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National Radio Astronomy Observatory

Quarterly Status Update (QSU) 2 FY2020

January – March 2020

PREPARED BY	ORGANIZATION	DATE
Thisdell/ADs	Director's Office	5/4/2020

APPROVALS (Name and Signature)	ORGANIZATION
Nicole Thisdell	NRAO
Tony Beasley	NRAO
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NRAO Quarterly Status Update
January - March 2020
QSU2 FY2020

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope
2.5	NA ALMA Operations							
	Operations							
1	Investigate logistics and feasibility for interferometric workshops	3/30/2020						
2	Review conference applications	12/31/2019						
		3/30/2020						
3	Special ALMA Session at AAS Winter 2020 meeting	3/30/2020						
	Development							
7	FY2021 (Cycle 8) Call for Study Proposals	3/30/2020						
	Chile Office							
9	Power options for Parque Astronómico Atacama and ALMA	12/31/2019						
		3/30/2020						
10	Office lease alternatives for OCA	12/31/2019						
13	Plan to improve maintainability of AOS technical building	12/31/2019						
		3/30/2020						
14	Management of FEHV warranty	12/31/2019						
		3/30/2020						
15	Multicancha project – delivery and inauguration	12/31/2019						
		3/30/2020						
16	Collective bargaining	12/31/2019						
		3/30/2020						
17	STEM EPO and D&I	12/31/2019						
		3/30/2020						
3.3	New Mexico Operations							
	Very Large Array							
	Operations							
1	Define VLA GO and SRO capabilities to be offered for Semester 2020B	12/31/2019						
3	Update VLA documentation to support 2020B Call for Proposals, perform proposal technical reviews	3/30/2020						
5	Determine baselines and pointing for antennas moving into their D configuration locations	12/31/2019						
6	Determine baselines and pointing for antennas moving into their C configuration locations	3/30/2020						
8	Reconfigure from A to D configuration	12/31/2019						
9	Reconfigure from D to C configuration	3/30/2020						
	Maintenance and Renewal							
16	WIDAR power system replacement	6/30/2020						
19	Perform preventive maintenance on each of two transporters prior to array reconfiguration to D	12/31/2019						
20	Perform preventive maintenance on each of two transporters prior to array reconfiguration to C	3/30/2020						
25	Perform preventive maintenance on the next configuration VLA antenna transformers prior to array reconfiguration to D	12/31/2019						
26	Perform preventive maintenance on the next configuration VLA antenna transformers prior to array reconfiguration to C	3/30/2020						
	Technical Upgrades and Enhancements							
36	P-band polarization observations to SRO	3/30/2020						
	Very Long Baseline Array							
	Operations							
43	Define VLBA GO and SRO capabilities to be offered for semester 2020B	12/31/2019						
45	Update VLBA documentation to support 2020B Call for Proposals, perform proposal technical reviews	3/30/2020						
47	Implement VLBA user help program	3/30/2020						
48	Evaluate pySCHED	3/30/2020						
50	VLBA/VLBA technical managers assume full administration of the JIRA-based maintenance tracking system	3/30/2020						
	Development							
51	Deliver production proposal for Oryx rollout to all VLBA sites	3/30/2020					Cancelled	
53	Initial development of network performance diagnostic tool	3/30/2020						
	Maintenance and Renewal							
55	Major Maintenance Visit #1	6/30/2020						
57	Cold temperature operating report	12/31/2019						
58	4 Gbps observing promoted from SRO to GO	3/30/2020						
59	YI promoted from RSRO to SRO	3/30/2020						
62	Finalize design of production E-rack power supply	3/30/2020						
4.3	Central Development Laboratory							
	Operations							
1	Build and test Band I cryogenic amplifiers	12/31/2019						
		3/30/2020						
2	Build and test ALMA Band I local oscillators	12/31/2019						
	Development							
5	Design, fabrication, and testing of 310 MHz short-backfire antenna	12/31/2019						
9	Initiate transmission-line reflectionless filter development with collaborator	3/30/2020						
	Maintenance Renewal, and Warranty Claims							
11	VLBA/VLBA multichip module support	12/31/2019						
		3/30/2020						
5.7	Science Support and Research							
	TAC							
1	CIP for Semester 2020B	3/30/2020						
2	SRP and Tech Review, Semester 2020B	3/30/2020						
5	TAC Meeting, Semester 2020A	12/31/2019						
7	Update SW requirements for TAC 2020A	12/31/2019						
8	Update SW tools requirements for PST 2020B	3/30/2020						
11	Update documentation for CIP 2020B	3/30/2020						
	Science Ready Data Products							
14	Wave-1 SRDP operations	12/31/2019						
15	SRDP Wave-2 capabilities and requirements	12/31/2019						
16	TTA Tools Conceptual Design Review	12/31/2019						
17	VLASS product delivery schedule	3/30/2020						
	Scientific User Support							
21	NM Symposium	12/31/2019						
22	CASA validation	3/30/2020						
23	CASAGuides	3/30/2020						
	Reference Services							
26	NRAO history book published - Development of U.S. radio astronomy	3/30/2020						
	Scientific Staff and Jansky Fellows							
27	SciStaff performance reviews	12/31/2019						
28	SciStaff promotion reviews	3/30/2020						

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POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope
29	Five-year reviews	3/30/2020						
31	Jansky Fellows selection completed	12/31/2019						
32	Jansky Fellows appointments completed	3/30/2020						
	Student Programs							
33	Summer student selection and offers	3/30/2020						
34	Student Observing Support selection (VLA)	12/31/2019						
37	Reber predoc selection	3/30/2020						
6.6	Data Management and Software							
	SIS							
1	Lustre and Cluster OS upgrades in NM	3/30/2020						
3	Evaluation of ICRAR NGAS	3/30/2020						
4	Investigate HTCCondor for local VLASS operations	12/31/2019						
5	Investigate HTCCondor for SRDP/VLA pipeline ops	3/30/2020						
8	Completion of VLBA fiber project	3/30/2020						
	ALMA Systems Software							
10	ALMA Cycle 8 Release	12/31/2019						
	New Mexico Systems Software							
15	VLA/VLBA Observing Support for Semester 2019B	3/30/2020						
17	VLA/VLBA Commissioning Support for Semester 2020A	3/30/2020						
19	Support hardware/CBE Upgrade	3/30/2020						
20	Support RHEL Upgrade	3/30/2020						
	CASA							
25	CASA 5.7/6.1 Release	3/30/2020						
	CASA Pipeline							
30	Pipeline C7/SRDP Release	12/31/2019						
32	Pipeline Python 3 Planning	12/31/2019						
	Science Support and Archives							
34	PST Updated for Semester 2020B	12/31/2019						
36	OPT Updated for Semester 2020A	12/31/2019						
38	PHT Updated for Semester 2020B TAC	3/30/2020						
40	SRDP-Wave-I	12/31/2019						
42	TTA Tools CoDR Support	12/31/2019						
7.5	Program Management Department							
	PMD Operations							
1	HQ PM/SE Project Leadership	12/31/2019						
		3/30/2020						
2	NM PM/SE Project Leadership	12/31/2019						
		3/30/2020						
3	CDL PM/SE Project Leadership	12/31/2019						
		3/30/2020						
	Proposal Development							
4	HQ Proposal Development	12/31/2019						
		3/30/2020						
5	NM Proposal Development	12/31/2019						
		3/30/2020						
6	CDL Proposal Development	12/31/2019						
		3/30/2020						
	PM Activities							
7	HQ Continuing Education	12/31/2019						
8	NM Continuing Education	3/30/2020						
9	CDL Continuing Education	3/30/2020						
	PM/SE Activities							
10	Program Management Software Decision	12/31/2019						
12	Multicanha Construction Complete	12/31/2019						
13	Multicanha JAO Acceptance Complete	3/30/2020						
14	SRDP TTA Tool Concept Design Review	12/31/2019						
15	VLBA Fiber Installation Complete	12/31/2019						
16	VLBA Fiber Final Report	3/30/2020						
19	Band I LNA Production Complete	3/30/2020						
8.5	Education and Public Outreach							
	News and Public Information							
1	Identify potential image or story to feature	12/31/2019						
		3/30/2020						
2	Reserve room with AAS	3/30/2020						
3	Coordinate with AAAS	3/30/2020						
4	Define promotional materials for Astronomers	12/31/2019						
5	Establish calendar and contacts for deskside briefings	12/31/2019						
6	Contact reporter for briefing	3/30/2020						
	Multimedia Team							
7	Define menu of press product image options	12/31/2019						
8	Determine specifications for Gallery	12/31/2019						
10	Identify topic for hosted video	12/31/2019						
		3/30/2020						
11	Complete assignments for hosted video	12/31/2019						
		3/30/2020						
12	Define format and develop procedure for populating style guide	12/31/2019						
14	Create AR beta application and web plugin	6/30/2020						
	STEAM Ed							
15	San Pedro Cohort orientation	12/31/2019						
16	NM Cohort orientation	3/30/2020						
18	Identify National Association for Interpreters workshops for certified trainers	3/30/2020						
	VLA VC Operations							
20	Survey advertising options	12/31/2019						
9.4	Computing and Information Services							
	Observatory-Wide Support							
1	Upgrade of Mac platform to Mojave	12/31/2019						
2	Albuquerque office connectivity	3/30/2020						
3	Cyber Security risk assessment	12/31/2019						
6	Information Privacy Policy release	12/31/2019						
7	Non-employee account audit	3/30/2020						

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POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope
	Site Specific Facilities Infrastructure							
10	VLA CBE and network upgrade	3/30/2020						
10.2	Office of Diversity and Inclusion							
	Local and National Programs							
1	Diversity Council quarterly meetings	12/31/2019						
		3/30/2020						
2	NAC and LSAMP Recruitment	3/30/2020						
5	RADIAL Project Plan and Proposal completed	3/30/2020						
6	Diversity and Cultural Awareness training offered	12/31/2019						
		3/30/2020						
	International Partnerships							
7	Chile REU program recruitment completed	12/31/2019						
8	Chile REU program completed	3/30/2020						
11.7	Human Resources							
	Workforce Management							
1	ngVLA Hiring	12/31/2019						
		3/30/2020						
2	GBO Five-Year Proposal Workforce Management Plan	12/31/2019						
		3/30/2020						
	Training and Development							
3	Observatory Leadership Cohort Pilot Assessment/Implementation plan	12/31/2019						
4	How to Travel as an Observatory Employee Training Module	3/30/2020						
	Compensation							
6	Enhance Online Marketing Pricing Tool	12/31/2019						
7	Finalize Variable Pay Plan	12/31/2019						
	Benefits							
10	Electronic enrollment - Non open enrollment benefit entry	12/31/2019						
		3/30/2020						
11	Third Party Benefits Vendor Upload Preparation	12/31/2019						
		3/30/2020						
12	Work with Aon to research Retiree Medical Plan for Chilean ISMs	3/30/2020						
	Recruitment Employment							
13	Jobvite Enhancements	3/30/2020						
14	Hiring Manager Training Design	3/30/2020						
16	Background and Credit Check for Specific Positions	3/30/2020						
	HR							
17	FY2019 Climate Survey Results Initiatives	12/31/2019						
18	Bi-Weekly Payroll Transition	3/30/2020						
12.2	Science Communications							
1	Redesign NRAO exhibits	12/31/2019						
2	Publish 2020 Research Facilities brochure	3/30/2020						
13.6	Administration							
	ESS							
5	Develop Security Plan	3/30/2020						
	MIS							
7	Bi-Weekly ETK Entry Enhancements	12/31/2019						
8	Exempt Staff Transition from Monthly to Bi-Weekly payroll	3/30/2020						
9	Implement Employee Benefits On-Boarding workflow	3/30/2020						
14.1	Budget							
1	Hire Jr. Business Systems Analyst	12/31/2019						
2	Implement FY2020 Budget	12/31/2019						
		3/30/2020						
4	Insurance broker rebid process	3/30/2020						
5	2020 Insurance renewal	12/31/2019						
6	NSF Spring Budget Meeting	3/30/2020						
9	FY2019 ICC Final Rate Submission to AUI	3/30/2020						
12	Revised budget structure for paid time off	3/30/2020						
15.3	Spectrum Management							
1	WRC-19, Sharm El-Sheik	12/31/2019						
16.2	Director's Office							
	ALMA							
1	ALMA Board Meeting	12/31/2019						
2	ALMA Director's Council	3/30/2020						
	Corporate Meetings							
3	AUI Board of Trustee Meeting	12/31/2019						
		3/30/2020					Cancelled	
4	AUI Executive Committee Meeting	12/31/2019						
		3/30/2020						
	Science Community							
6	Appoint new Users Committee Members	12/31/2019						
	Management Reviews							
8	NSF Annual Program Review	12/31/2019						
9	All-Hands Meeting	3/30/2020						



Milestone Progress

Total Q2 FY2020 milestone deadlines: 101
Total completed on time: 79
Percent completed on time: 78%
11 carryover milestones - 3 completed
2 cancelled - 1 early

POP MILESTONE # 2.5.14

NRAO-Chile Office

Management of warranty for FEHV

Cost

Schedule

Scope

COST:

Labor Actuals	Expected
\$	\$
Material Actuals	Expected
\$	\$
Travel Actuals	Expected
\$	\$

SCOPE:

The front end handling vehicles (4) were delivered to the OSF and conditionally accepted by the JAO in Q2. Pending actions include documentation and resolution of minor workmanship issues; these will be addressed once observatory operations resume after the pandemic.

SCHEDULE:




Milestone	Schedule	Target
I. Mgt of warranty issues	Q2	N/A

RISK & MITIGATION:

Risk	Mitigation
1. Uncertainty about resumption of operations	1. Must assume risk, cannot mitigate
2. Deterioration of idle vehicles (due to lack of use)	2. Request caretaker team member to test run the vehicles (monthly)

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COST: No additional costs are foreseen. Associated costs (staff time and travel) remain the same.

SCOPE: This milestone assumed that the FEHV had already been fully accepted by Q2 and therefore focused on management of any warranty issues. These issues can only be addressed once the vehicles are fully accepted and are being used by the JAO.

SCHEDULE: In the midst of the covid-19 pandemic, it is very difficult to estimate a new target date for full acceptance.

RISK & MITIGATION: In addition to the uncertainty about resumption of observatory operations, the deterioration of idle vehicles due to lack of use is a concern. A mitigation for this risk is to perform test runs of the vehicles (caretaker team member has been asked to do this).

- Cost
- Schedule
- Scope

Multicancha project – delivery and inauguration

COST:			SCOPE:	
Labor Actuals	Expected		Construction and delivery of an indoor sports facility for ALMA observatory staff use at the OSF.	
\$	\$			
Material Actuals	Expected			
\$	\$			
Travel Actuals	Expected		Work on the construction site was suspended on March 21 st due to Covid-19 pandemic and contractor demobilized.	
\$	\$			
SCHEDULE:			RISK & MITIGATION:	
Milestone	Schedule	Target	Risk	Mitigation
1. Delivery/Inauguration	Q1-Q3	N/A	1. Suspension costs 2. Technical interfaces 3. Schedule 4. Project closeout costs	1. Optimize resources, explore legal options 2. Review and propose solutions 3. Improve planning 4. Prepare for eventual legal dispute

3.- **PROJECT CLOSEOUT:** For many reasons, the contractor estimates that at the end of the project it will have lost approximately USD 2m. Because of the warranty bonds that AUI-NRAO holds, and because the project has not been completed, the contractor has an incentive to continue operating at a loss. Naturally, it can be expected that the contractor will request some measure of financial compensation before closing the contract, which could turn into a legal claim. **MITIGATION:** Working closely with legal counsel, optimize use of resources, help contractor with planning, eliminate tasks that bring no added value, relax certain requirements and specifications that have no impact in the final product but result in savings.

POP MILESTONE # 3.3.16

EVLA Engineering Services

WIDAR Power System Replacement

Cost

Schedule

Scope

COST: <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: Replace line filters and batteries in the WIDAR Uninterruptable Power supply.		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>1. WIDAR Power System Replacement</td> <td>1/30/2020</td> <td>06/30/2020</td> </tr> </table>			Milestone	Schedule	Target	1. WIDAR Power System Replacement	1/30/2020	06/30/2020	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>1. Deteriorated batteries will result in reduced UPS backup time.</td> <td>1. Complete project within the next two years.</td> </tr> </table>			Risk	Mitigation	1. Deteriorated batteries will result in reduced UPS backup time.	1. Complete project within the next two years.		
Milestone	Schedule	Target															
1. WIDAR Power System Replacement	1/30/2020	06/30/2020															
Risk	Mitigation																
1. Deteriorated batteries will result in reduced UPS backup time.	1. Complete project within the next two years.																

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COST: No impact.

SCOPE: No impact.

SCHEDULE: The original delay in the power system replacement occurred because the battery vendor could not deliver the batteries in time to meet the original schedule. In order to minimize array downtime and associated impact on science, the work has now been moved to coincide with the C to B array reconfiguration. It is currently expected that the array reconfiguration will take place no earlier than mid-June due to coronavirus complications and pending the return to normal operations.

RISK & MITIGATION: The WIDAR UPS is fully operational with the current batteries; these batteries are being replaced as preventative maintenance. The battery performance will continue to be monitored.

POP MILESTONE # 3.3.51

New Mexico Operations

Deliver production proposal for Oryx rollout to all VLBA sites

COST:

There are no changes in budget.

SCOPE:

Creation and delivery of a proposal for funds to deploy production replacements for the VLBA's ROACH Digital Back Ends (RDBE). Design would use the new architecture under development (Oryx). Milestone has been cancelled

SCHEDULE:

Milestone	Schedule	Target
I. Deliver Oryx production proposal	January 21 2020	Cancelled

RISK & MITIGATION:

Risk	Mitigation
I. No spare parts for RDBEs	I. Obtain second hand ROACH boards from SARAO

COST: No Impact.

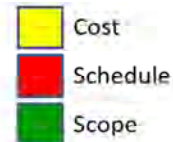
SCOPE: The production proposal is aimed at funding the deployment of the new Oryx digital architecture hardware at all 10 VLBA sites to replace the aging ROACH Digital Back Ends (RDBEs), for which it is no longer possible to find spares. After internal review it was decided that it is premature to write a proposal to deliver production systems until the prototype has completed its lab testing (POP milestone 3.3.52, due in Q4), because the required budget is too uncertain. This milestone has therefore been cancelled.

SCHEDULE: The schedule will be re-evaluated in FY21.

RISK & MITIGATION: The risk of delaying the delivery of the new digital architecture is that we have no spare components for the existing RDBEs, should one fail. We have recently been in touch with SARAO, who have offered us some spare ROACH boards. This will mitigate the problem while we continue with Oryx development and testing.

POP MILESTONE # 4.3.1

Central Development Laboratory Build and Test Band I Cryogenic Amplifiers



COST:

\$1,502,547 out of \$1,541,633 has been spent (figures from end of February, 2020). Although the contingencies had been spent out (to cover unexpected specification creep earlier on in the project cycle), no cost over run was expected for completing the project. However, there might be a cost over-run now due to work stoppage which is causing labor accruals without earned value.

SCOPE:

Last 4 of 160 articles remain to be completed and tested. No change in scope.



SCHEDULE:

Milestone	Schedule	Target
I. Build and Test Band I Cryogenic Amplifiers	(Original) 10/31/2019 (Revised by CRE) 4/30/2020	(New proposed) 9/30/2020

RISK & MITIGATION:

Risk	Mitigation
I. No technical risk. Only last four articles (out of 160) remain to be completed and tested. Delay is due to unexpected lockdown.	I. Target date has been delayed/adjusted accordingly. This does not impact follow-on activity. Likely delay has been communicated to NAC by the way of annual report.

COST: See description in four-square.

SCOPE: See description in four-square.

SCHEDULE: Deadline of 4/30/2020 will be missed. Completion of project depends on when the work is allowed to be restarted.

RISK & MITIGATION: No technical risk. See description in four-square.

POP MILESTONE # 4.3.5

Central Development Laboratory

310 MHz short-backfire antenna development and testing

Cost

Schedule


Scope

COST:

Labor Actuals	Expected
\$	\$
Material Actuals	Expected
\$	\$
Travel Actuals	Expected
\$	\$

SCOPE:

RF design-work for this feed has been completed. Subsequently, a plywood mockup was built to test the form factor, clearance etc. Wind loading analysis has also been performed and feed fabrication drawings completed. Need an additional ~ 2 months for fabrication and testing, this will likely extend into FY2020Q3 because of IDOS.



SCHEDULE:

Milestone	Schedule	Target
I. Deliver tested 310 MHz feed and test data	(Original) 12/31/2019 (Revised in Q1) 6/30/2020	(New proposed) 7/31/2020

RISK & MITIGATION:

Risk	Mitigation
I. NRAO's/GBO's WFH status continues until 1 June, delaying start of fabrication	I. Target date will have to be delayed/adjusted accordingly. This does not impact follow-on activity anymore, since the follow-on MSIP proposal is not going forward.

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COST: No impact.

SCOPE: The wind loading analysis has been completed. Feed fabrication drawings are nearly complete. Once the observatory goes off IDOS, we estimate that fabrication and testing can be carried out in two months.

SCHEDULE: Manufacture of this feed is scheduled for Q2 FY2020, and testing will follow – completion might slip to early Q3 FY2020.

RISK & MITIGATION: The overall 310 MHz project was a MSIP proposal (with University of Richmond) for which we had submitted a pre-proposal. In March, NSF decided to not seek a full proposal, so no follow on activity is impacted. The GBO construction of the 310 MHz antenna, however, does not depend on the MSIP award, and GBO plans to build the antenna and do live testing on the GBT.

POP MILESTONE # 5.7.14

Science Support and Research Wave-I SRDP operations

Cost

Schedule

Scope

COST: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: This milestone marks the beginning of the SRDP Wave I deployment, which has largely been met. A few operational issues remain with the AUDI capability to be resolved before declaring Pilot Operations complete.		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid black;">Milestone</th> <th style="width: 20%; border-bottom: 1px solid black;">Schedule</th> <th style="width: 20%; border-bottom: 1px solid black;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid black;">I. Commence SRDP Wave I Operations</td> <td style="border-bottom: 1px solid black;">12/31/2019</td> <td style="border-bottom: 1px solid black;">5/31/2020</td> </tr> </table>			Milestone	Schedule	Target	I. Commence SRDP Wave I Operations	12/31/2019	5/31/2020	RISK & MITIGATION: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; border-bottom: 1px solid black;">Risk</th> <th style="width: 50%; border-bottom: 1px solid black;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid black;">I. Failure to Validate</td> <td style="border-bottom: 1px solid black;">I. Accept and issue updates if bugs are found</td> </tr> </table>		Risk	Mitigation	I. Failure to Validate	I. Accept and issue updates if bugs are found			
Milestone	Schedule	Target															
I. Commence SRDP Wave I Operations	12/31/2019	5/31/2020															
Risk	Mitigation																
I. Failure to Validate	I. Accept and issue updates if bugs are found																

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COST: No Impact.

SCOPE: No Impact.

SCHEDULE: Wave I Operations have commenced, all planned capability has been delivered. A few operational issues remain with the AUDI capability to be resolved before declaring Pilot Operations complete.

RISK & MITIGATION: The code has been in production, with ongoing bug fixes. There is still a risk for a Failure to Validate or break working code. This is mitigated with further bug fixes and repeated validation.

POP MILESTONE # 5.7.16

Science Support and Research
TTA Tools Conceptual Design Review

Cost

Schedule

Scope

COST: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 2px;">Labor Actuals</td> <td style="width: 30%; padding: 2px;">Expected</td> <td style="width: 40%;"></td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$</td> <td></td> </tr> <tr> <td style="padding: 2px;">Material Actuals</td> <td style="padding: 2px;">Expected</td> <td></td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$</td> <td></td> </tr> <tr> <td style="padding: 2px;">Travel Actuals</td> <td style="padding: 2px;">Expected</td> <td></td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$</td> <td></td> </tr> </table>			Labor Actuals	Expected		\$	\$		Material Actuals	Expected		\$	\$		Travel Actuals	Expected		\$	\$		SCOPE: No impact on scope. Milestone marks completion of a Conceptual Design Review, which was conducted April 15-16. Committee recommendations are currently being addressed.		
Labor Actuals	Expected																						
\$	\$																						
Material Actuals	Expected																						
\$	\$																						
Travel Actuals	Expected																						
\$	\$																						
SCHEDULE: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; padding: 2px;">Milestone</th> <th style="width: 20%; padding: 2px;">Schedule</th> <th style="width: 50%; padding: 2px;">Target</th> </tr> <tr> <td style="padding: 2px;">I. Conceptual Design Review</td> <td style="padding: 2px;">Dec 31, 2019</td> <td style="padding: 2px;">Apr 16, 2020</td> </tr> </table>			Milestone	Schedule	Target	I. Conceptual Design Review	Dec 31, 2019	Apr 16, 2020	RISK & MITIGATION: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; padding: 2px;">Risk</th> <th style="width: 50%; padding: 2px;">Mitigation</th> </tr> <tr> <td style="padding: 2px;">I. Schedule (see notes)</td> <td style="padding: 2px;">I. Accept</td> </tr> </table>			Risk	Mitigation	I. Schedule (see notes)	I. Accept								
Milestone	Schedule	Target																					
I. Conceptual Design Review	Dec 31, 2019	Apr 16, 2020																					
Risk	Mitigation																						
I. Schedule (see notes)	I. Accept																						

10
QSU2 FY2020

COST: No Impact.

SCOPE: No Impact.

SCHEDULE: This delay resulted from a need to address gaps discovered in the initial concept and requirements by the system architect, which had to be resolved prior to moving forward with the conceptual architecture and design. The committee was not able to meet before the revised deadline of FY20Q2, so the review schedule introduced an additional three weeks delay.

RISK & MITIGATION: A risk of further delay was identified last quarter, in the event committee members were not available by end of Q2 FY2020. This risk was realized. Fortunately, the review was scheduled with only three weeks of schedule slip. Risk to implementation remains due to potential oversubscription in DMS.

POP MILESTONE # 5.7.17				<div>Cost</div> <div>Schedule</div> <div>Scope</div>	
Science Support and Research VLASS product delivery schedule					
COST:		SCOPE:			
Labor Actuals	Expected	Maintaining scientific scope though increase in cost and delays.			
\$	\$				
Material Actuals	Expected	Some compromise on image quality may be required to deliver scope under cost constraints.			
\$ compute resources	\$ under evaluation				
Travel Actuals	Expected				
\$	\$				
SCHEDULE:		RISK & MITIGATION:			
Milestone	Schedule	Target	Risk	Mitigation	
I. Product Delivery Schedule	3/31/2020	9/30/2020	1. Internal compute resources for SE imaging inadequate. 2. Algorithmic risk for single epoch products 3. Disengagement of users community	1. External compute resources. CHTC is under test 2. Engagement with ARDG/CASA 3. Transparent communication, and expectation management	

COST: Single Epoch imaging may be considerably more expensive than predicted. External processing alternatives are being explored. The most promising is the Condo High Throughput Computing Center at the University of Wisconsin. Processing protocols to use this resource are currently under test and look very promising.

SCOPE: Overall project scope is currently maintained, but initial goals for image quality are at risk.

SCHEDULE: Production of an updated delivery schedule in Q2 was predicated on the validation of the SE Imaging pipeline in Q1 FY2020. This did not happen, the VLASS Imaging Project (now wrapping up) will deliver a suitable recipe to be developed into a pipeline (for most fields) which will then be validated and used to develop an delivery schedule.

RISK & MITIGATION:

- 1) Constraints on compute resources pose a risk to cost and image quality. Primary mitigation is to restructure our data format to comply with CHTC, which is available at no increase in cost. Secondary mitigation includes use of Amazon Web Services (AWS) or the Extreme Science and Engineering Discovery Environment (XSEDE).
- 2) Detailed algorithms to process the entire survey are not yet available. This uncertainty introduces risk across all project areas, including schedule, scope, cost, and quality. An algorithm under test has produced several images and is currently under evaluation for use in production.
- 3) The survey consumes significant telescope time and has experienced delays, introducing reputation risk in the user community. Mitigation of this risk includes close interaction with the Survey Science Group, announcements and data releases as early as possible, engagement at astronomy events, and transparency with the challenges this survey presents.

POP MILESTONE # 5.7.22

Science Support and Research
Validation for CASA 5.7 and 6.1 Releases

Cost
 Schedule
 Scope

COST: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="width: 50%; border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> </table>	Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: <p>We are currently in a mostly-validation period for CASA 5.7/6.1, with approximately half of the tickets being under development or are in verification.</p>
Labor Actuals	Expected												
\$	\$												
Material Actuals	Expected												
\$	\$												
Travel Actuals	Expected												
\$	\$												
SCHEDULE: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%; border-bottom: 1px solid black;">Milestone</th> <th style="width: 33%; border-bottom: 1px solid black;">Schedule</th> <th style="width: 33%; border-bottom: 1px solid black;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid black;">I. Validation for CASA</td> <td style="border-bottom: 1px solid black;">3/30/2020</td> <td style="border-bottom: 1px solid black;">Q3 FY2020</td> </tr> </table>	Milestone	Schedule	Target	I. Validation for CASA	3/30/2020	Q3 FY2020	RISK & MITIGATION: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; border-bottom: 1px solid black;">Risk</th> <th style="width: 50%; border-bottom: 1px solid black;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid black;">I. Low</td> <td style="border-bottom: 1px solid black;">I. Offer users existing software until ready for release of 5.7/6.1.</td> </tr> </table>	Risk	Mitigation	I. Low	I. Offer users existing software until ready for release of 5.7/6.1.		
Milestone	Schedule	Target											
I. Validation for CASA	3/30/2020	Q3 FY2020											
Risk	Mitigation												
I. Low	I. Offer users existing software until ready for release of 5.7/6.1.												

12
QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: Our best estimate on the schedule slip before the IDOS began was mid-April but that will certainly slip to later in Q3.

We are getting used to the work-from-home experience and hope to refine this date in due course.

RISK & MITIGATION: Offer users existing versions of the CASA software. Continue with validation and release 5.7/6.1 once it is ready.

POP MILESTONE # 5.7.23

Science Support and Research

User Documentation for CASA 5.7

Cost




Schedule

Scope

COST: <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: Milestone tied directly to #5.7.22		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. User documentation</td> <td>3/30/20</td> <td>>mid-April</td> </tr> </table>			Milestone	Schedule	Target	I. User documentation	3/30/20	>mid-April	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. Low</td> <td>I. Offer users existing software until ready for release of 5.7/6.1.</td> </tr> </table>			Risk	Mitigation	I. Low	I. Offer users existing software until ready for release of 5.7/6.1.		
Milestone	Schedule	Target															
I. User documentation	3/30/20	>mid-April															
Risk	Mitigation																
I. Low	I. Offer users existing software until ready for release of 5.7/6.1.																

13

QSU2 FY2020

COST: No impact.

SCOPE: Milestone tied directly to #5.7.22

SCHEDULE: Same schedule delay as #5.7.22

RISK & MITIGATION: Offer users existing versions of the CASA software. Documentation is released with CASA 5.7/6.1.

POP MILESTONE # 5.7.26

Science Support and Research

NRAO History Book Published

Cost

Schedule

Scope

COST: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: The offices of both the proofreader and publisher in India and Germany, respectively, have been shut down due to quarantine measures taken by their respective governments.		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%;">Milestone</th> <th style="width: 20%;">Schedule</th> <th style="width: 20%;">Target</th> </tr> <tr> <td>I. Book published</td> <td>3/30/20</td> <td>N/A</td> </tr> </table>			Milestone	Schedule	Target	I. Book published	3/30/20	N/A	RISK & MITIGATION: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%;">Risk</th> <th style="width: 70%;">Mitigation</th> </tr> <tr> <td>I. Low</td> <td>I. Wait until quarantine is lifted then contact companies for a new publication date.</td> </tr> </table>			Risk	Mitigation	I. Low	I. Wait until quarantine is lifted then contact companies for a new publication date.		
Milestone	Schedule	Target															
I. Book published	3/30/20	N/A															
Risk	Mitigation																
I. Low	I. Wait until quarantine is lifted then contact companies for a new publication date.																

14
QSU2 FY2020

COST: No impact.

SCOPE: No impact

SCHEDULE: We were waiting for second round of proofs from India when the office was shut down for three weeks (at least) due to quarantine measures taken by the Indian Government. The publisher in Germany is also under similar restrictions. At this point, we have no idea what the proof/publication timeline will be.

RISK & MITIGATION: We will keep monitoring the situation and contact the companies for new dates once the quarantine measures have been lifted.

POP MILESTONE # 5.7.37

Science Support and Research
Reber Offers Issued

Cost
Schedule
Scope

COST:			SCOPE:	
Labor Actuals	Expected		This year we chose to shift the date of the Reber program to April 20, with consideration for the (original) April 15 ALMA Cycle 8 deadline.	
\$	\$			
Material Actuals	Expected			
\$	\$			
Travel Actuals	Expected			
\$	\$			
SCHEDULE:			RISK & MITIGATION:	
Milestone	Schedule	Target	Risk	Mitigation
1. Reber offers issued	3/31/2020	4/20/2020	1. Low	1. Make offers quickly

15

QSU2 FY2020



COST: No impact.

SCOPE: No impact

SCHEDULE: To ease workload we shifted the deadline until after the ALMA Cycle 8 deadline. The ALMA Cycle 8 has now been delayed, due to the Covid-19 measures.

RISK & MITIGATION: We can usually make offers quickly, within a week or so.

POP MILESTONE # 6.6.8

Data Management & Software/SIS

Completion of VLBA fiber project



COST:			SCOPE:	
Labor Actuals	Expected		No change in Scope: all 10 VLBA sites to be connected to internet by fiber optic	
\$	\$			
Material Actuals	Expected			
\$	\$			
Travel Actuals	Expected			
\$	\$			
SCHEDULE:			RISK & MITIGATION:	
Milestone	Schedule	Target	Risk	Mitigation
1. Hancock, NH	Q2 FY2020	Q4 FY2020	1. Two of ten sites running over slow internet service	1. Continue to ship disk packs and use other sites for observations needing real-time data
2. Los Alamos	Q2 FY2020	Q4 FY2020		

16

QSU2 FY2020



COST: No impact.

SCOPE: Two of 10 sites delayed.

SCHEDULE: Hancock NH should be completed in four months. Los Alamos awaiting COVID-19 reopening.

RISK & MITIGATION: Continue to ship disk packs and use other sites for real-time observations.

POP MILESTONE # 6.6.25

Data Management & Software

CASA 5.7/6.1 Release

Cost

Schedule

Scope

COST:

Labor Actuals	Expected
DMS funds this activity at a higher WBS level.	
Material Actuals	Expected
\$	\$
Travel Actuals	Expected
\$	\$

SCOPE:

CASA 5.7/6.1 dual release, incorporating several optimizations for imaging parallelization and memory consumption (tclean refactor), improvements to the VLBI fringe fit task, and support for both the Python 2 and 3 in 5.7 and 6.1 respectively.

SCHEDULE:

Milestone	Schedule	Target
1. CASA Release 5.7/6.1	3/31/2020	5/28/2020

RISK & MITIGATION:

Risk	Mitigation
1. Further slippage could impact ALMA pipeline schedule.	1. Code is finished and in testing, risk is minimal and fixes limited to blocker issues.

17

QSU2 FY2020

COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: In Q3, the 5.7/6.1 dual release will be delivered, incorporating several optimizations for imaging parallelization and memory consumption, improvements to the VLBI fringe fit task, and support for both the Python 2.7 5.x and the Python 3.6 6.x series of CASA.

SCHEDULE: Schedule was delayed, primarily from the complexity of refactoring the “tclean” module to optimize imaging parallelization and memory consumption, and improve supportability. The code is complete and in testing, with completion of testing and release scheduled in May.

RISK & MITIGATION: Further slippage could impact the ALMA pipeline schedule, as this is the release upon which the Cycle 8 pipeline will be based. Pipeline already uses this codebase for their development, and bug fixes will be limited to blocker issues (if found) to contain potential schedule impact.

POP MILESTONE # 6.6.42

Data Management & Software

TTA Tools CoDR Support

Cost

Schedule

Scope

COST:

Labor Actuals	Expected
DMS funds this activity at a higher WBS level.	
Material Actuals	Expected
\$	\$
Travel Actuals	Expected
\$	\$

SCOPE:

Create the architecture and implementation plan for the TTA tools in support of the CoDR and transition to implementation (no change).

SCHEDULE:

Milestone	Schedule	Target
1. Architecture document	Dec 1, 2019	April 30, 2020
2. Implementation plan	Dec 1, 2019	April 30, 2020

RISK & MITIGATION:

Risk	Mitigation
1. None	N/A

18

QSU2 FY2020

COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: The project to re-engineer the TTA tool suite is managed by SRDP. The project will transition from the initiation phase to the implementation phase in Q1 FY2020 with completion of a Conceptual Design Review (CoDR). DMS will create the architecture and implementation plan for review at the CoDR (no change).

SCHEDULE: This delay resulted from gaps discovered in the initial concept and requirements by the system architect, which need to be resolved prior to moving forward with the Conceptual Architecture. In addition, the Architect requested to include prototyping prior to the CoDR to validate the system architecture.

RISK & MITIGATION: No impact.

POP MILESTONE # 7.5.8

Program Management Department

New Mexico Education

Cost




Schedule

Scope

COST: <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: Provide PM/SE training.		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. Provide PM/SE training</td> <td>3/31/2020</td> <td>9/30/2020</td> </tr> </table>			Milestone	Schedule	Target	I. Provide PM/SE training	3/31/2020	9/30/2020	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. COVID 19 Restrictions will continue</td> <td>I. Monitor</td> </tr> </table>			Risk	Mitigation	I. COVID 19 Restrictions will continue	I. Monitor		
Milestone	Schedule	Target															
I. Provide PM/SE training	3/31/2020	9/30/2020															
Risk	Mitigation																
I. COVID 19 Restrictions will continue	I. Monitor																

19

QSU2 FY2020

COST: No impact.

SCOPE: Provide PM/SE training.

SCHEDULE: New employee on-boarded in March. Educational opportunities will resume once COVID 19 restrictions are lifted.

RISK & MITIGATION: COVID 19 Restrictions will continue into the summer. Monitor.

POP MILESTONE # 7.5.10

Program Management Department

Program Management Software Decision

Cost

Schedule

Scope

COST: No Impact on Cost			SCOPE:	
Labor Actuals	Expected		No change in scope.	
\$	\$			
Material Actuals	Expected			
\$	\$			
Travel Actuals	Expected			
\$	\$			
SCHEDULE:			RISK & MITIGATION:	
Milestone	Schedule	Target	Risk	Mitigation
1. Software Decision	Dec 31, 2019	Jun 30, 2020	1. Any risk is insignificant	N/A

20
QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: We continue to evaluate the Oracle Prime Cloud software as it continues to develop. A decision will be made in June 2020.

RISK & MITIGATION: Any risk is insignificant, No known risks

POP MILESTONE # 7.5.12

Program Management Department

Multicancha Construction Complete

Cost




Schedule

Scope

COST: <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: Multicancha Construction Complete		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. Multicancha Construction Complete</td> <td>3/31/2010</td> <td>9/30/2020</td> </tr> </table>			Milestone	Schedule	Target	I. Multicancha Construction Complete	3/31/2010	9/30/2020	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. COVID 19 Restrictions continue</td> <td>I. Monitor:</td> </tr> </table>			Risk	Mitigation	I. COVID 19 Restrictions continue	I. Monitor:		
Milestone	Schedule	Target															
I. Multicancha Construction Complete	3/31/2010	9/30/2020															
Risk	Mitigation																
I. COVID 19 Restrictions continue	I. Monitor:																

21

QSU2 FY2020

COST: No impact.

SCOPE: Complete Construction.

SCHEDULE: New construction completion date was being developed before COVID 19 outbreak. All work suspended until after COVID 19 restrictions are lifted.

RISK & MITIGATION: COVID 19 Restrictions continue. Monitor.

POP MILESTONE # 7.5.13

Program Management Department

Multicancha JAO Acceptance Complete

Cost




Schedule

Scope

COST: <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: Acceptance Complete		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. Multicancha JAO Acceptance Complete</td> <td>3/31/2020</td> <td>9/30/2020</td> </tr> </table>			Milestone	Schedule	Target	I. Multicancha JAO Acceptance Complete	3/31/2020	9/30/2020	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. COVID 19 Restrictions continue</td> <td>I. Monitor</td> </tr> </table>			Risk	Mitigation	I. COVID 19 Restrictions continue	I. Monitor		
Milestone	Schedule	Target															
I. Multicancha JAO Acceptance Complete	3/31/2020	9/30/2020															
Risk	Mitigation																
I. COVID 19 Restrictions continue	I. Monitor																

22

QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: New construction completion date was being developed before COVID 19 outbreak. All work suspended until after COVID 19 restrictions are lifted.

RISK & MITIGATION: COVID 19 Restrictions continue. Monitor.

POP MILESTONE # 7.5.14

Program Management Department
TTA Tools Conceptual Design Review

Cost

Schedule

Scope

COST:		SCOPE:		
Labor Actuals	Expected	This milestone has a dependency on SSR Milestone 5.7.16		
\$	\$			
Material Actuals	Expected			
\$ N/A	\$			
Travel Actuals	Expected			
\$ N/A	\$	RISK & MITIGATION:		
SCHEDULE:				
Milestone	Schedule			Target
I. CoDR	Oct 2019			Q2 FY2020
		Risk	Mitigation	
		I. Schedule risk	I. Dates assigned following CoDR	

23
QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: This milestone is the Project Management component to oversee preparation of the document package, administration, and logistics for the review addressed in SSR Milestone 5.7.16. The Q2 target to conduct the review was missed due to planning constraints, but was conducted Apr 15-16 with a status of “Conditional Pass”. The team is currently closing out remaining RIDs, action items, and committee recommendations.

RISK & MITIGATION: Schedule Risk remains due to potential oversubscriptions within DMS. Actual dates will be assigned to the execution plan following closeout of remaining CoDR issues.

POP MILESTONE # 7.5.15

Program Management Department

VLBA Fiber Installation Complete

Cost

Schedule

Scope

COST:

Labor Actuals	Expected
\$	\$
Material Actuals	Expected
\$	\$
Travel Actuals	Expected
\$	\$

SCOPE:

No impact

SCHEDULE:

Milestone	Schedule	Target
I. VLBA Fiber Installation Complete	3/31/2020	Q4 FY2020

RISK & MITIGATION:

Risk	Mitigation
I. Uncertainty of resuming operations until after COVID 19 restrictions	I. Monitor

24

QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: Three year no-cost extension granted. Hancock NH will complete install by end of July 2020. Los Alamos is on hold until after COVID 19 restrictions.

RISK & MITIGATION: Los Alamos will continue to delay due to COVID 19. Uncertainty in operations returning to normal. Monitor.

POP MILESTONE # 7.5.16

Program Management Department

VLBA Fiber Final Report

Cost




Schedule

Scope

COST: <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: No change		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. VLBA Fiber Final Report</td> <td>3/31/2020</td> <td>Q4 FY2020</td> </tr> </table>			Milestone	Schedule	Target	I. VLBA Fiber Final Report	3/31/2020	Q4 FY2020	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. Uncertainty of resuming operations until after COVID 19 restrictions</td> <td>I. Monitor</td> </tr> </table>			Risk	Mitigation	I. Uncertainty of resuming operations until after COVID 19 restrictions	I. Monitor		
Milestone	Schedule	Target															
I. VLBA Fiber Final Report	3/31/2020	Q4 FY2020															
Risk	Mitigation																
I. Uncertainty of resuming operations until after COVID 19 restrictions	I. Monitor																

25

QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: Three year no-cost extension granted. Hancock NH will complete install by end of July 2020. Los Alamos is on hold until after COVID19 restrictions.

RISK & MITIGATION: Los Alamos will continue to delay due to COVID19. Uncertainty in operations returning to normal. Monitor.

POP MILESTONE # 7.5.19

Program Management Department

ALMA Band I LNA Production Complete

Cost

Schedule

Scope

<div>COST: No Impact on Cost</div> <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$943,037</td> <td>\$813,533</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$105,227</td> <td>\$210,300</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$0</td> <td>\$0</td> </tr> </table>			Labor Actuals	Expected	\$943,037	\$813,533	Material Actuals	Expected	\$105,227	\$210,300	Travel Actuals	Expected	\$0	\$0	<div>SCOPE:</div> <div>No change in scope.</div>		
Labor Actuals	Expected																
\$943,037	\$813,533																
Material Actuals	Expected																
\$105,227	\$210,300																
Travel Actuals	Expected																
\$0	\$0																
<div>SCHEDULE:</div> <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. Complete production</td> <td>Mar 31, 2020</td> <td>TBD (COVID-19)</td> </tr> </table>			Milestone	Schedule	Target	I. Complete production	Mar 31, 2020	TBD (COVID-19)	<div>RISK & MITIGATION:</div> <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. Project completion will extend past contractual finish (Apr 2020) if cannot return to work by beginning of April</td> <td>I. Work with NAOJ/ASIAA to extend contract due to COVID-19 restrictions</td> </tr> </table>			Risk	Mitigation	I. Project completion will extend past contractual finish (Apr 2020) if cannot return to work by beginning of April	I. Work with NAOJ/ASIAA to extend contract due to COVID-19 restrictions		
Milestone	Schedule	Target															
I. Complete production	Mar 31, 2020	TBD (COVID-19)															
Risk	Mitigation																
I. Project completion will extend past contractual finish (Apr 2020) if cannot return to work by beginning of April	I. Work with NAOJ/ASIAA to extend contract due to COVID-19 restrictions																

26

QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: The completion schedule is TBD depending on when CDL staff can return to work. There are approximately three to four weeks of production work remaining on the project.

RISK & MITIGATION: If CDL staff cannot return to work, production will be delayed past contractual end date of April 2020. Project management will notify NAOJ/ASIAA and work to modify the production schedule towards a mutually agreeable date.

POP MILESTONE # 8.5.1 I

Education and Public Outreach

Hosted Video

Cost




Schedule

Scope

COST: <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: : Create quarterly hosted video inspired by a press release.		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. Edit hosted Q2 hosted video</td> <td>3/31/20</td> <td>4/30/20</td> </tr> </table>			Milestone	Schedule	Target	I. Edit hosted Q2 hosted video	3/31/20	4/30/20	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. None</td> <td>None</td> </tr> </table>			Risk	Mitigation	I. None	None		
Milestone	Schedule	Target															
I. Edit hosted Q2 hosted video	3/31/20	4/30/20															
Risk	Mitigation																
I. None	None																

27

QS U2 FY2020

COST: No impact.

SCOPE: Create quarterly hosted video inspired by a press release.

SCHEDULE: This was due at the end of March, because of inability to edit remotely, staff could not complete. It will be complete by the end of April.


RISK & MITIGATION: No impact.

POP MILESTONE # 8.5.14

Education and Public Outreach

Develop AR app

Cost
Schedule
Scope

COST: <table border="1"> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: : Develop AR app for the website 		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table border="1"> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. AR App</td> <td>6/30/20</td> <td>3/30/20</td> </tr> </table>			Milestone	Schedule	Target	I. AR App	6/30/20	3/30/20	RISK & MITIGATION: <table border="1"> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. None</td> <td>None</td> </tr> </table>			Risk	Mitigation	I. None	None		
Milestone	Schedule	Target															
I. AR App	6/30/20	3/30/20															
Risk	Mitigation																
I. None	None																

28

QSU2 FY2020



COST: No impact.

SCOPE: Develop AR app to explore ALMA and VLA dishes.

SCHEDULE: Due at the end of June, delivered in February and April.

RISK & MITIGATION: No impact.

POP MILESTONE # 8.5.16

Education and Public Outreach

SCO Cohort to Chile

Cost

Schedule

Scope

COST: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid #ccc;">Labor Actuals</td> <td style="border-bottom: 1px solid #ccc;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid #ccc;">\$</td> <td style="border-bottom: 1px solid #ccc;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid #ccc;">Material Actuals</td> <td style="border-bottom: 1px solid #ccc;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid #ccc;">\$</td> <td style="border-bottom: 1px solid #ccc;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid #ccc;">Travel Actuals</td> <td style="border-bottom: 1px solid #ccc;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid #ccc;">\$</td> <td style="border-bottom: 1px solid #ccc;">\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: : Send NM cohort to Chile		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid #ccc;">Milestone</th> <th style="width: 20%; border-bottom: 1px solid #ccc;">Schedule</th> <th style="width: 50%; border-bottom: 1px solid #ccc;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid #ccc;">I. Edit hosted Q2 hosted video</td> <td style="border-bottom: 1px solid #ccc;">3/31/2020</td> <td style="border-bottom: 1px solid #ccc;">FY2021</td> </tr> </table>			Milestone	Schedule	Target	I. Edit hosted Q2 hosted video	3/31/2020	FY2021	RISK & MITIGATION: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; border-bottom: 1px solid #ccc;">Risk</th> <th style="width: 50%; border-bottom: 1px solid #ccc;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid #ccc;">I. None</td> <td style="border-bottom: 1px solid #ccc;">None</td> </tr> </table>			Risk	Mitigation	I. None	None		
Milestone	Schedule	Target															
I. Edit hosted Q2 hosted video	3/31/2020	FY2021															
Risk	Mitigation																
I. None	None																

29
QSU2 FY2020

COST: No impact.

SCOPE: Send cohort of NRAO educator, one teacher, and two students from Magdalena, NM to Chile to visit ALMA.

SCHEDULE: Staff will not be able to complete this fiscal year, will participate next year.

RISK & MITIGATION: No impact.

POP MILESTONE # 11.7.16

Human Resources

Background and Credit Checks – specific positions

Cost

Schedule

Scope

COST: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: No impact		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid black;">Milestone</th> <th style="width: 20%; border-bottom: 1px solid black;">Schedule</th> <th style="width: 20%; border-bottom: 1px solid black;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid black;">I. Background/Credit Checks</td> <td style="border-bottom: 1px solid black;">3/30/2020</td> <td style="border-bottom: 1px solid black;">6/30/2020</td> </tr> </table>			Milestone	Schedule	Target	I. Background/Credit Checks	3/30/2020	6/30/2020	RISK & MITIGATION: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; border-bottom: 1px solid black;">Risk</th> <th style="width: 50%; border-bottom: 1px solid black;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid black;">I. None</td> <td style="border-bottom: 1px solid black;">None</td> </tr> </table>		Risk	Mitigation	I. None	None			
Milestone	Schedule	Target															
I. Background/Credit Checks	3/30/2020	6/30/2020															
Risk	Mitigation																
I. None	None																

30
QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: AUI has developed a policy with language that includes all positions would require a background check. The Observatory wants to pilot specific positions for background and credit checks. Awaiting final policy decision from AUI corporate.

RISK & MITIGATION: No impact.

POP MILESTONE # 13.6.5

Administration - ES&S

Develop Security Plan

Cost




Schedule

Scope

COST: <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>			Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	SCOPE: No change in scope		
Labor Actuals	Expected																
\$	\$																
Material Actuals	Expected																
\$	\$																
Travel Actuals	Expected																
\$	\$																
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. Develop security plan</td> <td>Q2, FY2020</td> <td>TBD</td> </tr> </table>			Milestone	Schedule	Target	I. Develop security plan	Q2, FY2020	TBD	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. Missed plan date for implementation</td> <td>I. Defer until COVID response requirements reduce</td> </tr> </table>			Risk	Mitigation	I. Missed plan date for implementation	I. Defer until COVID response requirements reduce		
Milestone	Schedule	Target															
I. Develop security plan	Q2, FY2020	TBD															
Risk	Mitigation																
I. Missed plan date for implementation	I. Defer until COVID response requirements reduce																

31

QSU2 FY2020

COST: No impact.

SCOPE: No impact.

SCHEDULE: The Security review was completed in December 2019. Review findings were summarized into potential actionable plans. Unable to complete the plan development as the support for COVID response with skeleton crew modified priorities. Unable to determine a revised schedule for development.

RISK & MITIGATION: The completion of this item will continue to slide until restrictions are lifted. Suggest to defer the further development of the plan until FY2021.

POP MILESTONE # 13.6.9

Administration - MIS

Employee On-Boarding through JDE ESS

Cost

Schedule

Scope

<div>COST:</div> <table> <tr> <td>Labor Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table>		Labor Actuals	Expected	\$	\$	Material Actuals	Expected	\$	\$	Travel Actuals	Expected	\$	\$	<div>SCOPE:</div> <p>In coordination with HR, implement Employee Benefits On-Boarding workflow through JDE Employee Self-Service.</p>
Labor Actuals	Expected													
\$	\$													
Material Actuals	Expected													
\$	\$													
Travel Actuals	Expected													
\$	\$													
<div>SCHEDULE:</div> <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. Implement</td> <td>Q2</td> <td>Q4</td> </tr> </table>		Milestone	Schedule	Target	I. Implement	Q2	Q4	<div>RISK & MITIGATION:</div> <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. None or low risk impact to HR or Employees</td> <td>I. Continue to utilize current process flow for employee on-boarding</td> </tr> </table>	Risk	Mitigation	I. None or low risk impact to HR or Employees	I. Continue to utilize current process flow for employee on-boarding		
Milestone	Schedule	Target												
I. Implement	Q2	Q4												
Risk	Mitigation													
I. None or low risk impact to HR or Employees	I. Continue to utilize current process flow for employee on-boarding													

32

QSU2 FY2020

COST: Costs are internal except for minimal questions to consultant (ad hoc, consulting contract for HR related questions).

SCOPE: Implementation of On-Boarding workflow in JDE.

SCHEDULE: Q2 scheduled date was impacted by other projects (Monthly exempt staff transitioning to bi-weekly payroll). New schedule target is implementation in Q4 to setup new fiscal year. This is due to impact of staffing on other projects (COVID related, Bank account transition, HR vendor uploads, others).

RISK & MITIGATION: Risk is none to low impact for this project. This is a tool that would assist HR in new employee sign-ups for benefits. Mitigation is to continue to utilize current process flows in employees enrollment in benefits.

POP MILESTONE # 14.1.6

Budget

NSF Spring Budget Meeting



Cost

Schedule

Scope

COST:

Labor Actuals	Expected
\$	\$
Material Actuals	Expected
\$	\$
Travel Actuals	Expected
\$	\$

SCOPE:

Annual budget status meeting with NSF.

SCHEDULE:

Milestone	Schedule	Target
1. Hold Meeting	3/30/2020	4/13/2020

RISK & MITIGATION:

Risk	Mitigation
1. Scheduling difficulties	1. Schedule when all parties available.

COST: No impact.

SCOPE: No Impact.

SCHEDULE: Meeting held 4/13/2020 at convenience of all parties.

RISK & MITIGATION: No impact.

POP MILESTONE # 16.2.3

Director's Office

AUI Board of Trustee Meeting

COST:			SCOPE:	
Labor Actuals	Expected		Milestone has been cancelled.	
\$	\$			
Material Actuals	Expected			
\$	\$			
Travel Actuals	Expected			
\$	\$			
SCHEDULE:			RISK & MITIGATION:	
Milestone	Schedule	Target	Risk	Mitigation
I. Meeting	3/30/2020	None	I. None	I. N/A

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QSU2 FY2020



COST: No Impact.

SCOPE: No Impact.

SCHEDULE: AUI no longer has a Board of Trustee Meeting in March. The Board of Trustees now only meet in June and October.
This milestone has been cancelled.

RISK & MITIGATION: No Impact.



Milestone Carryover Chart

FY2019				Q1 FY2020 Performance			Q2 FY2020 Performance		
POP Milestone	Milestone	Completion Date	New Completion	Cost	Schedule	Scope	Cost	Schedule	Scope
3.5	NA ALMA Operations								
	Maintenance, Renewal, and Warranty Claims								
29	Deliver reworked FDHV 1 to JAO	12/31/2018	1/1/2019						
30	Deliver FDHV 2, 3, and 4 to JAO	9/30/2019	1/1/2019						
	NRAO-Chile Office								
34	Inauguration of Malcondo	9/30/2019	6/1/2020						
3.3	New Mexico Operations								
	Very Large Array								
	Development								
14	VLA/SL1 Single epoch continuum imaging complete	12/31/2018	1/1/2019		Cancelled				
	Technical Upgrades and Enhancements								
41	Install ACUs in three antennas, #11, 12, and 13	9/30/2019	12/31/2019						
42	Install upgraded series SCF cards in three antennas	9/30/2019	12/31/2019						
	Very Long Baseline Array								
	Maintenance and Renewal								
60	Major VLA Maintenance Visit #1	6/30/2019	7/24/2020						
4.6	Next Generation Very Large Array								
	Conceptual Design and Development								
70	System Requirements and Architecture Review	9/30/2019	6/30/2020						
72	Antenna Optical Design	5/30/2019	9/30/2020						
29	Wide Band Feed Design	9/30/2019	1/1/2019						
31	Integrated Receiver Development Tests	9/30/2019	6/30/2020						
5.3	Control Development Laboratory								
	Research and Development								
12	Test SADC prototype ASIC	6/30/2019	3/31/2020						
4.7	Science Support and Research								
	Science Ready Data Products								
17	Post-MCIP Operations Complete	9/30/2019	12/1/2019						
7.5	Data Management and Software								
	CASA								
21	CASA 5.0 release	6/30/2019	12/1/2019						

Milestone Carryover Chart

FY2019				Q1 FY2020 Performance			Q2 FY2020 Performance		
POP Milestone	Milestone	Completion Date	New Completion	Cost	Schedule	Scope	Cost	Schedule	Scope
8.5	Program Management Department Headquarters								
6	Program Management Software Solution Implementation	6/30/2019	6/1/2020	Cancelled, in FY2020 POP			Cancelled, in FY2020 POP		
7	Multiscanha Mass Concrete Works Complete	12/31/2018	2/1/2020	Cancelled, in FY2020 POP			Cancelled, in FY2020 POP		
8	Multiscanha Beams Erection Complete	12/31/2018	2/1/2020	Cancelled, in FY2020 POP			Cancelled, in FY2020 POP		
9	Multiscanha Membrane Installation Complete	3/30/2019	2/1/2020	Cancelled, in FY2020 POP			Cancelled, in FY2020 POP		
10	Multiscanha Sport Flooring Installation Complete	3/30/2019	2/1/2020	Cancelled, in FY2020 POP			Cancelled, in FY2020 POP		
11	Multiscanha Construction Complete	9/30/2019	2/1/2020	Cancelled, in FY2020 POP			Cancelled, in FY2020 POP		
13	SRDP Wave 1 Review	9/30/2019	11/1/2019						
	New Mexico Operations								
20.	VLBA Fiber Final Service Analysis Report	9/30/2019	3/1/2020	Cancelled, in FY2020 POP			Cancelled, in FY2020 POP		
	Central Development Lab								
28	CDL Continuing Education	9/30/2019	10/1/2019						

FY2018				Q1 FY2020 Performance			Q2 FY2020 Performance		
POP Section	POP Milestone	Milestone	New Completion Date	Cost	Sched	Scope	Cost	Sched	Scope
4.1	Central Development Laboratory								
	Research and Development								
0	Explore DQMT calibration using hot-cold-noise	9/30/2018	12/13/2019						
	ngVLA								
4	Conceptual Design & Development								
12	Algorithmic study released	9/30/2018	6/30/2020						
15	RFI Publication study released	9/30/2018	12/13/2019						
1.11	Long Baseline Observatory								
	Operational Activities								
	VTE replacement program will be complete	9/30/2018	12/13/2019						

POP FY2019 MILESTONE: # 3.3.60

New Mexico Operations

Major VLBA Maintenance Visit #1

Cost

Schedule

Scope

COST: <table> <tr> <th>Labor Actuals</th> <th>Expected</th> </tr> <tr> <td colspan="2">There are no changes in budget.</td> </tr> </table>		Labor Actuals	Expected	There are no changes in budget.		SCOPE: Major maintenance visit to Los Alamos VLBA site for multiple preventive maintenance activities that require additional staff. There is no change to the scope.							
Labor Actuals	Expected												
There are no changes in budget.													
SCHEDULE: <table> <tr> <th>Milestone</th> <th>Schedule</th> <th>Target</th> </tr> <tr> <td>I. Completion of maintenance visit</td> <td>6/30/2019</td> <td>7/24/2020</td> </tr> </table>		Milestone	Schedule	Target	I. Completion of maintenance visit	6/30/2019	7/24/2020	RISK & MITIGATION: <table> <tr> <th>Risk</th> <th>Mitigation</th> </tr> <tr> <td>I. Azimuth 2 wheel assembly failure</td> <td>I. Routine monitoring of assembly performance and lubrication quality. Send separate team for assembly swap if needed.</td> </tr> </table>		Risk	Mitigation	I. Azimuth 2 wheel assembly failure	I. Routine monitoring of assembly performance and lubrication quality. Send separate team for assembly swap if needed.
Milestone	Schedule	Target											
I. Completion of maintenance visit	6/30/2019	7/24/2020											
Risk	Mitigation												
I. Azimuth 2 wheel assembly failure	I. Routine monitoring of assembly performance and lubrication quality. Send separate team for assembly swap if needed.												

38

QSU2 FY2020

COST: No impact.

SCOPE: No change. Visit includes a preventive replacement of the azimuth 2 wheel assembly.

SCHEDULE: Originally delayed to Q2 FY2020 due to the FY2019 St. Croix repair project. Staff and equipment are now unable to travel due to COVID-19 travel restrictions. The major maintenance visit is postponed until Q4 FY2020 at which point Los Alamos will receive a major preventive maintenance visit by staff from the Electronics and Engineering Services Divisions, pending return to normal operations.

RISK & MITIGATION: Due to the planned replacement of the wheel assembly being delayed, its performance and inspection of grease for signs of a failure are being watched closely. If signs of an impending failure are seen, antenna mechanics and engineers responsible for the assembly swap can be sent earlier than the main visit. Currently there are no signs this will be needed, despite this being the oldest remaining wheel assembly in the VLBA.

POP FY2019 MILESTONE # 4.6.20				Cost
ngVLA				Schedule
System Requirements & Architecture Review				Scope
COST:		SCOPE:		
Labor Actuals	Expected	An external system-level requirements and architecture review will ensure an appropriate level of completeness in the requirements, and architectural coherence, prior to competing sub-system conceptual design down-selections.		
\$	\$			
Material Actuals	Expected			
\$	\$			
Travel Actuals	Expected			
\$	\$			
SCHEDULE:		RISK & MITIGATION:		
Milestone	Schedule	Target	Risk	Mitigation
I. Requirements & Architecture Review	9/30/2019	6/30/2020	I. Incomplete definition of subsystem requirements	I. Complete the review

COST: No Impact.

SCOPE: No Impact.

SCHEDULE: A Stakeholders Requirements Review was held in Socorro on September 26, 2019, partially fulfilling the original intent of this milestone. The review was chaired by Michael Rupen (NRC) and Melissa Soriano (JPL). Both are on the ngVLA Technical Advisory Council (TAC). The committee noted the high quality of the documents they reviewed, and provided useful feedback on the documents in the form of Review Item Discrepancies (RIDs). The RIDs were addressed, and the review was successfully concluded. The high-level architecture was viewed as sufficiently mature for this stage of the project. The Requirements Verification and Traceability Matrix (RVTM) and System Requirements documents have since been updated. The System Requirements Review (remote) is scheduled for completion in Q3 FY2020.

RISK & MITIGATION: The high level requirements and architecture need to be reviewed for completeness and overall coherence so that the requirements for subsystems are in turn complete. If the review is not completed, the requirements definition for a subsystem could be incomplete, leading to an incorrect decision in a design downselect or to a subsystem that does not deliver its requisite functionality. The risk can be mitigated by completing the review.

POP FY2019 MILESTONE # 4.6.22			Cost
ngVLA			Schedule
Antenna Optical Design			Scope
COST:		SCOPE:	
Labor Actuals	Expected	The optical design of the ngVLA antenna will be updated, with an emphasis on the down-select of major optical parameters. Shaping profiles will be investigated to optimize G/T_{SYS} with Gaussian feed horns.	
\$	\$		
Material Actuals	Expected		
\$	\$		
Travel Actuals	Expected		
\$	\$		
SCHEDULE:		RISK & MITIGATION:	
Milestone	Schedule	Target	
I. Revised optical design	3/30/2019	9/30/2020	
		Risk	Mitigation
		I. Less than optimal aperture efficiency and/or a late optical design introduces major structural changes to the antenna.	I. Ensure the optical design is optimized prior to the completion of a detailed mechanical design of the antenna

COST: No Impact.

SCOPE: No Impact.

SCHEDULE: The current optical design for the ngVLA antenna continues to look very good, and we aren't expecting major changes to it. The risk of using the existing model, and then having to make major changes to the structural design, has decreased. However, additional trade studies and engineering analyses need to be completed before the new optical design is done. The new optical design needs to be completed before Q1 FY2021, when we expect to release a contract for the preliminary design of a prototype antenna. The work has been contracted to EMSS, who are currently scheduled to deliver the optical design in Q4 FY2020.

RISK & MITIGATION: The ultimate intent of the optical design is to optimize the aperture efficiency of the antennas. The higher the efficiency, the fewer number of antennas need to be built. Additionally, there was some concern that the optimized optical design would have major impacts on the structural design of the antenna, but this seems not to be a major design driver. The optical design needs to be finalized prior to the completion of the antenna's mechanical design.

POP FY2019 MILESTONE # 4.6.3I				Cost
ngVLA				Schedule
Integrated Receiver Development Test				Scope
COST:		SCOPE:		
Labor Actuals	Expected	The Integrated Receiver concept combines downconversion, sampling, and data transmission in a lightweight, compact package that offers advantages in cost, performance, and reliability. The performance of the Integrated Receiver chip will be characterized with a demonstration board.		
\$	\$			
Material Actuals	Expected			
\$	\$			
Travel Actuals	Expected	RISK & MITIGATION:		
\$	\$			
SCHEDULE:				
Milestone	Schedule	Target	Risk	Mitigation
I. Complete tests of the Integrated Receiver chip on a demonstration board.	9/30/2019	6/30/2020	I. ASIC does not perform as designed	<ol style="list-style-type: none"> 1. Revise the design to correct shortcomings revealed in the characterization tests. 2. Adopt the discrete component design, which will require more space and cooling.

COST: No impact.

SCOPE: No change. The Integrated Receiver concept was demonstrated with discrete components, but has yet to be demonstrated with the ASIC chip that includes all of the stated functionality. The purpose of this milestone is one of risk reduction in showing that the ASIC performs in accordance with its design.

SCHEDULE: The ASIC chips were delivered to NRAO, and a demonstration board for testing the chips was fabricated. Initial tests revealed some manufacturing errors on the part of the vendor (City Semiconductor). Steps were taken to address the errors, but additional tests have yet to be made because NRAO entered its Infectious Disease Operations Status (IDOS) as a result of COVID-19. Arrangements are being made to perform additional tests with the goal of completing them in Q3 FY2020. Note: this task tracks to CDL milestone #5.3.12.

RISK & MITIGATION: If the ASIC does not perform as intended, its design could be revised to address the shortcomings identified in the characterization tests. However, this could be at considerable cost since it might require another (expensive) wafer run for the ASIC. Alternatively, the ASIC development effort could be abandoned in favor of the discrete component design, which has been demonstrated to work. However, the discrete component design will require more space and cooling, and is likely to be less reliable than the ASIC design.

POP FY2019 MILESTONE # 5.3.12

Central Development Laboratory

Test SADC prototype ASIC

Cost

Schedule

Scope

COST:

Labor Actuals	Expected
\$	\$
Material Actuals	Expected
\$	\$
Travel Actuals	Expected
\$	\$

SCOPE:




Photo of a populated SADC evaluation board. Approximately 50% to 75% of area is taken up by test points and signal access connectors.

Initial testing revealed several errors in the chip implementation (vendor issue). Work-around for the critical issues identified, and a few chips have had their hardware edited (see details in the notes). Evaluation continues.

SCHEDULE:




Milestone	Schedule	Target
I. Test SADC prototype ASIC	Was 6/30/2019 Revised to Q3 FY2019 then to Q4 FY2019, and then to 3/21/2020 in Q1 FY2020.	Now requesting Q3 FY2020 6/26/2020

RISK & MITIGATION:

Risk	Mitigation
I. Not applicable.	I. Most of the previously described risks have either materialized or addressed – currently evaluation is underway.

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QSU2 FY2020

COST: No Impact.

SCOPE: The initial delivered chips had several errors that were the fault of the contractor (City Semiconductor in San Francisco, CA). The most damaging issue was traced back to a missing connection from the power supply to the output stage of the circuit. A number of the chips have undergone a crude fix known as a "FIB edit," where a focused ion beam is used to cut some traces and add others, bypassing faulty circuitry and repairing the problem. Five chips have thus been edited. We have carefully planned to perform the mounting of one of those edited chips onto our evaluation board and resume testing under IDOS, and hope to perform these tasks by the end of April. Because the FIB process is expensive on a per chip basis, and the tungsten traces it deposits are weak and susceptible to damage from careless soldering practice, we are proceeding with an unusual level of caution (above and beyond IDOS protocols) so that none of the edited chips are lost.

Next steps:

1. Ensure all circuits come up and are functioning (at CDL),
2. Ensure SADC output is nominally working and decoding algorithm is working (at CDL),
3. Ship a couple of boards to ASIC vendor (City Semiconductor, SF) for full evaluation of ASIC functionality.

SCHEDULE: As explained above, it is foreseen that additional schedule is required to complete this task.

RISK & MITIGATION: Most of the risks described previously have been mitigated, and evaluation is in progress.

POP FY2019 MILESTONE # 6.7.17

Science Support and Research (SRDP)

SRDP Pilot Operations Complete

Cost
 Schedule
 Scope

COST: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 2px;">Labor Actuals</td> <td style="padding: 2px;">Expected</td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$ no change</td> </tr> <tr> <td style="padding: 2px;">Material Actuals</td> <td style="padding: 2px;">Expected</td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$ no change</td> </tr> <tr> <td style="padding: 2px;">Travel Actuals</td> <td style="padding: 2px;">Expected</td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$ no change</td> </tr> </table>			Labor Actuals	Expected	\$	\$ no change	Material Actuals	Expected	\$	\$ no change	Travel Actuals	Expected	\$	\$ no change	SCOPE: No change to overall project scope. As a result of responding to external scope adjustments during Pilot Development, ALMA User Driven Imaging deployment was delayed.		
Labor Actuals	Expected																
\$	\$ no change																
Material Actuals	Expected																
\$	\$ no change																
Travel Actuals	Expected																
\$	\$ no change																
SCHEDULE: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; padding: 2px;">Milestone</th> <th style="width: 20%; padding: 2px;">Schedule</th> <th style="width: 50%; padding: 2px;">Target</th> </tr> <tr> <td style="padding: 2px;">1. End of Pilot Ops.</td> <td style="padding: 2px;">Sep 30, 2019</td> <td style="padding: 2px;">May 31, 2020</td> </tr> </table>			Milestone	Schedule	Target	1. End of Pilot Ops.	Sep 30, 2019	May 31, 2020	RISK & MITIGATION: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; padding: 2px;">Risk</th> <th style="width: 50%; padding: 2px;">Mitigation</th> </tr> <tr> <td style="padding: 2px;">1. Schedule Risk</td> <td style="padding: 2px;">1. Accept (see notes)</td> </tr> </table>			Risk	Mitigation	1. Schedule Risk	1. Accept (see notes)		
Milestone	Schedule	Target															
1. End of Pilot Ops.	Sep 30, 2019	May 31, 2020															
Risk	Mitigation																
1. Schedule Risk	1. Accept (see notes)																

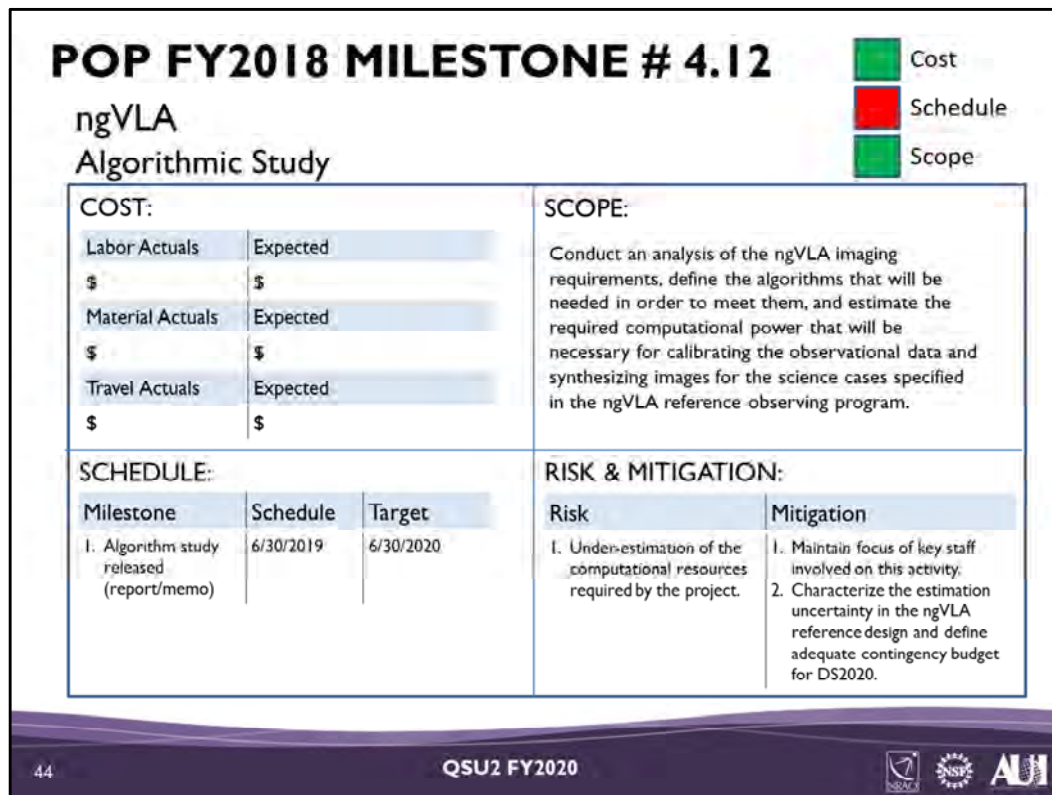
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QSU2 FY2020

COST: No impact.

SCOPE: No change to overall project scope, priorities were adjusted to exchange some scope items between Pilot development and Wave I development, primarily to support large projects. These scope adjustments resulted in deferred deployment of the ALMA User Driven Imaging (AUDI) until near the planned end of Pilot Operations. The final capability, ALMA User Driven Imaging (AUDI), was deployed but insufficient operational experience was gained by the scheduled target of Q4 FY2019. Pilot AUDI operations are currently ongoing. The suspension of ALMA observations has provided an opportunity for users to explore the AUDI capability, increasing community engagement and expanding the base of operational experience.

SCHEDULE: The original target for completion of Pilot Operations was Q4 FY2019, most of which has been met with the exception of AUDI. We are extending the Pilot Operations period to allow for development of operational experience.

RISK & MITIGATION: Risk of further schedule delay is low, preliminary results from validation indicate most known issues have been adequately addressed.



COST: No impact.

SCOPE: No impact.

SCHEDULE: Competing priorities within NRAO (e.g. algorithms for VLASS) have delayed the completion of this milestone. It also required input from the ngVLA reference observing program, which has been completed. A draft memorandum documenting the algorithm study has been written, and is scheduled for release in Q3 FY2020.

RISK & MITIGATION: The risk of not completing the algorithmic study is under-estimating the computational resources that will be required by ngVLA to produce its expected science products. In addition, a weak estimation in this area could suggest to DS2020 that the technical concept for the array is incomplete. This risk will be mitigated by maintaining the focus of the key personnel involved in writing the report. It would also be adequate to conduct a review of this report in anticipation of requests for additional information from DS2020.

POP FY2015 MILESTONE # 3.4.62				Cost
Administrarion (from NM Ops)				Schedule
Renew VLBA lease for Owens Valley				Scope
COST:		SCOPE:		
Current VLBA lease rate:	\$500 per year	Owens Valley, CA site sub-lease with Owens Valley Radio Observatory (OVRO) is lapsed. OVRO (managed by CalTech) has received a draft lease from Los Angeles Department of Water and Power (LADWP) and they have shared it with NRAO (we have no concerns or comments). NRAO has also reviewed and approved the draft of its sub-lease with OVRO which will be signed after OVRO signs the master lease. LADWP expects the lease to officially commence "soon."		
Expected new lease rate:	OVRO hopes to negotiate a lease with LADWP such that the VLBA share is < \$3,000 a year.			
SCHEDULE:		RISK & MITIGATION:		
Milestone	Schedule	Target	Risk	Mitigation
1. Owens Valley Lease renewed	03/31/2015	EOY 2019	1. Impact on VLBA operating budget (increase in lease cost – but early indications are for a modest increase) 2. Impact on VLBA operation	1. Adjust VLBA Operating budget, if necessary. 2. Avoid by periodic follow up of Caltech negotiation progress

Updated 07/8/2019

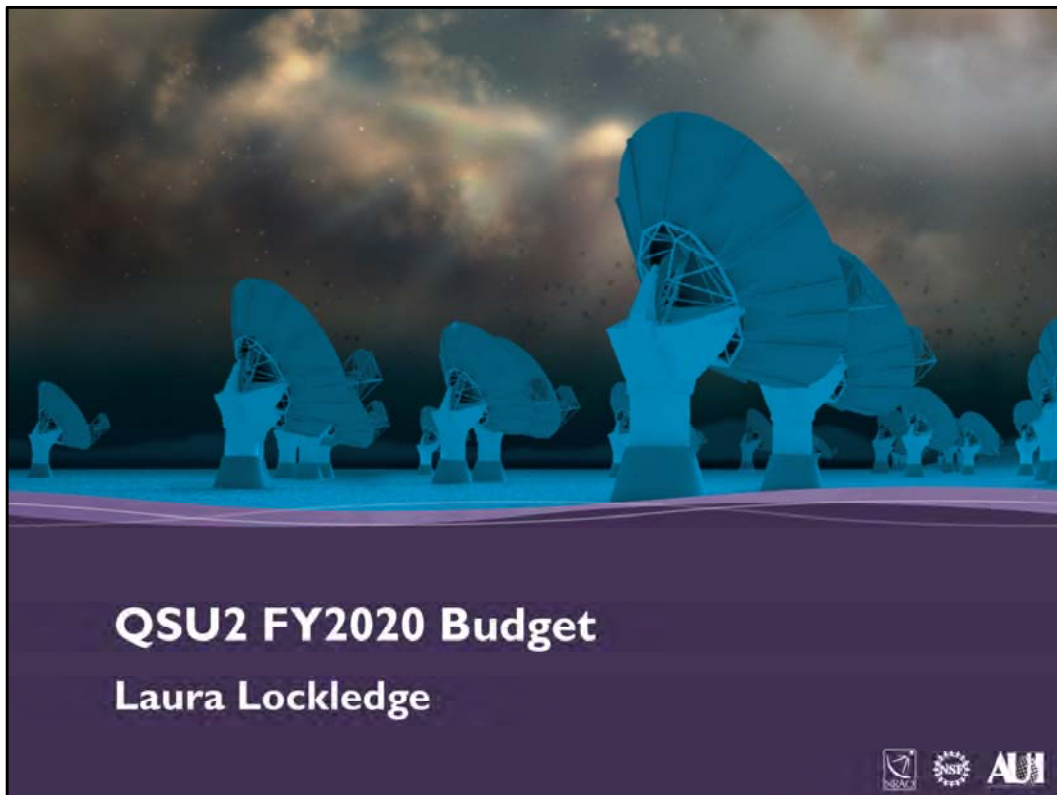
COST: Future lease costs are subject to the status of Caltech's re-negotiation of the lease with Los Angeles Water and Power.

SCOPE: No changes.

SCHEDULE: Owens Valley Lease: The master lease for the Owens Valley Radio Observatory is an agreement between Caltech and Los Angeles Water and Power (the lease holder). The master lease has been expired since March 31, 2015, and renegotiating it does not appear to be a priority for LA W&P. NRAO has a sublease agreement for VLBA-OV with Caltech. We will continue to monitor the situation with the master lease, and propose a new milestone for the sublease at the appropriate time.

RISK & MITIGATION:

1. Caltech has leased Owens Valley, CA for a low yearly fee. The probability of a cost increase is low, but a budget adjustment would be needed if a cost increase occurs.
2. Impacts on other aspects of VLBA Operations are not likely to occur.
3. An interim agreement between Caltech and NRAO regarding the sublease during this interim period has been discussed and our continued occupancy is not an issue.



Impact of COVID-19

- NRAO established Infectious Disease Operating Status (IDOS) policy. Activated 3/16/20. Applies to all AUI radio astronomy fund sources.
- Wages – record worked from home; worked from site; unable to work
 - N/E work at site generates 50% premium
 - Only potential savings from delays to seasonal labor (mostly GBO)
- Benefits
 - 2nd HSA payment advanced from June to April
 - Forecast hitting health plan stop loss (\$1M)
- Non-salary
 - IDOS specific costs (travel cancellations, PPE, special supplies or accommodations) being tracked

Impact of COVID-19

- Program Income – anticipated losses
 - Tour revenue
 - Gift shop revenue (nets w/COGS)
 - NM Guest House revenue
 - Still under estimation - Manageable
- Major review during Q2 forecast process

Impact of COVID-19: First Pay Period Experience

- Out of 549 radio astronomy employees
 - 476 were able to log some time worked (87% of Staff)
 - 65% of total hours were able to be worked in some capacity
- 285 employees used the IDN code (not worked)
 - 73 Used IDN exclusively
 - 212 Charged some time

2nd pay period indicates an increase in the number of recorded hours worked – significant as there was an AUI holiday during this time period.

Statement

- NRAO and GBO are pleased to offer their staff members dependable employment, compensation, and benefits during this time.
- As stewards of federal funds, NRAO and GBO are doing their utmost to maintain services to the scientific community while maintaining safe operations consistent both with local guidance and NRAO/GBO's status as essential services.
- We are grateful to the NSF for its support during this time.
Thank you.

FY2020 Q2 Notes

- NRAO has created management reporting to exclude the impact of benefits variance from individual units. As in past practice, that amount is now summarized as fund source adjustments for each fund source and included in the Director's Office WBS.
- New fringe approach in place, includes employee welfare benefits + PTO. Budget @ 61.75% Q2 Actual @ 64.6% (\$535K)
- Reflects vacation burn related to change in vacation carryover policy.
- General underspends, Q2 reflects cessation of travel and IDOS
- ICC underrecovered \$1M. Reflects:
 - Programmatic underspends vs. indirect linear.
 - NSF delayed indirect rate approval (~62%)

CSA-V Q2 Results

	FY20 POP Budget	FY20 Rev. Budget	FY20 YTD Expenses	YTD % Rev Budget
NSF	34,970	34,970	37,272	106.6%
Carryforward/Other	0	8,082	8,082	0.0%
Total Revenues	34,970	43,052	45,354	105.3%
Telescope Ops	10,841	12,010	5,014	41.7%
Development	3,606	2,894	1,034	35.7%
Science Ops	7,400	9,238	3,355	36.3%
Admin Services	9,863	11,763	4,158	35.3%
Director's Office	2,469	2,472	1,238	50.1%
Ed. & Public Outreach	791	820	321	39.1%
ngVLA	0	3,855	1,415	36.7%
FY20, Total	34,970	43,052	16,535	38.4%
FY20 CSA-V Net	0	0	28,819	

- Director's Office includes fund source adjustments.
- Budget changes related to carryforward allocations, esp. ngVLA.

CSA-A Q2 Results

	FY20 POP Budget	FY20 Rev. Budget	FY20 YTD Expenses	YTD % Rev Budget
NSF	47,260	47,260	52,190	110.4%
Carryforward	6,158	6,758	6,758	100.0%
Canadian Contribution	1,787	1,697	593	0.0%
Other	844	1,677	1,282	100.0%
Total Revenues	56,049	57,392	60,823	106.0%
Telescope Ops	28,310	24,767	9,212	37.2%
Development	3,181	10,082	-206	-2.0%
Science Ops	7,158	7,241	3,012	41.6%
Admin Services	8,744	10,930	3,932	36.0%
Director's Office	3,446	3,589	1,553	43.3%
Education & Public Outreach	761	783	333	42.5%
FY20, Total	51,600	57,392	17,836	31.1%
FY20 CSA-A Net	4,449	0	42,987	

- Director's Office includes fund source adjustments
- Telescope Ops budget reduction reflects reclass of reserves budget to Development.
- Telescope ops low due to favorable exchange rates.

CSA-L Q2 Results

	FY20 POP Budget	FY20 Rev. Budget	FY20 YTD Expenses	YTD % Rev Budget
NSF	3,430	3,760	4,288	114.0%
Telescope Time Sales	4,614	4,613	4,584	99.4%
Carryforward	71	128	128	
Other	333	624	621	99.5%
Total CSA-L Revenues	8,448	9,125	9,621	105.4%
Telescope Ops	5,311	6,021	2,514	41.8%
Development				
Science Ops				
Admin Services	2,673	2,584	1,096	42.4%
Director's Office	464	464	268	57.8%
Education & Public Outreach				
FY20	8,448	9,069	3,878	42.8%
FY20 CSA-L Net	0	56	5,743	

- Budget changes related to carryforward and reobligation of CSA-I \$.

CSA-H, F, N

	CSA H			CSA-F			CSA-N		
	Budget	ITD Expenses	% Budget	Budget	ITD Expenses	% Budget	Budget	ITD Expenses	% Budget
NSF	2,000	1,951	97.6%	2,500	948	37.9%	4,000	1,249	31.2%

- CSA-H - Closeout trip delayed; no-cost extension requested
- CSA-N - On track to fully expend. Holding \$400K contingency for antenna study ICC.

ICC Q2 Results

	FY20 POP Budget	FY20 Rev. Budget	FY20 YTD Expenses	YTD % Rev Budget
NRAO Recoveries	17,271	17,222	6,320	36.7%
External Recoveries	1,445	1,445	676	46.8%
Total ICC Revenues	18,716	18,667	6,996	37.5%
Telescope Ops	109	112	85	75.9%
Development	484	492	212	43.1%
Science Ops	2,841	2,870	1,183	41.2%
Admin Services	13,158	13,032	5,505	42.2%
Director's Office	2,124	2,161	997	46.1%
FY20, Total	18,716	18,667	7,982	42.8%
FY20 ICC Net	0	0	-986	

- Reduction in ICC budget reflects staffing changes.
- Under-recovery seasonal + rate approval delays.



Collective bargaining:

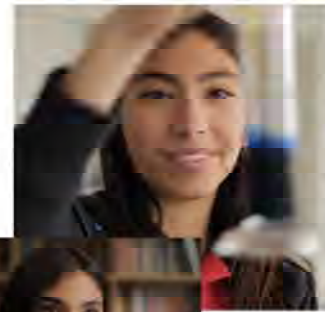
Three-year contracts signed in anticipated negotiations

- In March, AUI reached agreements with both unions and signed three-year collective contracts after a period of anticipated/unregulated bargaining. Regular negotiations would have taken place in April/May.
- This is a timely achievement that exceeds the expectations of the milestone set in the POP, both in terms of schedule and content. It sets the important precedent that a conciliatory approach, without the possibility of a strike, can result in a good and fair deal for all parties involved.
- Voting by union members was overwhelmingly in favor of the last offer. Original union: 172 members (161 in favor/11 against), Union 2: 43 members (unanimous approval).

Provoca success story:

Javiera Toro gets ready for university!

- Javiera participated in the first Provoca activity (STEM speed dating) in October 2018.
- She became the protagonist of one of the chapters in the web series (<https://www.youtube.com/watch?v=yAoQvRZiA2E>)
- Her interest in astronomy preceded Provoca, but the goal seemed unattainable before she met female role models.
- In March 2020, she started her B.S. at U. of Chile's prestigious engineering school, where she plans to study astronomy.



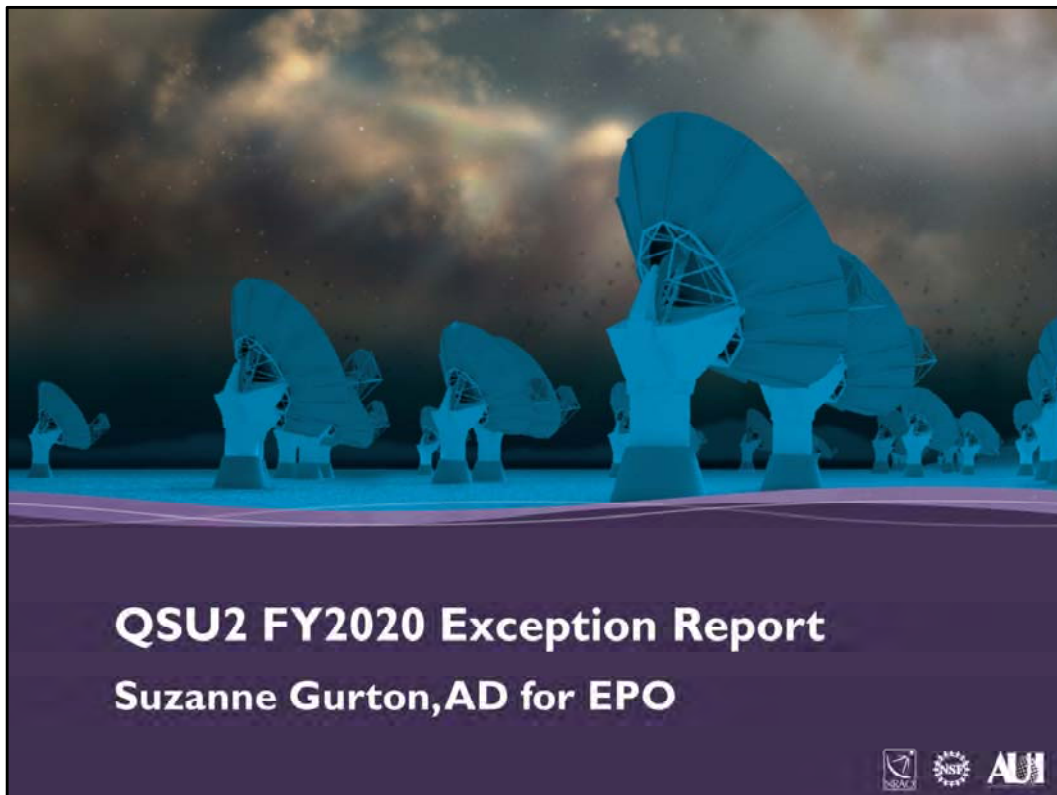
Provoca success story:

Javiera Toro finds a path and a voice

- ... *Provoca* showed me a path to follow my dreams. I learned many things about astronomy and could explain to my parents what it means, how I can become a professional in the field, and why it is important to me.
- After *Provoca* I focused even harder in my studies and started helping my sister to get ahead.
- I had to overcome my shyness to appear in the web series and speak in public. I now understand it is important to have my own voice...
- Javiera took part in ALMAs Con Ciencia Women's Day celebration on March 6th and was featured in the science ministry's social media.

<https://portaleduca.cl/joven-protagonista-de-serie-provoca-participo-del-encuentro-almas-con-ciencia/>





Multimedia Group Social Media Blogs

- Two new blogs published which shined a light on NRAO programs
 - Sister Cities and Observatories
 - NINE

< From Chile to New Mexico: Sister Cities and Observatories >



< NRAO NINE Hub at Texas Tech University >



The NRAO NINE National and International Non-Resident Exchange program aims to train students and broaden participation in radio astronomy. This includes participation in NRAO NINE Hub activities. The NINE Hub is a network of NRAO NINE Hub members who are active in the field of radio astronomy.

Multimedia Group

Social Media Facebook

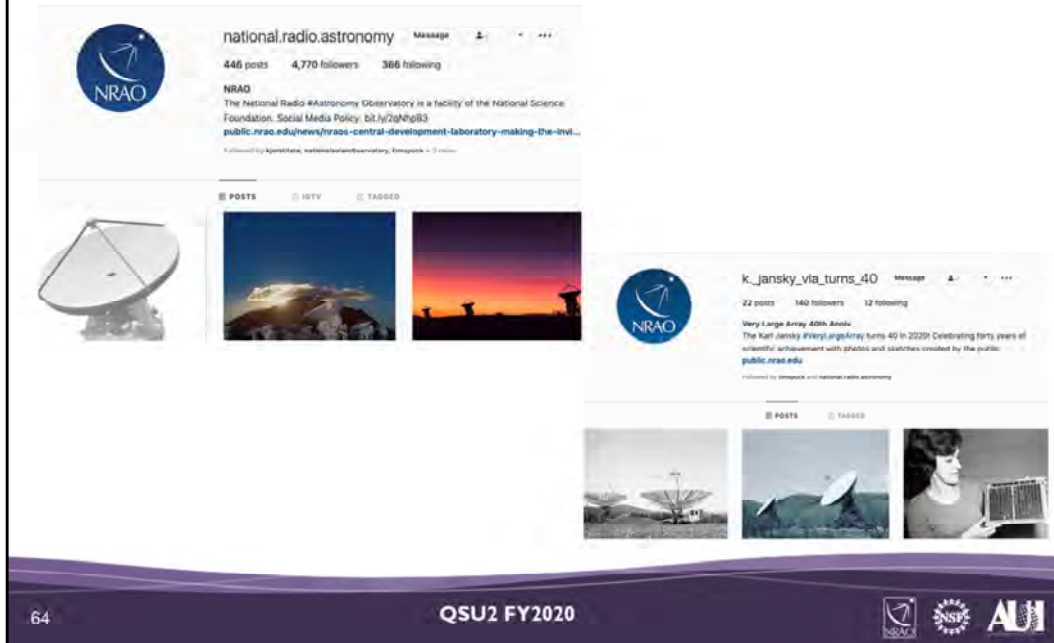
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NSF NRAO AUI

Two of our most popular Facebook posts were contributed by staff. Ron Taylor was giving me a photographic update on the concrete pour for our little visitor gazebo and included these lovely shots of the dishes in the fog and we got his permission to include them in a post. And this photo of ALMA got a similarly positive response, although the VLA post got a little deeper engagement.

Multimedia Group Social Media Instagram




Instagram is our newest and fastest growing social media platform. We use it to publicize innovations and new content on our website. We started an additional Instagram account to celebrate the 40th Anniversary of the VLA.

Multimedia Group

Social Media Twitter

 Come by and see us at #AAS235 for this @NightSkyPark #ngVLA limited edition poster!

 **Dr. Kelley Hess** @KHesser · Jan 6

Best #AAS235 swag so far!! @TheNRAO @VLArray (Aside from the @ASTRON_NL tool pen, of course.)



Twitter was kind to us at the AAS.

Multimedia Group Virtual Reality



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We premiered an ngVLA tour at the AAS meeting. It was a hit in the booth and now we're continuing to augment it with pop up details for a more self guided experience.

News and Public Information

Press Releases ALMA



The Turbulent Life of Two Supermassive Black Holes Caught in a Galaxy Crash

January 5, 2020 at 3:14 pm | News Release

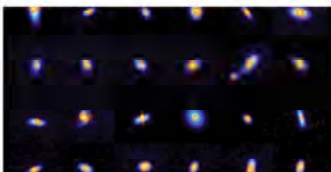
An international team of astronomers used ALMA to create the most detailed image yet of the gas surrounding two supermassive black holes in a merging galaxy.



The Strange Orbits of 'Tatooine' Planetary Disks

March 19, 2020 at 10:00 am | News Release

Astronomers using ALMA have found striking orbital geometries in protoplanetary disks around binary stars.



How Newborn Stars Prepare for the Birth of Planets

February 20, 2020 at 10:00 am | News Release

An international team of astronomers used ALMA and the VLA to create more than three hundred images of planet-forming disks around very young stars in the Orion Clouds. These images reveal new details about the birthplaces of planets and the earliest stages of star formation.

AAS was not all fun and games for EPO. We hosted two press conferences. Of the three ALMA press releases, one was featured as a press release at the winter AAS meeting, one is a fun result where we can play the Tatooine card, looking at the protoplanetary disks of binary star systems, and the third featured data from both the VLA and ALMA.

News and Public Information

Press Releases



Astronomers Find Wandering Massive Black Holes in Dwarf Galaxies

January 5, 2020 at 3:30 pm | News Release

Studies with the VLA indicate that roughly half of the massive black holes in dwarf galaxies are not in the centers of those galaxies. This gives astronomers new insights into the conditions in which similar black holes formed and grew in the early history of the Universe.



New Technologies, Strategies Expanding Search for Extraterrestrial Life

February 14, 2020 at 7:00 pm | News Release

New technologies that enable new strategies are revitalizing the Search for Extraterrestrial Intelligence (SETI), by not only augmenting the traditional search for intelligently-generated radio signals but also allowing searches for other signs of life and technological activity.



Latest Updates on COVID-19 Measures from NRAO, ALMA, GBO

March 17, 2020 at 11:00 am | News Release

In response to the COVID-19 outbreak and school closings, the NRAO and the GBO are closing facilities in three states. ALMA science observing has been temporarily suspended.

We had two releases that exclusively featured the VLA: one was a press conference at the AAS, the other was the headline grabber from the AAAS meeting about the SETI panel hosted by our director, Tony Beasley. The third is the release that we continue to update to reflect our facility status during this pandemic.

News and Public Information Announcements



American Astronomical Society Honors NRAO Scientists

February 26, 2020 at 11:56 am | Announcement

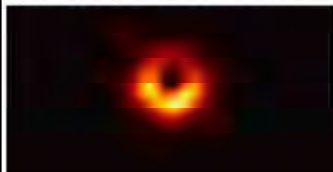
NRAO scientists are among the first American Astronomical Society members to receive the new honor of designation as "Fellows of the AAS."



International Group Honors NRAO Employee as Technician of the Year

February 7, 2020 at 5:45 pm | Announcement

NRAO servo technical specialist Bruce Mues is honored as Technician of the Year by international association.



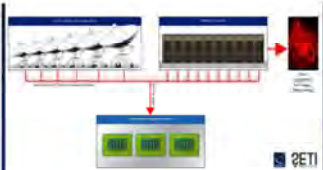
NRAO Jansky Fellow Kazunori Akiyama Receives 2020 ASJ Young Astronomer Award

March 2, 2020 at 10:00 am | Announcement

Kazunori Akiyama, a Jansky Fellow of NRAO at MIT Haystack Observatory, has received the 2020 Young Astronomer Award from the Astronomical Society of Japan for his contributions to the first-ever images of a black hole.

A total of six NRAO announcements were posted this quarter. Three were announcing honors bestowed on our staff.

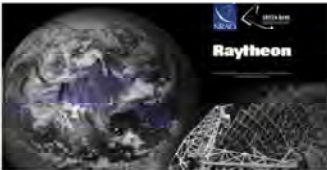
News and Public Information Announcements



NRAO, SETI Institute Agree on New Research Programs

February 14, 2020 at 7:00 pm / Announcement

NRAO and the SETI Institute will develop a new system to provide VLA data to an advanced signal processor that will seek to detect signs of extraterrestrial technologies.



Raytheon and the National Science Foundation radio astronomy facilities to detect dusty asteroids in space

March 3, 2020 at 8:00 am / Announcement

Raytheon Company, the National Radio Astronomy Observatory and the Green Bank Observatory entered a cooperative research and development agreement.



Observatory Cancels Group Tours of Very Large Array and ALMA Public Visits

March 6, 2020 at 3:15 pm / Announcement

In order to reduce the risk of possible exposure to Coronavirus Disease 2019 (COVID-19), all group tours of the VLA are cancelled. Visitors will be able to access the visitor center, the outdoor walking tour, and the gift shop.

Two were about partnerships/cooperative agreements with the SETI Institute and Raytheon. The the last one eventually got absorbed into the COVID press release, to announce the closing of both the VLA and ALMA sites to the public.

STEAM Ed Group Tours at Visitor Center

EPO Tours for the Quarter

1/4/20 First Saturday: January	141
1/18/20 Third Saturday: January	122
1/22/20 Austin College Tour	14
2/1/20 First Saturday: February	110
2/13/20 Thoreau High School Tour	32
2/15/20 Third Saturday: February	150
3/5/20 Parkview Elementary School Tour	90
3/5/20 NMT Prospective Grad Students Tour	10
3/8/20 Minnesota State U. Self-guided group	6
3/12/20 Road Scholars Tour #1	29
Total	704

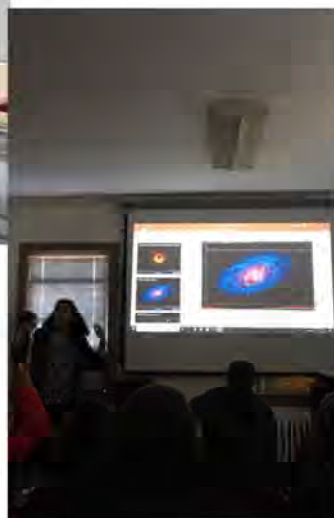
Cancelled:

1. conference tour from Santa Fe
2. student tour from UNM-Valencia campus

Winter is a slow season at the Visitor Center, but we served over 700 people before having to cancel all tours to protect both our employees and the public. The end of tours at the VC was effective March 14, so we canceled the tours for the 3rd Sat but had staff stationed at several places along the walking tour, encouraging visitors to keep their distance from each other as we addressed many questions. Shortly after that we closed the site completely to the public.

STEAM Ed Group Outreach Events

- **PVCC Manufacturing Day**
– February 20th, 2020
- **STEM and Mentorship
for Marginalize Student** –
February 21, 2020
- **Future Astronomers** –
February 22, 2020
- **CANCELLED PVCC
7th Grade Career Fair**
March 16 & 17



PVCC Manufacturing Day – February 20th, 2020

On February 20th, from 11 am–12 pm, Jennifer Jackson, Technical Specialist 3 from the CDL, participated in this event. Jackson had a NRAO table at the event. She talked about ALMA, how the receivers worked, and how many jobs affect the production of a single cartridge. She also talked about her career journey before coming to the CDL and the excitement of her job. Jackson gave away Crab Nebula postcards and CDL fliers. There were a total of about 150 to 200 who attend the panel discussion. About 40 of the students stopped by the NRAO table.

Table description: The NRAO is enabling forefront research into the Universe at radio wavelengths. The NRAO Technology Center in Charlottesville includes the Central Development Laboratory (CDL) and the ALMA Integration Center. The CDL develops and builds key components for NRAO telescopes, and for telescopes and research equipment commissioned by universities and other research institutions around the world. The ALMA Integration Center designs, prototypes, and fabricates key ALMA electronic components, including Front Ends, Back Ends, Local Oscillators, and the ALMA Correlator.

On Friday, February 21st, from 11:40 am–12:25 pm, Jessica Harris presented to high school students at Albemarle High School. The presentation was in the classroom of LaNika Barnes, AATF Fellow and part of the NRAO/AATF Think Tank. Class time was during their Patriot Period. Harris presented about her career journey in STEM and talked to students about NRAO's Observatories VLA and ALMA. About 20 students were in attendance.

On Saturday, February 21st, from 1:00–1:30pm, Jessica Harris, presented to the Future Astronomers Club as part of the Charlottesville Astronomical Society (CAS). The program is for kids in grades 4-12. The presentation was at McCormick Observatory for about 12 students. Harris presented about her career journey in STEM and talked to students about NRAO's Observatories VLA and ALMA.

Monday, March 16 is when the PVCC 7th grade career fair was scheduled, and we were set to participate, but it was cancelled

Multimedia Group Augmented Reality (AR)

- ALMA AR
- <https://public.nrao.edu/telescopes/alma/>
- VLA AR
- <https://public.nrao.edu/telescopes/vla/>



And to end on a fun note. I'd like to invite all with cell phones or tablets with a camera to follow either this link or use the QR code of your choice to bring a radio dish into your home. Open your camera and click on the link that appears. This will take you to the telescope page on the public website. Scroll down until you see the moving dish. Touch the stylized cube to the bottom right of the model. Then follow the on screen instructions.



science.nrao.edu
public.nrao.edu
ngvla.nrao.edu

*The National Radio Astronomy Observatory is a facility of the National Science Foundation
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