



ALMA MONTHLY REPORT
September 2012

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1. INTRODUCTION

During September, overall progress towards completion of the construction project remained on track, with a sustained effort by AIV to process approximately two array elements each month. Preparations for the acceptance of the permanent power system continue, with some slippage in commissioning.

Significant work was put into upgrading the baseline correlator to four-quadrant capability during the month. This effort, along with progress on the power system, meant that no Cycle 0 observations took place. Nonetheless, data processing at the ARCs and at the JAO proceeded, as did pipeline testing. Our forecast is that the majority of the Cycle 0 high priority projects will be finished by the end of 2012. Also during September, we prepared for the proposal review meetings for Cycle 1, to take place in Santiago on October 1st through 5th.

Both antenna transporters suffered critical failures in August, but they were repaired and made fully operational during the September.

A face-to-face meeting of the ABC took place in Santiago on September 24th-25th to review the draft 2013 budget. The ABC recommended some additional clarifications before submittal to the board.

There was one road accident during September, where a member of ALMA's correlator team hit a road barrier. Only vehicle damage was reported.

2. PROJECT MANAGEMENT

2.1. Management IPT and IPT Meetings

The overall progress continues to be good. The deliveries of front ends and antennas continue and AIV continues to process the array elements with a throughput of approximately two each month. Soon all of the North American (NA) and East Asian (EA) antennas will have been delivered. The preparations for the acceptance of the permanent power system continue although the date for the commissioning continues to slip. The details are reported in the SITE section of this report.

2.2. Budget Status

The JAO and the Executive project managers have prepared for the Alma Budget Committee (ABC) a detailed revision of the finances of the project. The summary tables follow. The first table represents the position from the bilateral agreement. The second table shows the ALMA-J contribution. A detailed report of the financial and schedule information underlying these summary tables for the construction project cost-to-complete will be shared with the ALMA budget committee soon.

		NA (M\$)	EU (M€)	ALMA (M Y2000\$)
A P P R O V E D	Approved Bilateral Budget	519.9	443.0	764.7
	Remaining Contingency + Reserve	15.0	11.2	20.7
	TOTAL Available Budget (bilateral, no-ALMA-J, no G&S)	534.8	454.2	785.4
	Actual Cost	517.9	383.5	713.5
	Unpaid Commitments	6.8	39.6	38.2
	Actual Cost + Unpaid Commitments	524.7	423.1	751.7
	Total Remaining Available Budget	10.2	31.1	33.7
I N P R O C E S S				
	Budget Changes in Process	17.7	7.3	19.6
	<i>NA BCRs</i>	13.4		10.2
	<i>EU BCRs</i>		10.6	8.8
	<i>JAO BCRs</i>	4.3	-3.3	0.5
	Forecast Remaining Contingency + Reserve	-2.8	3.9	1.2
	Risk Register (Probability Weighted Cost Risk)	1.7	2.6	3.5

	NA (M\$)	EU (M€)
Site and Site Integration Contribution	15.5	17.4
LSM Reimbursement	5.2	
Site and Site Integration Contribution (in process)	2.1	
LSM Reimbursement (in process)	0.2	
Site and Site Integration (received)	14.4	15.4
LSM Reimbursement (received)	3.5	
Open Commitments (received)	0.6	

Note: Tables above from July EV report version 2012Oct18d.

2.3. Schedule Status as of September 30th, 2012

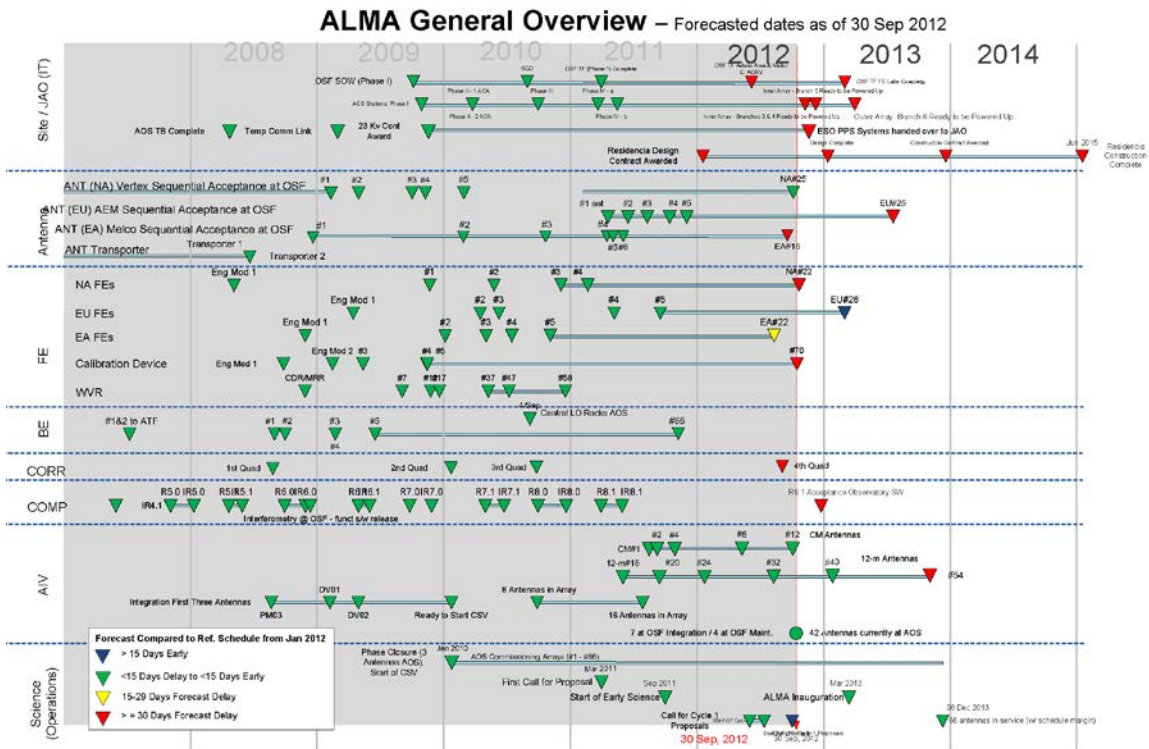
Key schedule topics of the month are:

- AOS
 - Infrastructure:
 - Stations: 45% of the array is conditionally accepted for use.
 - Power distribution: branches 1 and 2 are conditionally accepted for use.
 - Antennas in the Array:
 - Total of 46 antennas delivered (CM09 and CM12 during September) with 42 at the AOS, and four in maintenance.

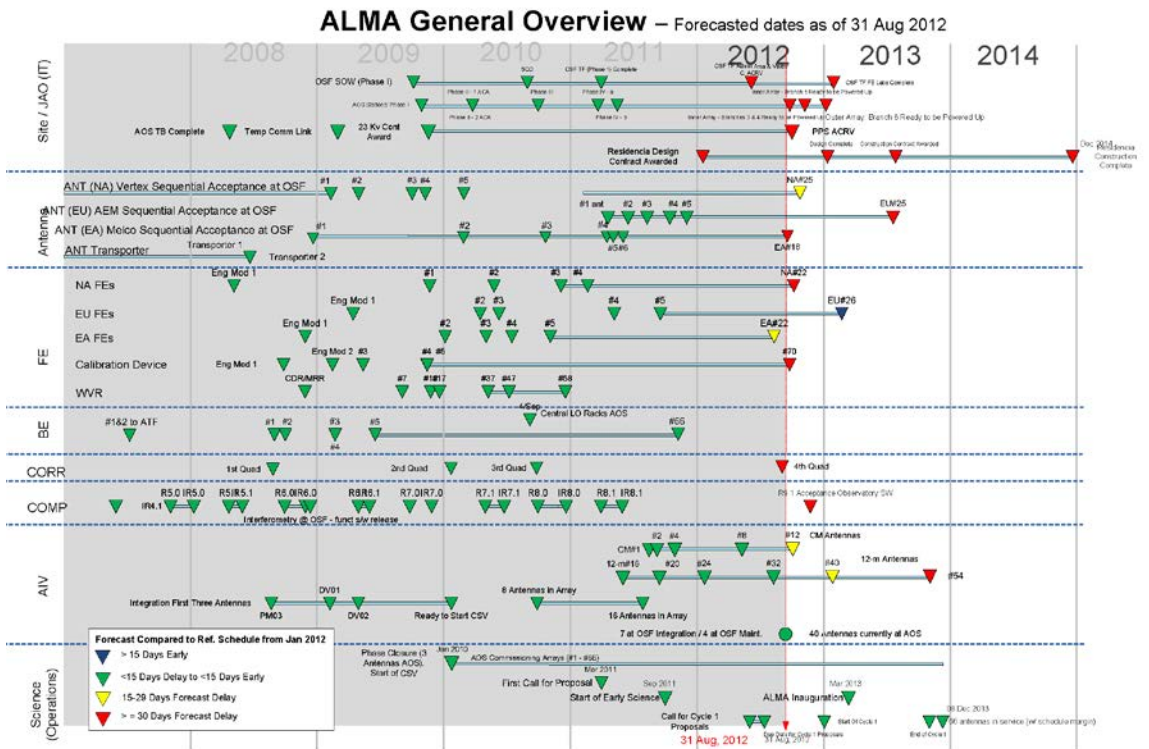
- OSF
 - Antennas: CM11 and DV24 were received at the OSF by AIV.
 - Permanent power: commissioning turbines on liquefied petroleum gas (LPG) by European (EU) contractor still under way, current forecast for finishing it is mid October.

The following diagrams show the ALMA general overview of the current and the previous month, and the same for next two diagrams with more details of 2012 and 2013.

Current Month



Previous Month



2.4. End of Construction Review and Correlator Integration

End-of-Construction Review

Reference documents for the AAER 2012 “end-of-construction” review were distributed on September 28th with some additional modifications. We prepared presentations for delivery to the review panel members in early October and coordinated with the panel chair to facilitate communication with panel members through the review item discrepancy process.

Sixty-four antenna correlator integration

The integration of the 64 antenna correlator started September 3rd as planned. It was successfully handed over to the commissioning and science verification (CSV) team for intensive testing with newly developed ALMA software R9.1.0 on September 26th. Two issues with correlator firmware and software were identified that prevented the use of more than 32 antennas. The root cause of firmware issue has been identified and will be tested in early October. Software R9.1.0 was tested thoroughly to support Cycle-0 operations (with less than 32 antennas). The acceptance review of R9.1R1 will be conducted mid-October. The software issue will be addressed in coordination with the acceptance review of the R9.1R1 and power related work at AOS to minimize the impact on the availability of antenna elements for the testing the 64 antenna correlator.

3. EAST ASIAN EXECUTIVE

3.1. Management

The EA project manager performed regular reviews of the schedules of the antennas and band 4/8/10 cartridges.

The EA ALMA science workshop was held in Daejeon, Republic of Korea, in which a number of astronomers participated from Japanese, Taiwanese and Korean universities, as well as from NAOJ, ASIAA and KASI (Korea Astronomy and Space Science Institute).

The Astronomical Society of Japan (ASoJ) annual autumn 2012 meeting was held between September 19th and 21st.

3.2. ACA Antennas

For a month starting on August 20th, MELCO conducted several corrective actions on all ACA antennas. The field programmable gate array (FPGAs) inside the drive-power-amplifier interface control (DIFC) and the digital signal processor (DSP) units have been updated (re-written) to remove bugs in data communication processes. The correction was found effective to reduce an interface-related alarm between the antenna control unit (ACU) and the DIFC, which had been one of the critical alarms to shut down the antenna operation. Another critical alarm issued by a failure of the clock board in the ACU has been successfully replicated in the MELCO factory and at least one of its root causes has been identified. The failure will be fixed after other causes are also identified. PM04, located at the MELCO site erection facility (SEF), has been used for the investigation and testing.

MELCO also added an interlock circuit to the heat, ventilation, and air-conditioning (HVAC) controller. This is to improve the HVAC safety by avoiding possible human errors in operations and maintenance. This has been installed in all ACA antennas.

3.2.1 ACA 12m antennas:

PM01, 02 and 03 have been used for CSV and early science activities at the AOS.

PM04 has been located at the MELCO SEF. As described above, it has been used for the investigation over the ACU alarms.

3.2.2 ACA 7-m antennas:

CM09 was relocated to the AOS on September 15th, and now ten ACA 7m antennas are located at the AOS for CSV activities. CM01 to CM10 are under CSV activities at the AOS.

An EL abnormal oscillation was found in CM10. MELCO's investigation revealed that the oscillation occurred at 31 Hz, probably due to the installment of ALMA equipment in the receiver cabin. The optimum servo-control filter had been initially fabricated with dummy loads in the receiver cabin, and they were replaced with the real ALMA equipment after the acceptance. A difference of mass distribution between the dummy and real equipment could cause such oscillation. MELCO re-optimized the servo-control filter for CM10 and successfully removed the oscillation. CM03 had an EL oscillation similar to that of CM10 and the same corrective action as for CM10 was taken.

CM10: One of the two uninterruptible power supply (UPS) units was found damaged on August 19th. A service engineer of the UPS manufacturer, Jovyatlas, is to come to Chile in early October and repair the damaged UPS unit.

CM11 and CM12 are used for assembly, integration and verification (AIV) activities at the OSF-TF

3.3. EA Front End

3.3.1 EA Front End Integration Center (FEIC):

The EA front-ends (FE) from #1 to #17 are contributed by EA, #18 to #22 by NA, and #23 to #26 by EU. The work on three FEs has been continued at the East-Asia FE integration Center (EA FEIC) in Taiwan in September 2012 (EA FE #24, #25, #26).

EA FE #23 (FEND S/N41) with six cartridge bands is the first FE that is being assembled for Europe. Its preliminary acceptance on-site (PAS) test at the OSF was already completed. The preliminary acceptance in-house (PAI) review meeting for EA FE #24 (FEND S/N50) with six cartridge bands was held on September 14th, and this FE was subsequently shipped out on September 21st. EA FE #25 (FEND S/N64) contains 6 cartridge bands. Due to technical problems, the Band 8 cold cartridge assembly (CCA) in EA FE #25 needed to be recalled. Schedule impacts that may be caused by this recall could be minimized by exchanging the CCAs with EA FE#26 (FEND S/N68). The PAI tests for EA FE #25 were resumed on September 27th. This EA FE #26 (FEND S/N68), with six bands, is the last of the FEs for Europe. After the CCA replacement with EA FE#25, the PAI test was resumed again on September 28th.

No instrumentation problems occurred in September. Preparations for re-locating a testing line to Chile are going on. The targeted installation date at the OSF is before March 2013.

3.3.2 Band 4/8/10 Cartridges:

Band 4 cold cartridge assembly (CCA4): To date, a total of 18 CCA4 cartridges, out of the 73 CCA4 cartridges, have been delivered. This month's progress is as follows:

- Requests for waivers (RfW) were approved by the FE IPT: (to the CCB) S/N 12, 27, 28, 32, (internally) S/N 22
- The PAI test report is pending: S/N 30
- The PAI test reports are being reviewed: S/N 14
- The PAI test is in progress: S/N 18, 19, 33, 38, 40
- The following cartridges are ready for the PAI test: S/N 09, 16, 39
- The following cartridges are ready for assembly: S/N 35, 36

Band 8 cold cartridge assembly (CCA8): To date, a total of 28 CCA8 cartridges, out of the 73 CCA8 cartridges, have been delivered. This month's progresses are as follows:

- The following cartridges were accepted by FE IPT: S/N 26, 38, 37 (with an RfW)
- The following PAI review report was uploaded: S/N 35

The EA FEIC reported a problem with CCA 8 S/N03, which showed the spike noise during the PAI test on EA FE#25 (FEND S/N64). Band 8 cartridge group intends to replace it with CCA 8 S/N38 which has passed the PAI review.

- NA FEIC raised a non conformance request (NCR) for CCA 8 S/N16 which did not function fully during PAI test on EA FE #62. The cartridge will be returned to NAOJ from OSF in future.

Band 10 cold cartridge assembly (CCA10): To date, a total of six CCA10 cartridges, out of the 73 CCA10 cartridges, have been delivered. This month's progresses are as follows:

- The shipment authorization will be issued: S/N 07, 08, 09, 10
- The PAI test reports are being reviewed: S/N 11, 12, 13
- The cartridges are waiting for cold nonuplers from NRAO: S/N 14, 15, 16, 17

3.4. New Development Projects

3.4.1 Band 1 Cartridge:

By the end of September, the Band 1 cartridge development consortium (ASIAA, NRAO, HIA, the University of Chile, and NAOJ) prepared the document package: technical specifications, change request, all external interface control document (ICDs), pre-production plan, production plan, and development status. We will submit them to the ALMA Development Steering Committee (ADSC) in October to obtain an approval by the ALMA Board in November.

4. EUROPEAN EXECUTIVE

4.1. Management

In September one more AEM antenna was accepted bringing the total to fourteen. Antennas #15 and #16 are in the pipeline and foreseen for acceptance and delivery to ALMA in October.

Over the past months an agreement between ESO and the AEM consortium on spare parts, warranty work at 5000m and closure of technical change requests was negotiated and is now in the signature process.

The 18th FE assembly (verified at the EA FEIC) was delivered to Chile. With this unit the European Executive has delivered fifteen FE assemblies in the last twelve months.

Good news on the road contractor arbitration case was received in September. The tribunal delivered its award fully confirming ESO's position and rejecting the contractor's claims. This concludes the risk of substantial financial burden for ESO and returns a budget provision to contingency.

An ESO report on the option of using liquid natural gas (LNG) as future fuel for the ALMA power system was distributed to JAO management. Contrary to a few years ago, LNG is now becoming available on the Chilean market and presents an interesting possibility. Supply would be via a pipeline (which would need to be built). This, and some other technical and commercial aspects, would need to be investigated in more detail in a dedicated study.

Information and replies were provided to the ABC during their f2f meeting in Santiago. Presentations for the AAER were prepared. Work on the cost-to-complete document

continued. Details on EU site activities, as well as on computing, science and science operations, are given in the joint sections.

4.2. EU Antennas and transporter

AOS/OSF status and progress

Accepted antennas

On September 25th, antenna DA54 was accepted from AEM, and transferred to ALMA a few days later. This brings the number of accepted antennas at end of September to fourteen, out of which ten are at the AOS (DA41 to DA50) and four at the OSF in the AIV area (DA51, DA52, DA53, DA54).

At the time of writing all antennas are operational except DA49, which had suffered an oil leak, and DA53, which has a sporadic error on the HVAC system; both issues being investigated at the time of writing. Equipped antenna DA52 did not pass the readiness review for going to the AOS, for pointing reasons. From the AIPT investigations there is no indication of any malfunction affecting pointing in this antenna, which was well within specification at delivery. Investigations on other possible sources like FE and ALMA SW are ongoing.

The refurbishment of the motor system of the AEM antennas is moving towards completion with nine antennas fully refurbished (DA48 to DA56). For the other antennas, the upgrade program has been initiated but not yet completed. With the steps already undertaken until now, the availability of the AEM antennas has sharply improved. There are indications by AEM that the next upgrade mission will take place in November 2012. It will be necessary to take into account the limited possibility of extensive hardware intervention at the high site.

AEM Work Area Antennas

The process of accepting antennas continued in September. The 14th antenna (DA54) was accepted and transferred to ALMA, and the testing of unit #15 (DA55) was completed. In the case of DA55, which exhibits pointing error residuals larger than previous antennas, the test campaign was longer than usual. It was confirmed that the particular foundation where the antenna was assembled and tested has poor stability (previously found also on antenna DA46, the other antenna tested on this pad) and that the interface to the optical pointing telescope was not fully stable. An RfW has been opened for this last matter. This waiver is not critical, because ALMA will not make use of that interface after delivery. The date for the acceptance review is October 4th, 2012.

At mid September the AIPT started the testing of unit #16 (DA56) with the expectation of completing it on October 9th, 2012. Formal inspections and tests were initiated on unit #17 (DA57), whereby the pointing tests on the sky could not be started due to the missing tiltmeters of the dynamic metrology.

Antennas #18 and #19 are in commissioning by AEM, while antenna #20, fully assembled, is in mechanical finishing. Antenna #21 and #22 are positioned on their pads and assembly has started. The reflector of antenna #21 is finished and ready for installation. The present plan foresees the acceptance of up to antenna #18 and possibly #19 before the end of the year.

The AIPT continued to spend some effort in order to keep the two prototype optical pointing telescopes (OPTs) operational. OPT #2, refurbished in August, behaves sensibly better than OPT#1, for which a date for a similar intervention is being looked for with ESO Paranal. November is now envisaged, but it remains to be seen if this is compatible with the acceptance schedule of antennas #18 and #19.

Antennas #24 and #25 arrived on site on September 7th, 2012. This completes the delivery of antenna structures to the OSF, and only BUS's #22 to #25 yet to arrive at the OSF. BUS's #22 and #23 are in travel while BUS #24 and #25 are planned to leave Europe before end of

October and at beginning of November, respectively.



Figure 1: Unloading of the last steel structure, #25, at the OSF on September 7th, 2012.

Open Points / Reservations

The work to close the reservations associated with the delivered antenna is steadily progressing. AEM is regularly putting manpower for closing the open points of the antennas at the AOS, with ESO coordinating with ALMA the access to the antennas at the AOS, and in AIV processing. Except for few exceptions, the only points remaining are those covered by changes agreed with AEM and recorded in the recent contract amendment #13, in signature process.

The new versions of the operation and maintenance manuals were delivered and provided to ALMA. ESO has been preparing with ALMA the maintainability review of the AEM antenna. The review, originally scheduled for October, has been shifted to November at the request of ALMA.

Work is progressing also on software aspects. Regular reviews on SW open points have been held during September. There is the general perception that the work is converging and that with the release of the SW version 1.5.0 a good level of stability will be reached. The release has been delayed to November, in order to address as much as possible all the known issues.

The scope of contract amendment #13, mentioned above, includes, beyond some agreed technical changes, also the procurement of a complete set of spare part from AEM and the regulation of warranty cases for antennas located at the AOS. With the signature of the amendment, the distinction between warranty cases at OSF and AOS is eliminated and AEM agrees to perform warranty interventions at 5000m at no extra charge.

Europe progress

Production in Europe approaches its end. During the month of September BUS #23 and cabin #24 were shipped. At the end of September the only factory inspection pending were those of BUS #24 and #25 and of Apex #23 to #25.

Ridges, I/F plates, and others.

Nothing pending. Work has been completed, and the spares have been provided to ALMA.

Transporters

After the anomaly of the fine positioning system of the two transporters (discovered in August), and their subsequent repair in the original design status, ESO has given ALMA a time limited mandate for the operation of the two transporters and has in parallel worked on the final solution of the issue. This foresees a mechanical upgrade of the positioning tables, increasing the safety factor in the relevant flanged connections to avoid any shearing forces on the bolts.

All the parts needed for the upgrade are either available at ESO or in procurement. This includes the special tools needed to intervene for the upgrade. ESO personnel will perform the intervention on the transporters. The date of the intervention needs to be agreed with the ALMA antenna group. A mission is being prepared for the upgrade, possibly to take place before the end of 2012.

4.3. EU Front End

The delivery status of major European FE products by September 30th 2012 was as follows:

Product	Delivered by 30 Sep 2012	Total	Percentage complete
Band 7 Cartridges	71	73	97 %
Band 9 Cartridges	73	73	100 %
Cryostats	69	70	99 %
Water Vapour Radiometers	58	58	100 %
FE DC Power Supplies	83	83	100 %
Amplitude Calibration Devices	70	70	100 %
EU Front End Assemblies	18	26	69 %

EU FE IPT activities focused this month on FE Assemblies, other FE production work packages have been completed or are nearly complete.

With the arrival of FE SN68 at the EA FEIC, all four FE Assemblies for verification have been delivered to the EA FEIC by the EU FEIC. FE SN50, the second unit verified by the EA FEIC, passed PAI on September 14th 2012 and has been shipped to the OSF in Chile, where it arrived on September 29th. With the delivery of this FE the EU FE IPT has delivered now 18 units in total (of which 15 in the last twelve months).

Cryostat production was held up due to problems with the delivery of a compliant cold head by Sumitomo for the last unit to be delivered. At the end of the month a cold head was finally delivered by Sumitomo and directly integrated into cryostat SN70.

The last batch of solar filter sub-assemblies has arrived at the OSF and is being installed on ACDs by JAO staff with support from the EU FE IPT.

Band 7 cartridge SN71 was completed, after a successful PAI review it was delivered to the EA FEIC. Assembly of SN72 was finished and PAI verification has started. Assembly of SN73, the last production unit, is awaiting the delivery of LO multipliers.

4.4. EU Back End

Photomixer production has been slightly delayed due to fault analysis and repair of the epoxy issue. Batch 13 (the last batch), consisting of 56 units, is scheduled to pass PAI end of October. All parts including Faraday rotating mirrors are available to complete production.

Several failures were found at the AOS on photomixers. After analysis by RAL it was determined that five out of eleven failures were related to the silver epoxy used as conductor in the manufacturing, two had dirty connectors and worked fine after cleaning, while the remaining four were related to mechanical or handling problems. The problem is summarized in CAR 224 and is being closely followed up by BEIPT. A management review board (MRB) was held together with RAL and the outcome is that it is not suggested to ship the potentially weak photomixer back to RAL for upgrade as the repair is invasive and could be risky for the photodiode. Two photomixers are expected to arrive at RAL for analysis. A follow up MRB will be held after these new results are available.

4.5. System Engineering and Integration

The SE team in Europe continues to support the resolution of corrective action reports (CARs) and systems verification by review.

A review of the European antenna maintenance and operation manual with the AEM consortium is to take place in the following month in Italy.

Agreement has been found with the EU AIPT to support the M&C of the AEM antenna; a workgroup of three experts combining software, antenna and system engineering has been setup and is expected to deliver final results by end of October. M&C data on the WVR is being analyzed by the manufacturer. CMMS data retrieval is continuing with a focus on antenna and back end components.

The product assurance team is continuing to monitor acceptances and quality control of photomixer, front ends and antennas sub-system.

5. NORTH AMERICAN EXECUTIVE

5.1. Management

The project plan for the ALMA phasing project was prepared and submitted to the ADSC for consideration and review. The intent is for the ALMA Board to consider the approval of the plan at its November 2012 meeting.

Quotations were requested for the installation of optical fiber cable between the OSF and Calama as part of a Board-approved development project. The best quotation was selected from those received. The capital cost of the installation is below the financial cap required by the ALMA Board. Requests for approval of the contract award were submitted to the NSF and the ABC. The NSF has approved the request.

A draft development proposal was written for the support of an SIS mixer foundry at the University of Virginia Microfabrication Laboratory (UVML). The foundry provided the SIS mixers for Band 6, and is the only one of its kind in the United States. The foundry's

capability will be needed to support existing development studies and future development projects in NA.

NRAO hosted a meeting of the ANASAC in Charlottesville on September 20th-21st. The NA project office gave presentations on construction project status and NA development activities.

The final candidates for the NRAO assistant director for ALMA-NA Operations were interviewed. The selection process is nearly complete.

A search is underway for a new environment, safety, and security manager at the NRAO. Interim arrangements have been made for existing NRAO safety staff to represent NA at the ALMA External Safety Review on October 28th-30th, and to review safety aspects of pending engineering change requests.

NA preparations for the End of Construction Review to be held in Santiago on October 22nd-25th were completed.

The NA portion of the ALMA risk register was updated.

5.2. NA Antennas

All 25 Vertex antennas are in Chile, and 24 of these have been accepted. The elevation encoder for DV25 was finally delivered and then installed on the antenna. Servo commissioning was completed, and the antenna's pointing tests are underway. The acceptance review for DV25 is now scheduled to occur in late October.

DV12 was returned to the SEF for tower holography measurements of its surface to complete the surface inspection and surface adjuster replacement program. The DV12 measurements are being evaluated by Vertex and the NA Antenna IPT.

Vertex requested additional holography measurements of DV12 to investigate previous reports from CSV of an astigmatic pattern that appears in the holography data. Since the antenna surfaces are set in the AIV process without a FE installed, Vertex had some concern that the load created by the FE might contribute to the surface deformation. Surface maps were made with and without an FE installed. A difference map made from the two did not show significant features. Thus, the FE is not a likely source for the reported surface deformations. Additional maps of the surface were made to investigate both the repeatability of the measurement technique and the temporal dependence of the surface. There are some indications that the surface has changed, as previously reported by CSV, but a quantitative assessment of the data has yet to be completed. The NA Antenna IPT continues to work with Vertex to explore possible root causes of this problem.

The electrolyte in the antenna tiltmeter sensors has been replaced in 22 units. Applied Geomechanics, the tiltmeter vendor, is replacing the electrolyte in two more units, and these should be shipped to Chile by the end of October 2012. Since the retrofit process involves removing the tiltmeters from antennas in the field and returning them to the vendor, the return of the 25th and final tiltmeter will likely occur in January 2013. Two spare tiltmeters will be delivered to the OSF in November 2012.

BEI (the manufacturer of the antenna encoders) wrote a report to document its findings from its August investigation of problems with some of the encoders it provided to Vertex. The report is currently under review by Vertex.

The performance of the first of four OPTs was evaluated in pointing tests of DV23 and DV24. The acceptance review of this OPT is pending the receipt of the test report. The issues with the OPT shutters that were found during the acceptance testing of the second and third OPTs were identified. The fourth OPT is assembled and remains at the vendor facility for factory acceptance testing.

Software improvements to the nutator servo control system have allowed the nutator performance to comply with its residual torque requirement of 20 N-mm. The pacing item for

nutator delivery is now the recoating of its mirror surface at CMA in Tucson. The factory acceptance test for the first nutator is scheduled for early November 2012 with on-antenna tests at the OSF in mid-December. The delivery of the four remaining nutators should occur in the first quarter of CY2013.

5.3. NA Front End

A total of 21 FEs have been delivered from the NA FEIC to Chile. NA FE 21 was shipped to the OSF on October 3rd. The PAI for the 22nd and final NA FE was successfully completed on September 27th. It will be held at the NA FEIC to facilitate tests of a front-end test and measurement system (FETMS). The NA FE 22 is now scheduled to ship to Chile in November. A plan for delivering the FETMS to Chile has been written. The FETMS will be shipped in late 2012, and will be reassembled at the OSF in the first quarter of CY2013.

An MRB will be held to resolve some CARs that are potentially blocking JAO acceptance of the assembled FEs from all FEICs.

A Band 5 production coordination meeting was held between the NA LO group and our EU partners on September 13th. The main topics of discussion were to agree on a way forward for incorporating the new LO components into the cold cartridges and the method for qualifying the full LO chain.

Two staff members from the JAO FE group received Band 3 integration, testing, and maintenance training at the HIA on September 24th through October 5th.

A new version (C) of the ALMA system technical requirements was reviewed.

NA has a goods and services agreement with EA to produce warm cartridge assemblies (WCAs) and cold multipliers for EA's Band 4, 8, and 10 receivers. The scope of this work is in addition to what is defined for the bilateral project. The WCAs for Bands 4 and 8 are currently scheduled for completion in December 2012, and the band 10 WCAs should be complete in March 2013. The cold multipliers for all three bands are scheduled for completion in the first quarter of CY2013.

The production of the front end handling vehicle (FEHV) is pending verification of its maneuverability within the EU 12-meter antennas and EA 7-meter antennas. The design is viewed as mature and is in the final stages of completion. However, the revisions made to the FEHV design to address clearance issues within the antennas and their protracted production schedule will require an additional \$328K to complete the work. The budget change request to complete this work has been submitted and needs to be prioritized in comparison to other pending change requests within the project. In the meantime, a pallet jack is used to install FEs in the antennas. If the change request is approved, the plan for moving forward with the FEHV is to complete the fabrication of the first unit and demonstrate a safe and successful installation of a FE. Upon confirmation of this proof of concept, the four remaining units will be fabricated. The delivery of these units is estimated at ten months.

5.4. NA Back End

Maintenance support and spare delivery continues at the NA back end (BE) IPT. Over the last month, six power supply units were repaired, and an additional four spare power supplies were shipped to the OSF. Spare Antenna Articles 67-69 were also shipped to the OSF. Two spare fiber lasers and two spare doubler assemblies were delivered by the vendor, Teraxion, to the BE photonics group. The document "ALMA back end master laser on-site maintenance procedures" was written.

The NA BE IPT hosted a labview training course the week of October 1st to increase the number of NRAO and ALMA staff who are familiar with the software. Two ADE staff members also attended the course. The software is used in many of the BE test stands.

The central local oscillator article has been operating continuously with high reliability. The reliability of the antenna articles, data receiver articles, and LO oscillator photonics receivers (LPR) has also been better than predicted.

5.5. NA Correlator

Significant progress has been made in bringing the correlator into its full, four-quadrant operation. All cabling related to the four-quadrant configuration is complete, including the fiber optic cables from the antennas and the electrical connections between the correlator racks and computers. All firmware and FPGA personality changes required for the transition are complete. Hardware testing of the four-quadrant correlator was successfully completed. New firmware for the correlator's long term accumulator was written to address a memory allocation error discovered during the tests. The Correlator IPT's four-quadrant test report is being written. The correlator is operating in four-quadrant mode, but is currently limited to inputs from up to 32 antennas. Correlator operation with inputs from 64 antennas is currently under test by CSV.

6. SITE

6.1. JAO

The dominant activity continues to be the preparations for the power transition. The work is progressing albeit the progress continues to be slower than hoped for. There are many activities underway, both in the power-generation and power-distribution systems across both the NA and EU executives; the pacing item for the transition is the turbine commissioning and it is delayed again as described below.

6.2. ESO

AOS

Acceptance of the remaining stations is still pending, though not time critical.

OSF TF

Formal closure of the acceptance review and acceptance certificate is pending.

ALMA Residence

The final phase of the design is approaching completion; more than 90% of the architectural design documentation has been submitted and review is ongoing. The other disciplines are slightly less advanced but are expected to be complete shortly. The final design review meeting is being planned for the end of October / beginning of November.

The proposed location has been subject to two analyses, one to assess the actual cost for cleaning the area and one to assess its current hydro-geologic conditions. Though those analyses have not yet been released, the suitability of the location was discussed at the Directors Council and alternatives have been proposed, although no final decision was made.

A re-design for a different location would require additional efforts and therefore additional costs and time.

Roads

The arbitration tribunal emitted an award for the process against ESO, brought by the contractor that made the salt-stabilized road pavement, substantially in favor to ESO.

The claiming party still has the possibility of starting an annulment procedure; however, this possibility is deemed not to be very likely.

Power

The mission by the turbine supplier to complete the commissioning has been postponed to early October because of late availability of the replacement parts, which have been shipped at the end of September.

In addition, the amount of tests and changes that are planned is now expected to extend the duration of this activity to two weeks.

Concerning the availability of the specified fuel (butane-rich LPG), the tenders for the supply of the fuel submitted in early September, indicate that it will be available at least through all of 2013, with some possibility for 2014.

Operations using the only LPG type available beyond 2013-14, propane-rich LPG, could then become necessary. The supplier claims that they have understood the reason for the incompatibility with propane-LPG emerged during the tests in August and envisaged a solution; however this could come with major limitations in terms of minimum load, which could be difficult for ALMA: currently it is expected that operations with propane-LPG at a load level below 80% of the nominal could be difficult, while operations of the turbines at such a level could not be possible in ALMA, as the large fluctuations of the load could require a larger margin.

Operations on diesel are an alternative, although not the best option because of the cost and environmental impact.

It is fundamental, before starting operations, to make sure tests on any new fuel (whether it be propane LPG or natural gas) can be performed without impairing operations.

Currently the system doesn't allow concurrent and independent testing and operation of different turbines. A concept to implement such a feature has been submitted by the supplier and is being evaluated.

The design of the water drainage improvements, to avoid major damages to the cable installation connecting OSF and AOS in case of exceptional precipitations, kicked off on early September, is progressing on schedule and is expected to be complete by the end of October.

The construction contract for the implementation of those improvements will be awarded once the design is complete and will include the installation of physical barriers to reduce the risk of damage to the cables during road works/maintenance.

The "black start" generator has been installed in the power generation area, replacing the rented generator.

The contractor for the medium voltage distribution system ("23kV") has delivered the full final, as built, documentation, now archived in EDM. This is now ready for review.

The acceptance process by JAO of the LPG storage plant has started with the review of the documentation and execution of the inspections by PA and safety.

6.3. AUI/NRAO

Overall progress during September 2012 reached 84.9% for the project, including work done by contractors. Recent work has been delayed by the effects of seasonal bad weather.

Contractor Agua Santa (AS) is back on site to work on grounding clamps as well as testing and documentation delivery. The full completion of the inner array will occur once the PPS connection is finished and the power tests can be carried out. The contractor estimates that the completion date will be near the end of 2012, which would require an adjustment of the contract termination date.

AUI/NRAO has almost completed the pads associated to Cycle 1, except for those depending on the JAO returning the loaned switchgear.

7. SYSTEM ENGINEERING

With respect to the power deliverables, JAO system engineering (SE) has reviewed the liquefied petroleum gas system and generated a number of review item discrepancies. Two engineering change requests for the outer array power distribution have been reviewed in detail. There is some but not full agreement between the delivering party and JAO on the way forward.

With respect to reviews, we have worked with project management (Ogasawara-san) for the preparation of the end of construction review. As a result of a critical design review of the front end handling vehicle, six updates to the technical specification have been prepared, and the delta critical design review is scheduled for the end of November. Planning has been started for the maintainability reviews for the AEM and MELCO antennas, in November and December respectively. Success in these reviews is a necessity for moving towards full ALMA acceptance of these antennas.

Now that some additional resource is available, the remaining FE subsystem acceptances are underway, including of the final batch of amplitude calibration devices. Authorization has been given for installation of solar filters into the amplitude calibration devices. The test readiness review was successfully held for the first batch of FE Band 8 cold cartridges which will be delivered direct to the JAO; authorization for testing was granted.

SE is co-coordinating with Site IPT and Back End IPT on how to move forward on delivering antenna stations whose fiber optics testing were nonexistent or incomplete.

SE continues with co-coordinating all upgrades and completion work within the scope of Construction.

The system verification team continues to respond to feedback on the system technical requirement update. Preparation continues of the documents and presentations for the end of construction review. The first draft of the system verification & compliance matrix has been prepared.

SE supported planning for the deployment of the complete 64-antenna correlator, and the related acceptance process.

Concerning staffing changes, we are grateful to NAOJ for support from Nagai-san to join the system verification team at 50% FTE. Juan Pablo Garcia has been internally transferred with ADE from the front end team to system engineering.

The normal work is ongoing for configuration management, release of requirements documents, and chairing of acceptances. The following chart provides a summary of acceptance events held up to and including the reporting period (September 2012). SE continues to support Computing in the testing and deployment processes of next software release

Reporting period	SEPTEMBER 2012				Statistics			
	TRR	PAI	PAS	ACRV	Accepted(ACRV/PAS)	Remaining	TOTAL[1]	% Completed
Site								
Antenna Stations				0	87	105	192	45%
Power, Signal Distribution System Branches				0	1	the number of branches is still being discussed		
Antennae	AIPC							
NA	0			1	24	1	25	96%
EA 12m	0			0	4	0	4	100%
EA 7m	0			0	12	0	12	100%
EU	0			1	14	11	25	56%
Nutators	0	0	0		0	5	5	0%
Optical Pointing Teles.	0	0	0		2	4	6	33%
Front End								
Integrated FE	0	3	2		53	17	70	76%
ACD	0	0	0		60	10	70	86%
WWR	0	0	0		58	0	58	100%
PSU	0	0	0		80	3	83	96%
COMP M&C	0	0	0		41	54	95	43%
PSU M&C	0	0	0		47	30	77	61%
FE Service Vehicle	0	0	0		2	0	2	100%
FE Handling Vehicle	0	0	0		0	4	4	0%
Back Ends								
Antenna Article	0	0	2		56	10	66	85%
FOW	0	0	0		140	2	142	98%
CLOA LRUs	0	0	0		154	0	154	100%
Correlator								
Baseline Quadrants	0	0	0		4	0	4	100%
ACA Quadrants	0	0	0		4	0	4	100%
Computing								
new release		0 "small release" handed to CSV			9	2	11	82%
System Engineering								
CMMS	0	0	0		1	0	1	100%
Science								
Weather Station	0	0	0	0	0	7	7	0%
Oxygen Sounder	0			0	1	0	1	100%

8. SCIENCE IPT

8.1 Commissioning and Science Verification

There were two major tasks for CSV during the month of September. Most of the effort over the second half of the month was focused on assisting Computing with the upgrade of the baseline correlator to four-quadrant capability. CSV officially began testing of the four-quadrant configuration on September 26th; in the ten days prior, CSV assisted in identifying and/or troubleshooting several blocking issues, including the inability to set delays to a certain tolerance, 250ps delay jumps, and various issues in FDM performance. Only one issue remains in the 32-antenna configuration, namely intermittent 250ps jumps, and we hope this is resolved in the coming weeks. Use of the four-quadrant correlator with more than 32 antennas is currently not possible and we plan another recommissioning of the correlator in mid-November to test this capability. Other baseline correlator tests revealed that the latencies between sub scans have been reduced by a factor of two, to 5s for situations in which the number of antennas is larger than sixteen. This is a great step forward in verification of the 150 pointing mosaic mode.

CSV made a focused effort on ACA commissioning in the first half of the month. We made measurements of the focus and pointing models as well as antenna position determinations. Phase closure at Band 8 was also demonstrated. There are nevertheless significant challenges still remaining before we can say that the ACA is fully ready for scheduled Early Science observing. On the data-taking side the most critical of these is finding a satisfactory way of treating the digitization effects when making spectral system-temperature measurements. On the data-processing side the main issue is to gain experience of the practical steps needed to combine ACA, 12m and single-dish data. To that end we have been working hard to obtain good data sets on a range of suitable objects. By the end of the month we had obtained total power, ACA interferometric and baseline array interferometric data on two objects, Saturn and IRC10216, in continuum and spectral lines, respectively. These datasets will be used at a workshop aimed at determining the best imaging strategies.

Members of the CSV team and Science IPT staff from the executives continued to be heavily involved in testing antennas, acceptance meetings and readiness reviews.

8.2 ASAC

The regular monthly telecon between the JAO, the Executive project scientists and the ASAC took place on September 12th. There was discussion of the terms of reference and temporal charges from the Board in preparation for the October face-to-face meeting. The ASAC gave feedback on the science verification process and was pleased with the planned improvements in the information provided to the community. There was further discussion regarding science overlap of two specific sources in the science verification list with Cycle 0 approved proposals. It was ultimately decided to remove these sources from the list.

8.3 Staffing

September saw the departure of Richard Hills from the JAO. His vast array of technical knowledge will be greatly missed. Tim van Kempen from the Dutch ARC node also left us after a two-year stay where, among other things, he led the effort to fill the calibrator catalog database with enough measurements to prepare us for Cycle 1.

Ed Fomalont joined the JAO for a period of at least a year starting on September 20th. He has already taken up significant leadership roles including working on combining the total power, ACA, and 12-m array data. Ed is coordinating a workshop in Grenoble, France, in October to focus on these issues. Joanna Bulger from Exeter University in the UK joined CSV during August and most of September. She worked on characterizing the sideband ratios for our front ends and conducted a complete survey of the quantity at Bands 3, 6 and 7. We look forward to a summary of the work, which is forthcoming.

9. COMPUTING IPT

The testing of the correlator software needed after the installation of the correlator fourth quadrant took ten days longer than expected (for a number of reasons in addition to software problems). It was decided to concentrate efforts to enable work with up to 40 antennas to allow resuming Early Science observations by October 17th. The software to allow the full 64 antenna inputs on the correlator is already implemented (it involves switching from 32 to 64 bits), but needs to be tested. It should be deployed by early November.

During the first part of this effort, two blocking issues (one in software, one in hardware) were resolved in late September and the system was handed over to CSV for testing on September 26th. Software acceptance scope for R9.1.0 was reduced accordingly and adjusted to start on October 5th, about a week later than planned. At the time of this writing there is no indication of further delays.

No further testing of the new bulk data system was carried out in September to avoid interference with the correlator upgrade work. Testing will resume in early October.

The schedule for R9.1.1, which contains a significant fraction of control/correlator new features, as reported last month, remains unchanged. The most prominent feature of 9.1.1 is scan sequences, which will finish the observing efficiency improvements that were kicked off early in 2012. The schedule for R9.1.2 handover to CSV for testing will be delayed in a week as a result of the pending work in the correlator software mentioned above. No significant impact on R9.1.2 acceptance is foreseen so far.

The software applications to support the ALMA proposals review process was extensively used in the last week of September. ALMA assessors provided very positive comments about it and the process ran smoothly with no significant issues to report.

The ALMA science portal has been deployed internally for testing by nominated DSO and ARC staff. They are providing crucial feedback to the development team. Additional resources from other subsystems are assisting the archive team to ensure a successful deployment for the December 6th opening of the ALMA science archive.

The CIPT subsystem leads meeting was carried out late September in the Santiago offices. The discussions were mostly related to the processes and tools for the upcoming operations phase starting next year.

Release management will be handed over to the JAO on October 1st, following the creation of the software engineering and quality management group. As a result, Erik Allaert will hand over the release manager role to Ruben Soto in ADC, and will become the lead of the newly created group. The new release manager will work closely with the Integration and test subsystem lead to prepare an implementation plan for the release management and integration testing group foreseen in operations.

10. SCIENCE OPERATIONS

Status of the Cycle 1 proposal review process

Preparations for the proposal review meetings that will take place in Santiago on October 1st - 5th at Hotel Sheraton in Santiago went well. A summary of the meetings and the outcome will be presented in the October monthly report.

Cycle 0 observations and data processing

No observations took place in September because of the work on the upgrade of the correlator and the power system.

Data processing is proceeding at the ARCs as well as at the JAO. Figure 2 shows the number of SBs that have been processed and delivered to PIs as function of time (=completed executions of SBs that have passed QA2), and Table 1 shows the cumulative status of observations and data processing until October 6th. The calibration problems that had been delaying processing of Band 9 data have been rectified, and all the Band 9 data collected so far have now been distributed to ARC and JAO staff for processing.

Pipeline testing is currently ongoing at the JAO and the ARCs, and the second version of the pipeline software is now in use at the JAO. The results of the tests are promising.

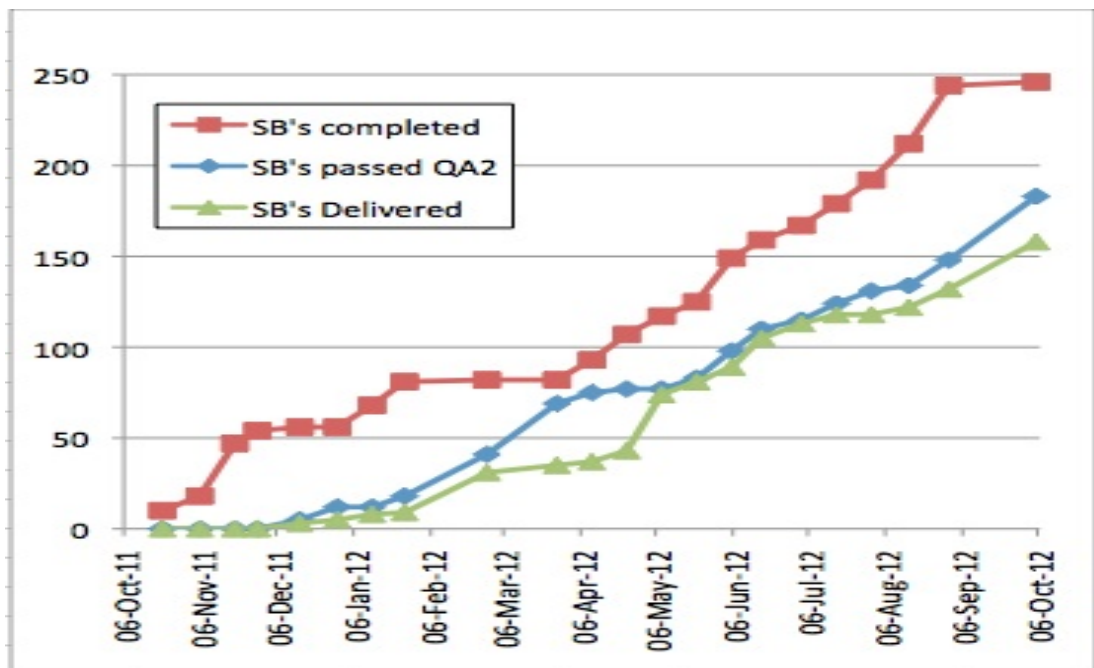


Figure 2: Data Processing and data delivery

Priority=Highest	Projects	SBs	Executions
Total Number Needed	113	370	749
Started	96	278	619
Passed QA0+	-	244	574
Passed QA2 or delivered (partly or completely)	59	182	363
Completed	25	182	363

Table 1: Status of Cycle 0 observations and data processing on October 6th

Table 2 shows the Executive balance derived from the number of hours of successful observations (datasets that have passed QA0). Active management of the observing schedule ensures that the balance achieved to date is very close to the nominal regional shares.

Summary: Time of Executions that passed QA0; by Executive (hours)				
Executive:	CL	EA	EU	NA
Sum (hours)	93.5	179.0	285.2	279.2
Fraction (%)	11.2%	21.4%	34.1%	33.4%
Difference	1.2%	-1.1%	0.3%	-0.4%

Table 2: Executive balance of observing time and the differences with respect to the regional share

The forecast is that the majority of the Cycle 0 high priority projects will be finished (currently 70% of the observing time has been used and 70% of the executions are done) before the end of Cycle 0. However, it will most likely not be possible to finish all Band 9 executions because of limitations in suitable observing conditions and pressure in some LST ranges.

DSO Hiring:

Interviews took place for the JAO operations astronomer position. Several good candidates were identified and a job offer will be made.

The deadline for applications for the first three JAO postdoctoral fellowship positions was September 27th. Applications from 23 candidates were received.

Additional ARC activities

Users' survey completed: EU is producing the pie charts to hand over to the NA ARC to write the final report.

EA ARC:

East Asia accepted a total of 11 SBs to be reduced for QA2 in September. During this month, the data reduction for six SBs passed QA2.

The EA ARC was involved in reducing SV data HD163296 B6 data and Arp 220 B9 data.

The semi-annual meeting of the Astronomical Society of Japan was held on September 19th-21st in Oita, Japan, and ARC staff members reported their ARC activities and their researches.

EU ARC:

QA2 process has been going on during the month of September with the help of the ARC nodes. The first EU Band 9 dataset was calibrated, imaged and delivered to PI. Many other data were delivered to EU PIs.

Pipeline testing: Humphreys and Stoehr completed the pipeline testing using the EU

delivered early science projects. Felix Stoehr created a script to compare QA2 of Pipeline and script-based reductions.

CASA beta testing started in EU with the help of Fellows and ARC nodes

SV data reduction: EU ARC involved in reducing SV data SgrA*, HD163296 and RXCJ1347-1145.

The annual meeting of the German Astronomy Society was held in Hamburg, September 24th-28th. Two posters were presented: "The Atacama Large Millimeter/submillimeter Array", "The European ALMA Regional Centre", displayed Monday through Friday at the splinter meeting "First Science with ALMA"

NA ARC:

September efforts include extensive testing by NAASC staff of CASA 3.4 and the local pipeline installation.

With the backlog of Band 9 observations released, NA started a concerted data reduction effort. A total of 13 staff (including colleagues from NRC and the NAASC postdocs) started (or restarted) processing for 25 SBs, encompassing 15 projects. By the end of September, 11 of these had been posted for approval, 11 were in process, and three resubmitted for more observations. NA delivered datasets for five projects. We anticipated that this elevated effort will continue into October, after which we should be caught up.

The NAASC hosted our yearly face-to-face meeting with our community advisory committee, the ANASAC. The meeting was held in Charlottesville on September 20th-21st. Topics included updates on Science Operations and Construction, ASAC charges, the Cycle 1 proposal process, data processing requirements, future NAASC workshops, and the ALMA Development program. Presentations are available at:

<https://safe.nrao.edu/wiki/bin/view/ALMA/Sep12Agenda>.

The NAASC co-hosted the science workshop "High Redshift Comes of Age: A Celebration of the Career of Paul Vanden Bout" in Charlottesville, September 13th-15th (<https://science.nrao.edu/facilities/alma/naasc-workshops/HizISM/>). About 60 scientists attended, and some spectacular ALMA results were presented.

Interviews were conducted at NRAO for the Assistant Director for NA ALMA Operations.

11. ALMA DEPARTMENT OF ENGINEERING

11.1 Management

The support of operations and the construction project both continue. Highlights include the efforts in support of the preparation to transition from the temporary power system to the permanent system. Budget plans for FY2013 are completed including those for the transitions that will dominate this year's activities. Operations and maintenance planning continues. Inputs from the front-end IPT were provided to the JAO and executive program managers to incorporate into their programmatic plans.

11.2 Antenna Group (AG)

After critical failure of both antenna transporters on August, in a combined effort between antenna group and ESO we were able to repair them and have them fully operational. We have performed several relocations to/from AOS without problems. ESO IPT and the vendor of the transporters will prepare a redesign to avoid this problem from happening again in the future. LORE's 1500 hours maintenance has concluded successfully. Currently we are in the process of procuring hydraulic hoses to replace them in both transporters after six years of use.

A walkabout to the Vertex hangar was performed with a representative from the project office and NAAIPT to assess the effort that would be needed in case of moving antenna group there.

A supervisors' workshop was held with the attendance of all antenna group supervisors and manager to define guidelines and unify criteria in both shifts.

11.3 Instrumentation Group (IG)

Trainings: In September, two FEND staff were trained in the dis/assembly and testing of Band 3 cold cartridge assemblies; the first sessions of observatory-wide quality management trainings have been given to the instrument group teams; a LabVIEW training at Socorro and troubleshooting and certification training for BE LRUs is organized for the first week in October for two BE team engineers, who will then transfer their knowledge among the IG staff.

Back End: *AIV activities:* BE antenna articles were integrated in three array elements, and three BE AAs were PAS-tested; *Operations:* Re-configuration of the AOS patch panel for better configuration control; Routing of Fiber from the OSF CLO room to the OSF technical building for availability of a photonic source in the BE lab; Re-routing of fibers in CM antennas for better maintainability; After the quality management training a project was started to improve the documentation of the BE procedures.

Front End: *AIV activities:* Holography campaigns were performed on five antenna elements; PAS tests were done on five FEs; receiver noise and locking tests on four array elements; three FEs were installed on new array elements. *Operations:* Six FEs were installed on operational array elements after maintenance; 22 individual trouble shooting activities were performed on various LRUs and subsystems.

Cryo Team: *Integration:* cryo system installations and checkouts were concluded in six array elements; three cryogenic compressor enclosures were PAS-tested; five cryo systems required support and attention with PAS tests. *Maintenance & Troubleshooting:* Preventative maintenance on cryo systems was done on nine FEs, both at the AOS and the OSF; the team lent support during various switch gear shutdowns. *Laboratory activities:* The room 13 He pipe drawings details were completed; and the shaker bench design was concluded.

Correlator/data transfer system (DTS): *AIV activities:* Deployment of 4-Quadrants configuration, together with computing group and the CORL IPT; CMMS for ACA correlator. *Operations:* Several correlator LRUs have been repaired and tested; correlator firmware modifications were carried out; a statement of work and purchase request for operational spares were generated.

Concerns: Re-starting the cryogenics/vacuum environment for the FEs in array elements after power shutdowns at the AOS (switch gear maintenance) is taking longer than anticipated; a CRE by Armin Silber was revived to confront the issue.

11.4 Maintenance Group (MG)

Power Generation:

The temporary power system continues to provide reliable power but with some substantial maintenance activity required. The transition to the PPS has not yet been firmly scheduled.

OSF Technical Facilities Area

The power to the OSF technical facilities area and the camps and antenna contractor areas was reliable through the month. This is provided through a mix of owned and rented diesel generators.

AOS Area:

On September 16th, there was an unexpected power outage at 13:17 that affected the AOS. The outage duration was ~1 minute, and the breakers for the antennas were tripped.

Unfortunately, the array recovery took several days as the restart procedure required hands-on intervention and consequently the front ends were without power for a period of time that resulted in the need for them to be cycled. The root cause was found to be the generator G02, which had a short circuit in the battery charger producing an automatic disconnection of the other generators.

11.5 AIV Processing

During this month two additional AEs were delivered to the AOS, bringing the delivered total to 46. Three new antennas were transferred to AIV, allowing for the usage of the full processing capacity throughout this period.

In early September array element relocations got delayed due to the fact that both antenna transporters remained out of service, due to technical problems. This reduced the schedule contingencies of several AIV array elements, but the target delivery pace of two AE/month in average also during October-November is still achievable.

Technical failures of three EU antennas in AIV processing showed that a clarification on what can be expected in terms of AEM warranty support (priority, spares and response time) would be an asset. E.g., in case longer repair lead-times need to be considered this would have to be reflected appropriately in the AIV schedule contingency planning.

Efforts have started to get to at least six 7-m array elements at the AOS equipped with Bands 4 and 8 in the coming weeks, in preparation for CSV to acquire images using these bands on the ACA.

A second station 4 review for a batch of six array elements took place, and no major issues were identified that would prevent from final hand-over of these AEs to Operations. Currently, all AIV processing stations have been completed for twelve AEs.

11.6 Array System Group (ASG)

The results of the fault analysis for the past the months are shown in figure 3. During this period, 95% of the available observing time of about 950 hours was actually available. Hardware faults accounted for about 2% of lost time and software for another 2%.

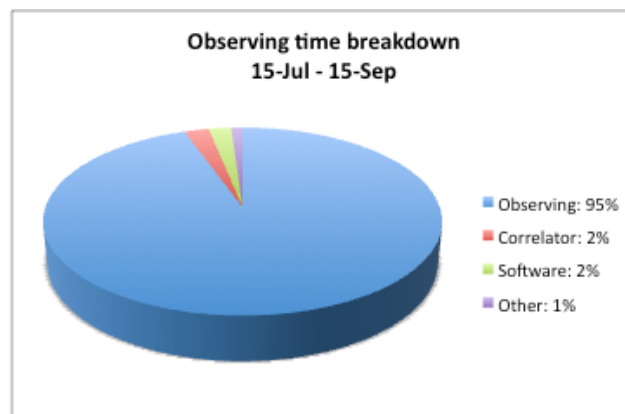


Figure 3

Work is progressing well to implement a prototype of the proposed new problem reporting and tracking system. So far the workflows and most entry screens have been implemented in JIRA while development of scripts to interface JIRA with CMMS and the on-line software is on-going. We expect to start testing the new tools in mid October and begin using it for recording faults in the operational systems from November 1st.

The ASG has developed procedures and tools to optimise the operation of Band 4 and 8 FE cartridges and these have been handed over to the instrument group front-end team for routine use. The group has also worked on characterising IF signal level detector offsets and developed tools to update the relevant hardware calibration files. These tools will be handed over by mid October to the back-end team for operational use.

11.7 Projects Office

The radio sites are expected to be finished in October, after some failed attempts. The beginning of the installation of the communication elements is scheduled for November 8th.

The SoW for the weather stations project was not completed on September but will be sent to ESO for approval during October.

The OSF IG laboratories project is ongoing. Proposals responding to the Call for Tender have been received and are now in evaluation. We expect to complete the analysis and deliver a proposal to ESO PR by mid October, so we could have the awarded contractors on site by early November.

Stage 1 of the AOS hangar door upgrade (electrical system and automatic opening and closing) will be completed by mid October. Stage two (exhaust system) will start the same month.

11.8 Integration of Bands 4/8/10 at OSF

The draft project plan has been further iterated and improved together with the stakeholders, and the document release process has now started. The progress of the FETMS deliveries to the OSF and their related installation/verification has been monitored; here the delay of the start of the OSF TF civil works is concerning considering that these are required for receiving the test systems.

Preparations for pilot acceptance testing of a first set of Band 8 cartridges at the OSF are underway. This is done in tight coordination with SE and PA.

12. ALMA DEPARTMENT OF COMPUTING

12.1 Management

The implementation of the departmental training plan is proceeding as planned and almost completed. A call for tender for CISCO equipment is in preparation. It will include telecommunication, phone and videoconferencing equipment. With respect to Oracle, a one-year extension for the existing contract through ESO has been granted, and a call for tender is under preparation.

The execution for 2012 budget proceeds as planned, and input for the 2013 budget and outer years has been discussed with the other department heads and ALMA directors.

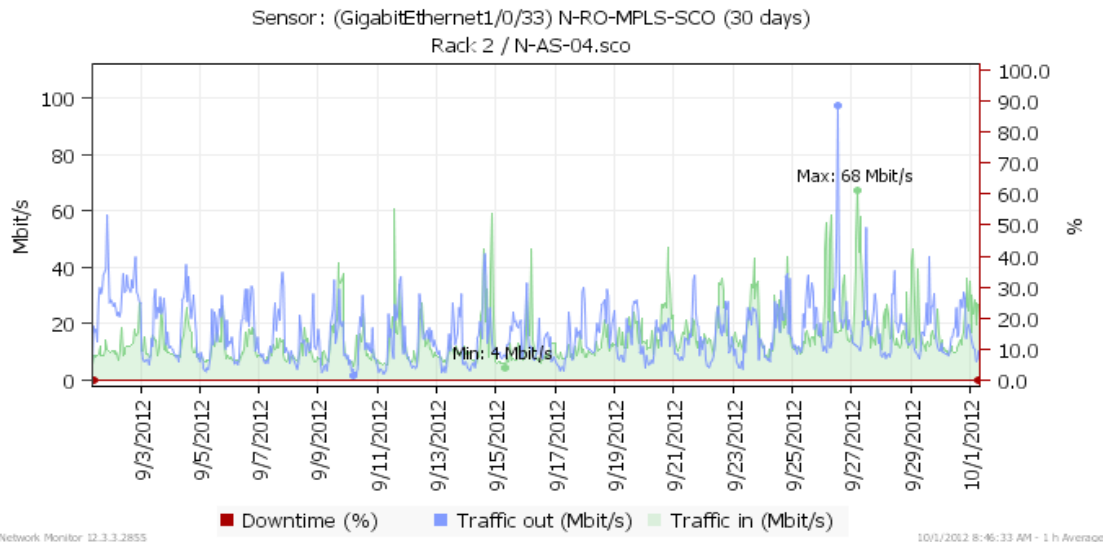
The execution of the unified procurement interface project is now on a second phase and details on its use are currently been work out. The user information data repository project charter has been discussed with JAO senior management and their comments have been incorporated.

12.2 Information Technology Group (IT)

The user satisfaction survey was completed in September (33% users answered it). Data is currently being analyzed and a report is due in November.

Additional hardware for the ALMA blade system in Santiago has been received and being installed. Migration of EDM has been completed allowing recovery of hard disk space. Additional storage space was also added to the e-mail server.

MPLS link continues to be stable, as shown by the graphic of the up time and traffic during September 2012 below:



12.3 Software Group (SG)

Starting June 2012, the software group report has been integrated in the Computing IPT section.

12.4 Archive and Pipeline Operations Group (APO)

Significant effort has been put in understanding the root cause of replication issues between the SCO and OSF. The effect of this issue when it appears is that project updates submitted in the SCO are not reflected at the OSF, blocking observations. In addition, they need of bi-directional replication is being analyzed with Science.

Software installation for the archive operations test environment has been delayed due to higher priorities and now it is expected to be finished end of October.

NGAS storage capacity increase (data migration from 1TB to 2TB disks) already started at the OSF in September. The plan is to complete this task in October.

Data production has been lower than predicted and therefore no disk shipment has been required so far. Data transfer has been done using the existing network bandwidth capacity. Shipments may be needed in November/December.

13. ADMINISTRATION

The ABC met face-to face with the JAO CMT on September 24th-25th in Santiago to review the fourth internal draft proposal (2013.D4) for the 2013 budget. Three external experts appointed by the Executives also participated in this review. Overall, the JAO budget presented for 2013 was consistent with the guidelines of the ABC with only some additional clarifications required before final submittal to the ALMA Board. In addition, greater transparency of the off-site budgets and a short report on the 2014 and beyond budgets were requested. These will be completed for submission to the board.

Bids were received and are under review for calls for tender (CFT) for contracts to be awarded before the end of the year for power fuel (LPG), catering and cleaning, general maintenance, road maintenance, and in-land freight. Bid clarification and final negotiations will occur during October with the award of each contract planned for November.

The JAO PMCS team and the executive controllers continued working on the construction cost to complete summary. This report, with all contributions as of September 30th, will be completed during October.

14. HUMAN RESOURCES

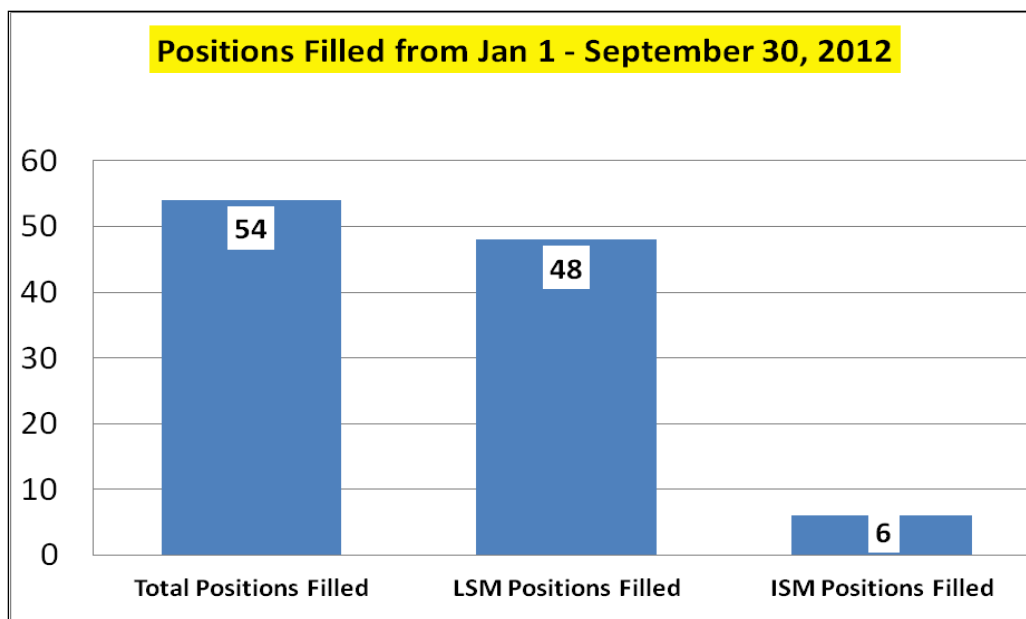
September 18th Staff Celebrations:

Despite difficult weather at the OSF, staff members were able to celebrate Chile's national holiday on September 18th with a special barbecue. In Santiago, a joint barbecue was organized on ESO's grounds with staff participation across the partnership (JAO, ESO, AUI, and NAOJ).

Local Staff Member (LSM) Attendance and Timekeeping:

After full implementation of the updated time and attendance policies and procedures and related training, September overtime for LSMs returned to a level commensurate with the average experienced prior to the implementation of the Electronic Timekeeping (ETK) system. Overtime dropped from 12,273,620 CLP (approximately \$25,886 USD) in August to 3,091,115 CLP (approximately \$6,510 USD) in September. The JAO anticipates that overtime payments will now remain at reasonable levels; however, the situation will continue to be monitored and follow up conducted, as needed.

LSM Recruitment and Selection:



Local Staff Member (LSM) on-going Recruitment:

ALMA Human Resources is currently searching for ten LSM positions as follows:

- **ALMA Department of Engineering (7)**
 - Antenna Group (1)
 - Maintenance Group (4)
 - Project Office (2)

- **ALMA Project Management (2)**
 - Quality Assurance (2)
- **ALMA Director's Office (1)**
 - Site Group Security and Warehouse (1)

Arrivals and Changes:

Two new LSMs started work during the month of September: one technical services supervisor, ADO-site group technical maintenance; and one operator, power team ADE-maintenance group. There were four promotions within the ADE-maintenance group; one transfer in ADO-Site group technical maintenance and one change of position in ADE-array system group.

Four LSM's left and/or transitioned out of the organization, one software engineer from ADC-SW group, one warehouse operator from ADO-site group security and warehouse, the HR LSM manager from ADO-HR and one facilities operator from ADO-site group technical maintenance.

ISM Recruitment and Selection:

- **Operations Astronomer (1 ISM)**
 - A total of seven interviews were conducted for the position of operations astronomer.
 - The selection board report will be finalized in October and the successful candidate will be expected to begin work as soon as possible.
- **ALMA Postdoctoral Fellows (3 ISMs)**
 - A total of 23 applications were received for the ALMA postdoctoral fellow positions.
 - The selection board will meet in October to finalize the short-list and interviews are expected to take place in late October and/or early November.

International Staff Member Departures:

Richard Hills completed his role as ALMA's project scientist and returned to Cambridge University in the United Kingdom. During his many productive years at ALMA, Richard led the scientific commissioning and verification activities, providing the scientific leadership and expertise needed in this very difficult role. He played a crucial role in establishing ALMA's scientific capabilities as prescribed in the ALMA bilateral agreements and contributed to decision making, overall policy development and strategic planning.

Tim van Kempen completed his commissioning scientist role in September and returned to Leiden University in The Netherlands.

15. EDUCATION AND PUBLIC OUTREACH

During September we had three media crews at the ALMA site: Dutch science television "Labyrint"; Australian Global Mail, and Associated Press.

At the same time, we had four media requests: Chilean newspaper La Tercera, Radio Francia Internacional, Radio Universidad de Chile and America Economía Magazines. A new press release based on ALMA observation ("Astrochemistry Enters a Bold New Era with ALMA") was featured worldwide.

ALMA images were featured as part of the Awesome Universe ESO 50th Anniversary exhibition campaign (<http://www.eso.org/public/events/special-evt/awesome-universe.html>).

NAOJ created a serial column online "Bienvenido a ALMA!" in order to have first-hand impressions of what it means to work at this Observatory. Two of them were published this month: "Commissioning ALMA with People around the World NOW" (<http://alma.mtk.nao.ac.jp/e/news/column/Bienvenido/12.html>) and "Daily Meeting with JAO & Project Coordination" (<http://alma.mtk.nao.ac.jp/e/news/column/Bienvenido/13.html>)

Significant effort has been put in the preparation for the First ALMA Conference in Puerto Varas, Chile (www.almasc.org) and for the ALMA Inauguration event. The Communications Task Force had a teleconference to coordinate each partner's contribution for the ALMA Inauguration.

In order to amplify our relation with the community, EPO –in coordination with an external designer– created an ALMA power point to support our staff in their talks.

16. SAFETY

Meetings & Training

A second period of mountain driving training started and it is expected to be completed by the second week of October.

The second shift of ALMA's brigade got trained in Chilean fire department training facility. The course focused in emergency management and collapsed structures and confined areas rescue. The course is the first part of a group of trainings that can lead to a USARS certification.



Vehicles

There was one accident during this month on the ALMA road. An ALMA staff member hit one of the road barriers. Only damages to the vehicle were reported. Over 3,000 speed

controls were taken on the ALMA road this month, and five suspensions were issued to contractors.

Environment

The safety department has been carrying out periodic inspections to the sewage treatment plant. An improvement has been noticed in that operators spend more time at the plant.

Incidents

A series of false fire alarms have been triggered at the OSF TF and at the AOS. ALMA's safety brigade was activated every time and the building inspected. JAO safety and MG have been discussing with system vendor (TYCO and West Fire) possible solutions to the problem. Maintenance work has been scheduled for the second week of October with the vendors.

Health & Well Being

The second round of onsite HAMEs took place during the last week of September.

17. LIST OF COMMONLY USED ACRONYMS

AAER: ALMA Annual External Review
ABC: ALMA Budget Committee
ACA: Atacama Compact Array
ACD: Amplitude Calibration Device
ACRV: Acceptance Review
ACU: Antenna Control Unit
ADA: ALMA Department of Administration
ADC: ALMA Department of Computing
ADE: ALMA Department of Engineering
ADSC: ALMA Development Steering Committee
AEM: Consortium building the European antennas
AG: Antenna Group
AIPT: Antenna IPT
AIV: Assembly, Integration and Verification
ANASAC: ALMA North American Science Advisory Committee
AOS: Array Operations Site
ARC: ALMA Regional Center
AS: Agua Santa (contractor)
ASAC: ALMA Science Advisory Committee
ASG: Array System Group
ASIAA: Academia Sinica Institute of Astronomy and Astrophysics
BE: Back End
BUS: Back Up Structure
CCA: Cold Cartridge Assembly
CDR: Critical Design Review
CIPT: Computing IPT
CMMS: Computerized Maintenance Management System
CSV: Commissioning and Science Verification
DSO: Department of Science Operations
DTS: Data Transfer System
EA: East Asian
EDM: Electronic Documentation Management
EL: Elevation
EPO: Education and Public Outreach
EoC: End of Construction
ESO: European Organisation for Astronomical Research in the Southern Hemisphere
EU: European
FAT: Factory Acceptance Test
FE: Front End
FEHV: Front End Handling Vehicle
FEIC: Front End Integration Centers
FETMS: Front End Test Measurement System
FPGA: Field Programmable Gate Array
HVAC: Heating, Ventilating and Air Conditioning
IPT: Integrated Product Team
ISM: International Staff Member
JAO: Joint ALMA Office / Joint ALMA Observatory
LO: Local Oscillator
LPG: Liquefied Petroleum Gas
LPR: Local Oscillator Photonic Receiver
LSM: Local Staff Member
M&C: Monitor and control
MG: Maintenance Group

NA: North American
NAASC: North American ALMA Science Center
NAOJ: National Astronomical Observatory of Japan
NRAO: National Radio Astronomy Observatory (USA)
OPT: Optical Pointing Telescope
OSF: Operations Support Facility
PA/QA: Product Assurance/Quality Assurance
PAI: Preliminary Acceptance In-house
PAS: Provisional Acceptance on Site
PM: MELCO 12-m antennas
PMCS: Project Management Control System
PPS: Permanent Power System
RAL: Rutherford Appleton Laboratory
RFW: Request for waiver
SB: Scheduling Block
SEF: Site Erection Facility
SG: Software Group
SIS: Semiconductor-Insulator-Semiconductor
SoW: Statement of work
SW: software
TF: Technical Facility
UPS: Uninterruptible Power Supply
WCA: Warm Cartridge Assembly
WVR: Water Vapor Radiometer