contract Last Phase	2006-Dec-31	2						X							-	0
8390	2.025.8390	Board Decision Location/Size Santiago JAO Office	2004-Jul-01	2					X								JAO	0
8391	2.025.8391	Architectural Design Contract awarded Santiago JAO Office	2004-Sep-01	2					X								EU	0
8392	2.025.8392	CDR Santiago JAO Office	2004-Nov-01	2					X								EU	0
8393	2.025.8393	Construction Tender Docs Complete Santiago JAO Office	2004-Dec-01	2					X								EU	0
8394	2.025.8394	Construction Contract signed Santiago JAO Office	2005-Jan-01	2					X								EU	0
8395	2.025.8395	Provisional Acceptance Santiago JAO Office	2006-Jan-01	2						X							EU	0
8502	3.035.8502	Shared Access VertexRSI Antenna	2002-Nov-15	2	Done	X											NA	0
8503	3.035.8503	Deliver Foundation Design requirements	2003-May-02	2	Done		XX										Both	76
8505	3.035.8505	Provisional Acceptance of VertexRSI Antenna	2003-Mar-20	2	Done		X										NA	59
8510	3.035.8510	Complete Technical Performance Report-VertexRSI Antenna	2003-Dec-10	2	Delay		X	X									NA	265
8530	3.035.8530	Shared Access AEC Antenna (Preliminary Acceptance)	2003-Oct-10	2	Delay		X	X									EU	135
8540	3.035.8540	Provisional Acceptance of AEC Antenna	2003-Nov-21	2	Delay			XX									EU	120
8545	3.035.8545	Complete Technical Performance Report-AEC Antenna	2004-Jan-21	2	Delay			X	X								EU	120

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Milestone #	WBS #	Milestone Name	Due Date	Level	Status	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Responsible	Delay (days)
8500	3.045.8500	RFQ for VertexRSI Antenna Delivered to Project Office	2003-May-20	2	Done		XX										NA	106
8524	3.045.8524	Prototype Antenna released to Contractor for Refurbishment / Transport to Chile	2004-Aug-28	2	Delay			X									Both	31
8525	3.045.8525	CFT/RFQ Bid Package Submitted to Project Office (AEC/VertexRSI)	2003-Sep-30	2	Delay		XX										Both	122
8535	3.045.8535	Issue CFT/RFQ for Production Antenna Design(s)	2003-Oct-31	2	Delay		X X										Both	123
8550	3.045.8550	Closing Date for Production Antenna Bids (Competitive Tender)	2004-Feb-28	2	Delay		XX										Both	121
8560	3.045.8560	Bid Evaluations Due to Project Office	2004-Apr-30	2	Delay		XX										Both	94
8565	3.050.8565	Sign Contract for 31+1 North Am. Production Antennas	2004-Jul-28	2	Delay		XX										NA	61
8575	3.050.8575	Sign Contract for 32-Euro Production Antennas	2004-Jul-28	2	Delay		XX										EU	59
8585	3.050.8585	First Antenna Arrives at OSF (Retrofitted prototype TBC)	2005-Oct-31	2					X								-	0
8035	3.050.8035	First Production Antenna available in Chile at OSF	2005-Dec-31	1					1								Both	0
8600	3.060.8600	8th Antennas Preliminary Accepted at OSF	2007-Feb-28	2							X						-	0
8605	3.060.8605	20th Antennas Preliminary Accepted at OSF	2008-Jun-12	2								X					-	0
8610	3.060.8610	30th Antennas Preliminary Accepted at OSF	2009-Jun-12	2									X				-	0
8615	3.060.8615	50th Antennas Preliminary Acceptance at OSF	2010-May-31	2										X			-	0
8620	3.060.8620	All Antennas Preliminary Accepted at OSF	2011-Jun-30	2											X		-	0
8625	3.060.8625	All Antennas Provisionally Accepted in Chile at AOS	2011-Dec-16	2												X	Both	0
8555	3.065.8555	Nutator Critical Design Review Completed	2004-Oct-28	2	Delay		X	X									NA	386
8590	3.065.8590	All Nutators Accepted at OSF	2006-Apr-15	2						X							NA	-61
8569	3.070.8569	Transporter Critical Design Review Complete	2003-Dec-17	2	Delay		X	X									EU	277
8571	3.070.8571	Transporter Contract signed	2004-Mar-31	2				X									-	0
8580	3.070.8580	First Transporter Accepted at OSF	2005-Sep-30	2					X								-	0
8595	3.070.8595	Second Transporter Accepted at OSF	2006-Sep-15	2						X							-	0
8700	4.075.8700	Initial set of FE specs and interface-control documents discussed	2003-Apr-01	2	Done		X										Both	0
8705	4.075.8705	FE specifications and requirements plus ICD's submitted for approval	2003-Sep-01	2	Done		XX										Both	139
8990	4.075.8990	Front end sub-system Delta PDR	2003-Dec-01	2	Delay		XX										Both	91
8995	4.075.8995	All FE Contracts / Agreements in place	2003-Nov-01	2	Delay		X X										Both	214
9020	4.075.9020	RECEIVER CDR	2006-May-01	2						XX							-	-106
9023	4.075.9023	FE Production authorized	2006-May-01	2						X							-	0
8720	4.080.8720	Freeze Dewar design	2003-Aug-31	2	Done		X										EU	47
8740	4.080.8740	Prototype cartridge bodies (plus dummies) delivered	2003-Jan-01	2	Done		X										EU	0
8750	4.080.8750	Cartridge body design frozen	2003-Dec-01	2	Delay		XX										EU	91
8730	4.085.8730	Receiver Dewar #1 delivered to integration centre	2004-Mar-15	2	Delay			X									EU	74
8735	4.085.8735	Receiver Dewar #8 delivered to integration centre	2005-Jul-01	2					X								-	0
8755	4.085.8755	Cartridge bodies for first receiver delivered	2004-Apr-01	2	Delay			XX									EU	91
8760	4.085.8760	Cartridge bodies for eighth receiver delivered	2004-Jul-01	2				X									EU	0
8765	4.090.8765	Freeze optics design	2003-Sep-30	2	Delay		XX										EU	153
8770	4.090.8770	Freeze windows/IR filters design	2003-Jun-17	2	Done		X										EU	48
8775	4.095.8775	Warm optics for receiver #1 delivered	2004-Feb-01	2	Delay			X									EU	31
8780	4.095.8780	Windows/IR filters for receiver #1 delivered	2004-Jan-01	2				X									EU	0
8785	4.095.8785	Warm optics for receiver #8 delivered	2005-Jul-01	2					X								-	0
8790	4.095.8790	Windows/IR filters for receiver #8 delivered	2005-Jul-01	2					X								-	0
8810	4.100.8810	Deliver lab-prototype DC bias circuits	2003-Apr-24	2	Done		XX										NA	54
8820	4.100.8820	Freeze the design of the DC support electronics	2003-Oct-01	2				X									NA	0
8835	4.100.8835	Deliver lab prototype M/C circuit	2003-May-22	2	Done		X										NA	51
8845	4.100.8845	Freeze hardware design M&C circuit	2004-Jan-01	2	Delay			XX									NA	92
8856	4.105.8856	Deliver the final monitor and control circuitry to each of the cartridge builders	2004-Mar-01	2				X									NA	0
8860	4.100.8860	Deliver receiver control software to users	2004-Mar-15	2	Delay			X									NA	74
8865	4.100.8865	Deliver FE software req. to computing IPT	2004-Jan-01	2				X									NA	0
8905	4.100.8905	Freeze the design of the IF switch/processor	2004-Jan-01	2				X									NA	0
8920	4.100.8920	Freeze the design of the FE chassis	2003-Dec-01	2	Delay			X									NA	61
8922	4.100.8922	Freeze FE Design	2004-Jul-01	2	Delay			X X									Both	182
8825	4.105.8825	Deliver DC bias electronics for cartridge #1	2004-Jan-01	2				X									NA	0
8830	4.105.8830	Deliver DC bias electronics for cartridge #8	2004-Jul-01	2				X									NA	0
8850	4.105.8850	Deliver the monitor and control module for front-end number one	2004-Mar-15	2	Delay			X									NA	14
8855	4.105.8855	Deliver the monitor and control module for front-end number eight	2004-Sep-01	2				X									NA	0
8910	4.105.8910	Deliver the IF switch/processor for the first front-end	2004-Oct-01	2				X									NA	0
8915	4.105.8915	Deliver the IF switch/processor for the eighth front-end	2005-Jul-01	2					X								-	0
8925	4.105.8925	Deliver the FE chassis for receiver #1	2004-Mar-01	2	Delay			X									NA	60

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Milestone #	WBS #	Milestone Name	Due Date	Level	Status	Responsible	Delay (days)
8930	4.105.8930	Deliver the FE chassis for receiver #8	2004-Sep-01	2	Delay	NA	62
8935	4.145.8935	Band 3 Cartridge #1 delivered	2004-Oct-01	2		NA	0
8940	4.145.8940	Band 3 Cartridge #8 delivered	2006-Jan-01	2		-	0
8945	4.165.8945	Band 6 Cartridge #1 delivered	2004-Oct-01	2		NA	0
8950	4.165.8950	Band 6 Cartridge #8 delivered	2006-Jan-01	2		-	0
8955	4.175.8955	Band 7 Cartridge #1 delivered	2004-Oct-15	2	Delay	EU	14
8960	4.175.8960	Band 7 Cartridge #8 delivered	2006-Jan-01	2		-	0
8965	4.195.8965	Band 9 Cartridge #1 delivered	2004-Oct-01	2		EU	0
8970	4.195.8970	Band 9 Cartridge #8 delivered	2006-Jan-01	2		-	0
8795	4.210.8795	Delivery of 2 WVR development prototypes	2004-Sep-01	2		EU	0
8800	4.215.8800	Deliver WVR #1 to OSF	2006-Jan-01	2		-	-14
8805	4.215.8805	Deliver WVR #8 to OSF	2006-Dec-01	2		-	-14
8975	4.220.8975	FE Test & Integration centre design ready	2004-Jun-01	2	Delay	NA	244
8040	4.230.8040	Initial Front End Subsystem available at OSF	2005-Dec-31	1		Both	0
8980	4.230.8980	NA FE Test & Integration centre operational	2005-Jun-01	2	Delay	NA	243
8985	4.230.8985	EU FE Test & Integration centre operational	2005-Jun-01	2	Delay	EU	243
9000	4.230.9000	Deliver Receiver #1 to the ATF	2005-Oct-01	2	Delay	-	92
9005	4.230.9005	Deliver receiver #2 to OSF/AOS	2006-Jan-01	2	Delay	-	90
9010	4.230.9010	Deliver receiver #7 to OSF/AOS	2006-Mar-15	2		-	0
9015	4.230.9015	Deliver receiver #8 to OSF/AOS	2006-May-01	2		-	0
9025	4.240.9025	Issue RFP for FE Service & exchange vehicle	2004-Jun-01	2		Both	0
9030	4.240.9030	FE Service & exchange vehicle #1 available	2005-Oct-01	2	Delay	-	183
8870	4.258.8870	LO review	2002-Nov-21	2	Done	Both	0
8880	4.258.8880	Deliver lab prototype LO chain to each cartridge man.	2003-Aug-22	2	Done	NA	174
8890	4.258.8890	Freeze LO design	2004-Jan-01	2	Delay	NA	92
8895	4.258.8895	Deliver LO chain(s) for cartridge #1	2004-Apr-01	2	Delay	NA	91
8900	4.258.8900	Deliver LO chain(s) for cartridge #8	2005-Jan-01	2		-	0
9100	5.260.9100	Deliver BE modules for system integration	2004-Jan-01	2		Both	0
9106	5.260.9106	Deliver Back End Production Plan	2004-Sep-01	2		Both	0
9120	5.260.9120	All BE production contracts placed	2005-Jan-01	2		-	0
9105	5.262.9105	Install BE hardware on two ALMA prototype antennas at the ATF	2004-May-01	2		Both	0
9110	5.262.9110	Complete BE Critical Design Review	2004-Jul-01	2		Both	0
9115	5.295.9115	LO Phase Correction Demonstration	2003-Dec-31	2		NA	0
9117	5.295.9117	End to End LO Demonstration	2004-Dec-31	2		NA	0
9119	5.295.9119	Pre production LO Review	2005-Mar-31	2		NA	0
8020	5.305.8020	Central Back End System Ready to Install at Array Site	2005-Mar-31	1		Both	0
8030	5.305.8030	First Antenna based Back End Subsystem Ready for Installation at OSF	2005-Nov-01	1	Delay	Both	124
9122	5.305.9122	Deliver Back End Assemby, Test, & Verification Plan	2004-Nov-30	2		Both	0
9125	5.305.9125	All ALMA assembly, test and verification equipment in place	2005-May-01	2		-	0
9130	5.305.9130	Deliver BE antenna hardware for first three antennas	2005-Nov-01	2		-	0
9135	5.305.9135	Deliver BE central electronics hardware for first three antennas	2005-Nov-01	2		-	0
9140	5.305.9140	Deliver BE antenna and central hardware for antennas #4 - 9	2006-Jul-01	2		-	0
9145	5.305.9145	Deliver BE antenna and central hardware for antennas #10 - 17	2007-Jan-01	2		-	0
9150	5.305.9150	Deliver BE antenna and central hardware for antennas #18 - 37	2008-Jan-01	2		-	0
9155	5.305.9155	Deliver BE antenna and central hardware for antennas #38 -57	2009-Jan-01	2		-	0
9160	5.305.9160	Deliver BE antenna and central hardware for antennas #58 - 64	2009-Oct-01	2		-	0
9200	6.315.9200	Complete design of pre-production boards for prototype correlator	2002-Dec-30	2	Done	NA	0
9205	6.315.9205	Begin integrated testing of prototype correlator	2003-Jan-06	2	Done	NA	0
9208	6.315.9208	Correlator ICDs submitted for approval	2003-Aug-13	2	Done	NA	166
9215	6.315.9215	Pass Critical Design Review	2003-Oct-31	2	Delay	NA	137
9225	6.315.9225	Prototype Correlator shipped to ATF	2003-Dec-15	2		NA	0
9220	6.320.9220	Contract signed for Custom Correlator chips	2003-Oct-31	2	Delay	NA	60
9222	6.320.9222	Contract signed for Correlator PCB assembly	2003-Oct-31	2		NA	0
9230	6.320.9230	Begin assembly of first quadrant	2003-Oct-31	2	Delay	NA	60
9235	6.320.9235	Begin board testing for first quadrant	2004-May-01	2	Delay	NA	180
9240	6.320.9240	Begin integrated testing for first quadrant	2004-Jun-01	2	Delay	NA	61
9250	6.320.9250	First quadrant shipped to Chile	2005-Dec-31	2	Delay	-	153
9255	6.320.9255	Begin Integration of second quadrant*	2005-Oct-01	2	Delay	-	267

ALMA Milestone Summary (Version: 2003sep12b)

Legend: Level 1:1 Level 2:X Level 3: o (Original dates in gray)

Milestone #	WBS #	Milestone Name	Due Date	Level	Status	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Responsible	Delay (days)
9260	6.320.9260	Begin board testing for second quadrant	2004-Oct-31	2				X	X								-	-121
9265	6.320.9265	Begin integrated testing for second quadrant	2006-Jan-01	2	Delay				X	X							-	245
9275	6.320.9275	Second quadrant shipped to Chile	2006-Dec-31	2	Delay					X	X						-	358
9280	6.320.9280	Begin Integration of third quadrant*	2006-Oct-01	2	Delay					X	X						-	267
9285	6.320.9285	Begin board testing for third quadrant	2005-Oct-31	2					X	X							-	-121
9290	6.320.9290	Begin integrated testing for third quadrant	2007-Jan-01	2	Delay					X	X						-	245
9300	6.320.9300	Third quadrant shipped to Chile	2007-Dec-31	2	Delay						X	X					-	358
9305	6.320.9305	Begin integration of fourth quadrant*	2007-Oct-01	2	Delay						X	X					-	267
9310	6.320.9310	Begin board testing for fourth quadrant	2006-Oct-31	2						X	X						-	-121
9315	6.320.9315	Begin integrated testing for fourth quadrant	2008-Jan-01	2	Delay						X	X					-	245
9320	6.320.9320	Fourth quadrant shipped to Chile	2008-Dec-31	2	Delay							X	X				-	359
9350	6.325.9350	Second Generation Correlator Feasibility Study	2002-Mar-27	2	Done	X											EU	0
9355	6.325.9355	2GC System Requirements Review	2003-Nov-30	2	Delay		X	X									EU	194
9360	6.325.9360	2GC Conceptual Design Review	2004-Mar-19	2				X									EU	0
9365	6.325.9365	2GC Preliminary Design Review	2005-Feb-28	2					X								-	0
9400	7.340.9400	Computing Subsystem Start (T0)	2002-Jun-01	2	Done	X											Both	0
9405	7.340.9405	Internal Design Review (IDR)	2002-Dec-09	2	Done		X										Both	0
9410	7.340.9410	Preliminary Design Review (PDR)	2003-May-08	2	Done		X										Both	27
9415	7.340.9415	Subsystem pre-release (R0)	2003-May-16	2	Done		X										Both	15
9420	7.340.9420	Subsystem Critical Design Review 1 (CDR1)	2003-Aug-01	2	Done			X									Both	23
9495	7.340.9495	Subsystem Major Release 1 (R1)	2003-Oct-01	2				X									Both	0
9515	7.340.9515	Integration Release 1 (IR1)	2003-Dec-01	2				X									Both	0
9422	7.340.9422	Submit Computing Communications Study	2004-Jan-01	2					X								Both	0
9425	7.340.9425	Deliver ALMA Operations Plan, Software Aspects	2004-Jan-01	2					X								Both	0
9430	7.340.9430	Subsystem Minor Release 1.1 (R1.1)	2004-Apr-01	2					X								Both	0
9435	7.340.9435	Critical Design Review 2 (CDR2)	2004-May-01	2					X								Both	0
9500	7.340.9500	Subsystem Major Release 2 (R2)	2004-Oct-01	2						X							Both	0
9520	7.340.9520	Integration Release 2 (IR2)	2004-Dec-01	2						X							Both	0
9440	7.340.9440	Subsystem Minor Release 2.1 (R2.1)	2005-Apr-01	2						X							-	0
9445	7.340.9445	Subsystem Critical Design Review 3 (CDR3)	2005-May-01	2						X							-	0
9505	7.340.9505	Subsystem Major Release 3 (R3)	2005-Oct-01	2							X						-	0
9525	7.340.9525	Integration Release 3 (IR3)	2005-Dec-01	2							X						-	0
9450	7.340.9450	Subsystem Minor Release 3.1 (R3.1)	2006-Apr-01	2							X						-	0
9455	7.340.9455	Subsystem Readiness Review (RR)	2006-Jun-01	2							X						-	0
9460	7.340.9460	Subsystem Major Release 4 (R4)	2006-Oct-01	2								X					-	0
9465	7.340.9465	Subsystem Preliminary Acceptance Review (PAR)	2006-Dec-01	2								X					-	0
9530	7.340.9530	Integration Release 4 (IR4)	2006-Dec-01	2								X					-	0
9480	7.340.9480	Computing Preliminary Acceptance (CPA)	2007-Mar-01	2									X				-	0
9510	7.340.9510	Subsystem Minor Release 4.1 (R4.1)	2007-Apr-01	2									X				-	0
9470	7.340.9470	Software Agreements, Final Construction Phase	2007-Jun-01	2									X				-	0
9475	7.340.9475	Support Completion (T1)	2007-Jun-01	2									X				-	0
9485	7.340.9485	Computing Readiness for Interim science observation	2007-Jun-01	2									X				-	0
9535	7.340.9535	Integration Release 4.1(IR4.1)	2007-Jun-01	2									X				-	0
9490	7.340.9490	Complete Subsystem Upgrade	2011-Jun-01	2											X		-	0
9602	8.365.9602	System Requirements Review (SRR) - System Requirements Finalized	2003-Oct-31	2	Delay		X	X									Both	60
9605	8.365.9605	ALMA System Design Review	2004-Mar-31	2	Delay			X	X								Both	121
9615	8.365.9615	ALMA System CDR	2005-Jul-01	2						X							-	0
9650	8.370.9650	Prototype Integration & Verification Plan (Q4 2003 through Q4 2004) approved for Lab & ATF	2003-Oct-13	2	Delay			X	X								Both	73
9653	8.370.9653	All hardware for Prototype System Lab Integration accepted and delivered	2004-Jan-01	2					X								Both	0
9656	8.370.9656	AEG Releases Antennas to ALMA System Prototype Integration Group	2004-Apr-01	2					X								Both	0
9659	8.370.9659	ALMA prototype electronics and software installed on ATF	2004-May-01	2					X								Both	0
9662	8.370.9662	First interferometer fringes using prototype antennas at ATF	2004-Sep-01	2						X							Both	0
9665	8.370.9665	Discontinue interferometer hardware and software system testing and commisioning	2005-Jan-01	2						X							-	0
9668	8.370.9668	Finish testing of ALMA prototype and production hardware / software on ATF	2006-Jul-01	2							X						-	0
8005	8.370.8005	Start Antenna Evaluation at ALMA Test Facility	2003-Mar-22	1	Done		1	1									NA	81
9718	8.370.9718	NA Prototype Evaluation Report	2004-Mar-12	2	Delay			X									Both	71
9721	8.370.9721	EU Prototype Evaluation Report	2004-May-31	2	Delay			X	X								Both	151
9750	8.375.9750	ALMA Integration & Verification Plan - Q1 2005 through Q4 2007 for OSF and AOS	2004-Jan-01	2				X									Both	0

ALMA Milestone Summary (Version: 2003sep12b)

Legend: Level 1:1 Level 2:X Level 3: o (Original dates in gray)

Milestone #	WBS #	Milestone Name	Due Date	Level	Status	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Responsible	Delay (days)
9753	8.375.9753	Establish Integration office at OSF	2005-Feb-15	2					X								-	0
9756	8.375.9756	Integration team and infrastructure ready at OSF.	2005-Sep-01	2					X								-	0
9759	8.375.9759	Initial central electronics and computing - integrated, tested and accepted at OSF	2005-Nov-15	2					X								-	0
9762	8.375.9762	Initial antenna electronics and computing - integrated, tested and accepted at OSF	2005-Nov-15	2					X								-	0
9765	8.375.9765	First fully outfitted antenna integrated and accepted at OSF	2006-Feb-15	2						X							-	0
9768	8.375.9768	First fully outfitted antenna integrated and accepted at AOS	2006-Apr-01	2						X							-	0
9771	8.375.9771	Phase 2 ALMA Integration and Verification Plan Q1 2008 and beyond	2006-Jul-01	2						X							-	0
9774	8.375.9774	Three antenna array integrated & functioning at AOS	2006-Aug-01	2						X							-	0
9800	9.380.9800	Plan for compact and intermediate configurations submitted	2002-Nov-27	2	Done	X											Both	0
9805	9.380.9805	Review of calibration requirements with science examples complete	2003-Feb-28	2	Done		X										Both	13
9812	9.380.9812	Document on how calibration reqs flow down to instrumental specs	2003-Jun-30	2	Done		X										Both	0
9815	9.380.9815	Plan for Y+ configuration submitted	2003-Jun-30	2	Done		X										Both	0
9820	9.380.9820	Calibration strategy submitted	2003-Oct-31	2	Delay		XX										Both	31
9825	9.380.9825	Science aspects of operations plan complete	2004-Jun-30	2	Delay		X	X									Both	182
9830	9.380.9830	Plan for early science configurations complete	2004-Jun-30	2				X									Both	0
9835	9.380.9835	Report WVR strategy / implementation / operations	2004-Sep-30	2				X									EU	0
9840	9.380.9840	Review of tests of calibration strategies on prototype interferometer complete	2004-Dec-31	2				X									Both	0
9843	9.380.9843	Review of tests of calibration strategies on ATF interferometer	2005-May-30	2					X								-	0
9845	9.380.9845	Science verification plan for commissioning submitted	2005-Jun-30	2					X								-	0
9870	9.380.9870	Definition of site characterization instrumentation for ALMA operations	2006-Jan-31	2						X							-	0
9850	9.380.9850	Science verification of ALMA early science array Bands 3, 6, & 7 complete	2007-Jul-31	2							X						-	0
8045	9.380.8045	Start Early Science Operations	2007-Sep-30	1							1						Both	0
9855	9.380.9855	Science verification of ALMA Band 9 complete	2008-Sep-30	2								X					-	0
9860	9.380.9860	Science verification of ALMA imaging quality	2009-Dec-31	2									X				-	0
9865	9.380.9865	Final Science verification complete array	2011-Dec-31	2											X		-	0
8055	9.380.8055	Start of full Science Operations	2012-Mar-31	1												1	Both	0

Atacama Large Millimeter Array

Memorandum

2003-Sep-15

TO: ALMA Management IPT

FROM: Richard Simon

SUBJ: ALMA Milestone Issues

This memo highlights significant issues that arose during the recent review of ALMA milestones. It may be possible to resolve some of these issues during the ALMA meetings being held this week in Richmond, VA. The detailed issues outlined below should be clarified and confirmed with the IPTs involved **before** specific actions are taken.

Management IPT

The Management IPT has two "Late" milestones – milestones for which the due date has passed, and for which there is no revised date. These are the only milestones marked as "Late": in the 2003-Sep-12b plan.

8105	**Designation of responsibility for Phase 2 development work elements in Europe**	**2003-Sep-15**
8122	**Executives submit 2004 budget and financial projections to JAO**	**2003-Sep-01**

The delays in 8105 have the potential to cause serious delays in several areas. Apparently, the temporary solution to this issue is that the institutions involved are allowing work to proceed in advance of and in anticipation of formal contracts.

Milestone 8410 (Start Operations Budget) has been moved from Site Development to Management.

There are no milestones associated with finalizing JAO plans during Construction, or completing the recruitment of Key staff for the JAO (e.g., Project Manager, Project Scientist, and Project Engineer).

Site Development IPT

A number of milestones for the Site IPT have been delayed. Sources of delay include the following: delays in site access (now resolved); delays in approving specification for the AOS technical building; delays caused by the specification and design of the unified antenna foundation; and delays related to contracting. There is a potential for further delay if the contract for design of the OSF is not signed by 2003-Oct-01; the Site IPT deemed this a critical issue. The current Site development plans project that the initial AOS building and OSF facilities will be completed. The following key milestones have been affected:

8025	**Initial Phase of Civil Works in Chile Complete (Level 1 milestone)**	**2005-Jun-30**
8266	**AOS Buildings Finish & Installations NA Provisional Acceptance**	**2005-Dec-31**
8348	**OSF Facilities Phase 1 (Tech area) EU Provisional Acceptance**	**2006-Feb-01**

Accommodating the delays in 8266 will be difficult; installation of the correlator and central Back End equipment depend on completion of the AOS technical building. The delays in 8348 may have less impact, since high priority facilities can be readied first, and temporary facilities utilized for offices and storage if necessary. Meeting 8025 will depend on the detailed definition that is adopted; the current schedule will cause a delay in 8025, if 8025 is defined to include completion of the AOS technical building and the Phase 1 OSF facilities.

Site Development has moved milestones for the inner foundations (outside of the Central Cluster) forward in time, while delaying the Central Cluster foundations. This change was necessitated by delays in final specifications for the Central Cluster, and will allow foundation work in Chile to begin without any overall delay. Completion of the Central Cluster (milestone 8228) is now delayed until 2007-Jun-30, from 2005-Jun-30, while Provisional Acceptance of the inner North American foundations is advanced from 2007-Jun-01 to 2006-May-31. This change means that initial integration and commissioning of ALMA antennas may need to use foundations outside the Central Cluster.

Site Development may face additional delays if milestone 8360 (Freeze Fiber Optics and Electrical Specifications) is not met. The Site IPT suggests that this milestone should be the responsibility of System Engineering, with a revised date of 2003-Dec-31.

Antenna IPT and the Antenna Evaluation Group

There have been significant delays in key antenna milestones in recent months. These delays have been driven primarily by contractor performance, and secondarily by management decisions and limited resources. The key Antenna milestones affected by recent developments are:

8525	CFT/RFQ Bid Package Submitted to Project Office (AEC/VertexRSI)	2003-Sep-30
8530	Shared Access AEC Antenna (Preliminary Acceptance)	2003-Oct-10
8535	Issue CFT/RFQ for Production Antenna Design(s)	2003-Oct-31
8540	Provisional Acceptance of AEC Antenna	2003-Nov-21
8510	Complete Technical Performance Report-VertexRSI Antenna	2003-Dec-10
8545	Complete Technical Performance Report-AEC Antenna	2004-Jan-21
8550	Closing Date for Production Antenna Bids (Competitive Tender)	2004-Feb-28
8560	Bid Evaluations Due to Project Office	2004-Apr-30
8565	Sign Contract for 31+1 North Am. Production Antennas	2004-Jul-28
8575	Sign Contract for 32-Euro Production Antennas	2004-Jul-28
8524	Prototype Antenna released to Contractor for Refurbishment / Transport to Chile	2004-Aug-28
8585	First Antenna Arrives at OSF (Retrofitted prototype TBC)	2005-Oct-31
8035	First Production Antenna available in Chile at OSF	2005-Dec-31

System and AEG milestones related to Antenna evaluation, testing, and procurement:

9718	NA Prototype Evaluation Report	2004-Mar-12
9659	ALMA prototype electronics and software installed on ATF	2004-May-01
9721	EU Prototype Evaluation Report	2004-May-31
9656	AEG Releases Antennas to ALMA System Prototype Integration Group	2004-Jun-01
9662	First interferometer fringes using prototype antennas at ATF	2004-Sep-01
9665	Discontinue interferometer hardware and software system testing and commissioning	2005-Jan-01

The above schedule cannot be met without the resolution of several issues:

- 8530 is dependent on contractor performance, but appears possible. Achieving 8540 as scheduled is more problematic, since it is dependent on both contractor performance and no unexpected technical problems. Delays in 8540 will cause delays in 8545, and the System IPT milestones 9721 and 9656.
- 9659 cannot be met as scheduled, since it is dependent on 9656. Correcting this would schedule 9659 for 2004-Jul-01, representing an additional 2-month delay.
- The amount of time between 8560 and 8565 has been reduced from 5 months (the minimum amount of time thought to be required a few months ago) to an aggressive 3 months. Informal discussions suggest that 4 months is an optimistic minimum.
- The Antenna IPT has proposed milestone 8524 with a date that does not allow for the completion of testing at the ATF. The conflict is potentially more serious than the above schedule suggests: in informal discussions, a more realistic date for milestone 9662 (first fringes) might be 3 months or more after the nominal 2003-Sep-01.
- The Systems group apparently would like to delay 9665 until there are enough antennas in Chile for testing and commissioning activities.
- The milestones related to the first production antenna (8585 and 8035) should be clarified. For several IPTs, the key date is the actual delivery of the outfitted antenna to the AOS. In addition, a new milestone for delivery of Antenna #2 to the AOS is needed; the Front End and Back End IPTs are planning final verification tests before production that will require the use of two antennas at the AOS.
- It is essential that the necessary logistical support, facilities, and nascent operational capabilities be present in Chile at the time of antenna assembly and delivery.
- Although the project remains committed to meeting 8035, the Level 1 milestone for the first antenna in Chile, performance to date suggests that this milestone may not be met. The potential for delay of 8035 arises from the following causes:
  - Vendor delays in delivering prototype antennas and resolving technical problems;
  - The requirement for serial rather than parallel radiometric testing and evaluation of the prototype antennas, since only a single nutator is available;
  - An unknown time requirement to refurbish a prototype antenna for shipment and installation in Chile, complicated by the required redesign of the antenna pedestal.
  - The probable need for additional time for ATF interferometry and system prototype testing;
  - Potential delays in the procurement process.
  - The possibility that delivery of production antennas in Chile will begin about two years after the contract is awarded.

Front End IPT

Contracting delays and a lack of resources have resulted in delays in some Front End milestones. The following issues are noted:

Uncertainty about the technical performance of the Front End portion of the LO will persist until tests are completed near the end of 2003; unexpected technical issues could delay this further.

Formal work on the design of the Integration Center (Milestone 8975, delayed from 2003-Oct-01 to 2004-Jun-01) has barely started; the estimated delay for the Integration Center amounts to 8 months. However, the FE IPT expects to recover this time during the integration of the first Front End. In effect, setting up and debugging the Front End integration process will happen in parallel with the integration of the first Front End.

Delays in milestone 8995 (All FE Contracts / Agreements in place) may cause delays to some activities. Difficult contracting issues remain unresolved. Delivery of the initial cartridges for Bands 7 and 9 are dependent on the resolution of these issues.

The recent delays in Front End development are expected to be recovered during the production of the 8 initial Front Ends.

Release for production of all Front Ends depends on the availability of 2 antennas at the AOS to verify performance of the Front Ends and related systems. In particular, milestone 9020 (Receiver CDR on 2006-May-01) depends on the successful completion of initial interferometry tests at the AOS.

Milestone 9023 (Front End Production Authorized) is presently scheduled for the same day (2006-May-01) as passing the Front End CDR. Is this realistic, or will the JAO and the Executives need time to review the CDR report before approval of the start of production?

A new level 2 milestone may be needed to mark completion of the planned FE design/manufacturing readiness review. Such a milestone would follow 8922 (Freeze FE Design, 2004-Jul-01).

A new definition and new baseline date was adopted for milestone 9025 (Issue RFP for FE Service vehicle). The change in definition and date are consistent with earlier plans, and do not imply any delay.

Back End IPT

The first Level 2 milestone scheduled for the Back End System, Milestone 9100 (Deliver BE modules for system integration, 2004-Jan-01), is not likely to be met as scheduled, but partial deliveries should allow Lab integration to start nearly on time. If milestone 9100 is interpreted as including a full prototype LO system, the LO development plans imply that 9100 will be a year later than currently scheduled.

The current Back End plan may need significant revision. The IPT leaders would prefer to hold a final CDR and release for production after end-to-end tests using actual prototype receivers and a prototype of the ALMA LO system. These tests will not be possible until early 2006, based on the current Front End schedule and development plans for the LO distribution portion of the LO system. There are at least two possible solutions to this conflict:

- Release to production based solely on the results from laboratory testing. Initial installation and testing in early 2006 could then use the production units, but any problems encountered might be expensive to resolve. This approach is hampered by the late availability of prototypes for the IF Distribution system.
- Adopt an approach similar to that planned for the Front End, where an initial production run of hardware for 8 units is planned, with release for full production occurring after full system tests. The cost and schedule implications of this approach may be complex and have not been explored in detail.

Three level two milestones (below) have been added to reflect current plans for the completion of the prototype IF distribution system. The schedule implications for these milestones have not been explored in detail.

9115	**LO Phase Correction Demonstration**	**2003-Dec-31**
9117	**End to End LO Demonstration**	**2004-Dec-31**
9119	**Pre production LO Review**	**2005-Mar-31**

There are two level 1 milestones scheduled for the Back End IPT, which are not clearly defined. They both appear to be earlier than is reasonable.

Correlator IPT

While the Correlator schedule has slipped a few months, the current schedule accounts both for the scheduled CDR and the detailed procurement plans. The current Correlator schedule easily meets the overall ALMA schedule.

Shipment of the first quadrant of the Correlator is dependent on the completion of the technical building at the AOS. Further slips in the technical building would start to delay shipment of the first quadrant of the correlator.

Milestone 9255 (Begin integration of second quadrant, 2005-Oct-01) requires that adequate power and space are available for two correlator quadrants to run simultaneously.

Computing IPT

The Computing IPT plans are dependent on the availability of an operations plan. In particular, 9435 (Critical Design Review 2, 2004-May-01) depends on the existence of an operations plan by the end of 2003. The nominal plans for ALMA computing have always assumed that there will be a basic operations group to receive software releases, as well as to provide support.

Milestone 9465 (Subsystem Preliminary Acceptance Review (PAR), 2006-Dec-01) is dependent on computing, communications networking infrastructure (including links to external sites) being in place sometime in 2005. The PAR is expected to be held in Chile. 9465 is closely followed by 9480 (Computing Preliminary Acceptance, 2007-Mar-01), which is similarly dependent on Operations support.

Although nominally Level 3 milestones, 70319 and 70320 are awaiting completion of ICDs for LO and BE to FE. This issue should be discussed during the 2003-September ALMA week.

System Engineering and Integration IPT

Issues related to the Antenna Evaluation Group have been discussed above, in conjunction with the Antenna discussion.

The System group proposes shifting 9605, ALMA System Design Review, from 2003-Dec-01 to2004-Mar-31, and holding it in conjunction with an ALMA week during first quarter 2004.

Milestone 9659 (ALMA prototype electronics and software installed on ATF, 2004-May-01) depends on unformulated plans for a temporary LO system of some sort. It appears that a prototype of the ALMA LO, even for Bands 3 and 6, will not be available until several months later.

The System and Back End groups expressed no confidence that the date for achieving First Fringes on the ATF (Milestone 9662, 2004-Sep-01) could be achieved. A more realistic date, assuming no major technical problems or delays, may be 2004-Dec-01.

There is a significant conflict between the current plans to remove one of the prototype antennas from the ATF for refurbishment and shipment to Chile, and the need to complete prototype system integration and testing on the ATF. The currently scheduled date for 9665 (Discontinue interferometer hardware and software system testing and commissioning, 2005-Jan-01) is estimated to be 18 months earlier than ideal. The clear message was that "Discontinue" does not mean "Complete".

The interaction/conflict of the ALMA System CDR (Milestone 9615, scheduled for 2005-Jul-01) with the plans for the Front End / Receiver PDR (milestone 9020, 2006-May-01) must be resolved. At the current date scheduled for the System CDR, the current plans are that the ALMA Front Ends will be fully prototyped or ready for review.

Science IPT

Several of the Level 2 Science milestones depend on the availability of a working draft plan for ALMA Operations.

The Science IPT has lost several staff in recent months, and may face delays in completing some milestones.

Operations Planning Group

This group is working without any published milestones or goals.

ALMA Safety Committee

It is unclear whether or how to incorporate the Safety related milestones into the overall ALMA Milestone Plan.