***Title*:** QSU3 FY2019	***Author*:** Thisdell/ADs	***Date*:** 8/8/2019
		***Version*:** Draft

National Radio Astronomy Observatory

Quarterly Status Update (QSU) 3 FY2019

April - June 2019

PREPARED BY	ORGANIZATION	DATE
Thisdell/ADs	Director's Office	08/8/2019

APPROVALS (Name and Signature)		ORGANIZATION
Nicole Thisdell	Nicole Thisdell Digitally signed by Nicole Thisdell Date: 2019.11.13 09:32:08 -05'00'	NRAO
Tony Beasley	Digitally signed by Tony Beasley Date: 2019.11.13 09:34:36 -05'00'	NRAO
Dave Curren		AUI

NRAO Quarterly Status Update
April - June 2019
QSU3 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment			Q3 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope	Cost	Schedule	Scope
2.5	**NA ALMA Operations**										
	NAASC										
1	Create Position of Deputy Division Head within the NAASC	12/31/2018									
2	Finalize the NAASC Reorganization	12/31/2018									
3	ALMA Ambassador applications will be advertised to the community	12/31/2018									
4	Run and organize the ALMA Ambassadors program in Charlottesville	3/30/2019									
5	TORUS 2018: The Many Faces of AGN Obscuration meeting	12/31/2018									
6	Exploring our Cosmic Origins: New Results from the Atacama Large Millimeter/submillimeter Array	3/30/2019									
7	New Horizons in Planetary Systems	6/30/2019									
9	Cycle 7 Call for Proposal and user documentation and ALMA Science portal updates/edits	12/31/2018									
		3/30/2019									
10	Preparation of the ALMA Cycle 7.5 Call for Proposals	12/31/2018									
11	Instructional video on the subtleties of ALMA operations	3/30/2019									
12	Conduct an investigation into the apparent fall off in publication rate of NA ALMA users	12/31/2018									
		3/30/2019									
13	Present the results of the investigation	6/30/2019									
14	Pipeline initial requirements	12/31/2018									
15	Validate CASA 5.5/6.0	3/30/2019									
16	Pipeline final requirements	6/30/2019									
18	NAASC staff will develop and implement the raw data pilot program	12/31/2018									
19	Venue for ALMA APRC7 finalized	12/31/2018									
20	Support APRC7 Meeting	6/30/2019									
21	P2G prepared and review all NA Phase 2 SBs	12/31/2018									
		3/30/2019									
22	ObsMode Cycle 8 planning, meeting and follow-up process in coordination with JAO	3/30/2019									
		6/30/2019							Cancelled		
23	Planning and coordination meetings in preparation for Cycle 7	6/30/2019									
	Development										
24	FY2020 (Cycle 7) Call for Study Proposals	3/30/2019									
26	Band 6 Upgrade project Proposal	12/31/2018	Cancelled								
	Maintenance, Renewal, and Warranty Claims										
27	Begin cabin temp control project (all 25 antennas)	12/31/2018									
28	Finish cabin temp control project (all 25 antennas)	6/30/2019									
29	Deliver reworked FEHV 1 to JAO	12/31/2018									
	NRAO-Chile Office										
31	Renewal of office lease	12/31/2018									
32	Catering, cleaning and maintenance contract	3/30/2019									
		6/30/2019									
33	Accounting tool Blackline	12/31/2018									
		3/30/2019									
35	Survey and assessment of NA infrastructure	12/31/2018									
36	Study on provision of power to non-ALMA projects	12/31/2018									
		3/30/2019									
37	Introduction of new ETK	12/31/2018									
38	Streamlining of HRIS	12/31/2018									
		3/30/2019									
39	Lessons learned from 2018 collective bargaining	12/31/2018									
		3/30/2019									
		6/30/2019									
40	Application of 2018 collective contract clauses	3/30/2019									
42	Sister Cities and Observatories: strengthening of STEAM	12/31/2018									
		3/30/2019									
		6/30/2019									
43	Galileo Teachers Training Program: global meeting in Chile	12/31/2018									
		3/30/2019									
		6/30/2019									
44	Kick off role model series/campaign	12/31/2018									
		3/30/2019									
45	Hour of Code sessions (2)	12/31/2018									

NRAO Quarterly Status Update
April - June 2019
QSU3 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment			Q3 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope	Cost	Schedule	Scope
45	Hour of Code sessions (2)	6/30/2019									
46	Organization of public meeting/seminar on D&I topic	6/30/2019									
3.3	**New Mexico Operations**										
	Very Large Array										
	Operations										
1	Define VLA GO and SRO capabilities to be offered for semester 2019B	12/31/2018									
2	Define VLA GO and SRO capabilities to be offered for semester 2020A	6/30/2019									
3	Update VLA documentation to support 2019B Call for Proposals, perform proposal technical reviews	3/30/2019									
5	Determine baselines and pointing for antennas moving into their C configuration locations	12/31/2018									
6	Determine baselines and pointing for antennas moving into their B configuration locations	3/30/2019									
7	Determine baselines and pointing for antennas moving into their BnA configuration locations	6/30/2019									
9	Reconfigure from D to C array	12/31/2018									
10	Reconfigure from C to B Array	3/30/2019									
	Development										
14	VLASS1.1 Single epoch continuum imaging complete	12/31/2018									
15	VLASS1.2 observing complete	6/30/2019									
17	VLASS special session at winter AAS meeting	3/30/2019									
19	VLASS/CIRADA definition complete	12/31/2018									
	Maintenance and Renewal										
22	Perform preventive maintenance on each of two transporters prior to array reconfiguration to B	12/31/2018									
23	Perform preventive maintenance on each of two transporters prior to array reconfiguration to A	6/30/2019									
27	Perform preventive maintenance on the next configuration VLA antenna transformers prior to array reconfiguration to B	12/31/2018									
28	Perform preventive maintenance on the next configuration VLA antenna transformers prior to array reconfiguration to A	6/30/2019									
	Technical Upgrades and Enhancements										
39	Ku-band Solar upgrade, install three additional receivers (#19-#21) with 20 dB switched attenuators on outputs only, no Solar Tcals.	6/30/2019									
43	Design and build PCB for refrigerator variable frequency drive	3/30/2019									
44	Upgrade the FE card cage firmware to V6.02 in 65 receivers	6/30/2019									
45	Frequency averaging promoted from SRO to GO	3/30/2019									
46	Phase-binned pulsar observing promoted from SRO to GO	3/30/2019									
47	Coherent-dedispersion pulsar observing promoted from RSRO to SRO	6/30/2019									
48	Wind prediction software requirements	12/31/2018									
49	Wind prediction implementation	6/30/2019									
50	Implementation of conditional Scheduling Blocks in OPT	3/30/2019									
	Very Long Baseline Array										
	Operations										
52	Define VLBA general and shared risk capabilities to be offered for semester 2019B	12/31/2018									
53	Define VLBA general and shared risk capabilities to be offered for semester 2020A	6/30/2019									
54	Update VLBA documentation to support 2019B Call for Proposals, perform proposal technical reviews	3/30/2019									
57	Retire MainSaver as maintenance tracking tool	6/30/2019									
	Development										
58	Install Mark6 4 Gbps recording equipment at the 10 VLBA sites	3/30/2019									
59	Commission Mark6, 4 Gbps recording capability	6/30/2019									
	Maintenance and Renewal										
60	Major VLBA Maintenance Visit #1	6/30/2019									
	Technical Upgrades and Enhancements										
63	Build and install L404B synthesizers in one VLBA antenna.	3/30/2019									
64	Verify operation of L404B synthesizer	6/30/2019									
65	Install one E-Rack at a VLBA site	3/30/2019									
4.6	**Next Generation Very Large Array**										
	Astro2020 Preparations										
1	Conduct documentation reviews for ngVLA Reference Design	3/30/2019									
2	Receipt and review of final results of Costed Antenna Reference Design	12/31/2018									
3	Reference Design Packet ready for submission to Astro2020 process.	3/30/2019									
	Community Engagement										
4	Publication of findings for second round Community Studies	12/31/2018									

NRAO Quarterly Status Update
April - June 2019
QSU3 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment			Q3 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope	Cost	Schedule	Scope
5	Formal Publication of ngVLA Science Book through ASP	12/31/2018									
6	Engage potential domestic and international partners	6/30/2019									
7	Host a Special Session at 2019 URSI National Radio Science Meeting	3/30/2019									
8	Host a special session at 2019 Winter AAS	3/30/2019									
9	Develop ngVLA flyover animation	12/31/2018									
10	Put together multi-messenger animation production team	6/30/2019									
	Conceptual Design and Development										
12	Reference Observing Program	3/30/2019									
13	System Requirements	6/30/2019									
14	Requirements and Architecture Model	6/30/2019									
15	Preliminary Operations Plan	3/30/2019									
16	Preliminary Transition Plan	3/30/2019									
17	Preliminary Development Plan	6/30/2019									
21	Preliminary Sub-System Requirements	6/30/2019									
22	Antenna Optical Design	3/30/2019									
23	Antenna Mechanical Design	6/30/2019									
25	Composite Antenna Structures PDR	12/31/2018									
26	Composite Antenna Structures Study Complete	3/30/2019									
27	Wide Angle Feed Prototype	9/30/2019									
30	Integrated Receiver Development Prototypes	3/30/2019									
32	Water Vapor Radiometer Development	6/30/2019									
	Project Administration and Management										
34	Develop initial draft of Project Execution Plan	12/31/2018									
36	Conduct a review of software solution options and determine best-fit solutions	12/31/2018									
37	Implement the selected software solutions	3/30/2019									
38	Internal Project Office review of the ngVLA cost model.	12/31/2018									
39	Prepare a risk-adjusted, fully costed and documented cost estimate for the reference design; formatted for Decadal Survey Astro2020 submission.	12/31/2018									
40	Prepare a lifecycle cost estimate in support of a proposal to the NSF AST Directorate for MREFC candidacy; formatted for NSF submission.	6/30/2019									
41	Provide final versions of systems engineering process planning and documentation	3/30/2019									
5.3	**Central Development Laboratory**										
	Repair, Maintenance, Production, and Support										
1	Build and test Band 1 amplifiers	12/31/2018									
		3/30/2019									
		6/30/2019									
2	Build and test Band 1 Local Oscillators	12/31/2018									
		3/30/2019									
		6/30/2019									
3	VLA/VLBA multi-chip module support	12/31/2018									
		3/30/2019									
		6/30/2019									
4	CUP ASIC devices (prototype)	9/30/2019									
5	CUP Circuit card assemblies	6/30/2019									
	Research and Development										
7	Evaluate upgraded balanced IF amplifiers	6/30/2019									
8	Wide flare angle horn prototype(s) for ngVLA	12/31/2018									
9	Ka-Band feed horns for VLBA	3/30/2019				Cancelled					
10	Design dichroic and tertiary reflectors for VLBA	6/30/2019							Cancelled		
11	Design of the ngVLA Central Signal Processor	12/31/2018									
12	Test SADC prototype ASIC	6/30/2019									
13	Test W-band DSSM-DOMT receiver	6/30/2019									
15	Advanced reflectionless filter implementations	6/30/2019									
6.7	**Science Support and Research**										
	Telescope Time Allocation										
1	CfP for Semester 2019B	3/30/2019									
2	SRP and Tech Review Process, Semester 2019B	3/30/2019									
5	TAC Meeting, Semester 2019A	12/31/2018									
6	TAC Meeting, Semester 2019B	6/30/2019									

NRAO Quarterly Status Update
April - June 2019
QSU3 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment			Q3 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope	Cost	Schedule	Scope
7	Update SW Tools Requirements for TAC 2019A	12/31/2018									
8	Update SW Tools Requirements for PST 2019B	3/30/2019									
9	Update SW Tools Requirements for TAC 2019B	6/30/2019									
11	Update Documentation for CfP and Tools 2019B	3/30/2019									
13	TTA SW Tool Suite Requirements	12/31/2018									
14	eXtra-Large Proposals	12/31/2018									
	Science Ready Data Products										
15	SRDP Operations Planning Complete	3/30/2019									
16	Begin Pilot SRDP Operations	6/30/2019									
	Scientific User Support										
18	Community Day Event Program Finalized	6/30/2019									
19	NM Symposium	12/31/2018									
20	CASA Validation	3/30/2019									
21	CASA Guides	3/30/2019									
22	CASA Validation	6/30/2019									
23	CASA Guides	6/30/2019							Cancelled		
	Reference Services										
26	NRAO Papers requirements	12/31/2018							Canceled		
28	Development of U.S. Radio Astronomy	12/31/2018									
	Scientific Staff and Jansky Fellows										
29	SciStaff Performance Reviews Completed	12/31/2018									
30	SciStaff Promotions Reviews Completed	3/30/2019									
31	Post Tenure Reviews Completed	3/30/2019									
32	Jansky Lectureship Awarded	6/30/2019									
33	Jansky Fellows Selection Completed	12/31/2018									
34	Jansky Fellows Appointments Completed	3/30/2019									
	Student Programs										
35	Summer Student Selection and Offers	3/30/2019									
36	Student Observing Support Selection (VLA)	12/31/2018									
37	Student Observing Support Selection (VLA)	6/30/2019									
39	Reber Predoc Selection	3/30/2019									
7.5	**Data Management and Software**										
	SIS										
1	RHEL Configuration Control system	6/30/2019									
2	Oracle Virtual Machine installation	3/30/2019									
3	Upgrade of NGAS storage for VLA	3/30/2019									
5	Warm storage evaluation	6/30/2019									
6	Moab cluster scheduler optimization	12/31/2018									
	ALMA Systems Software										
8	ALMA Cycle 7 release	3/30/2019									
	VLA										
11	Support 2018B observing	3/30/2019									
13	Support 2019A commissioning	3/30/2019									
15	Support Frequency averaging to GO	3/30/2019									
16	Support YUPPI-mode to SRO	6/30/2019									
17	Wind prediction in the OST	6/30/2019									
18	Conditional SBs in OST/OPT	3/30/2019									
	CASA										
20	CASA 5.5 release	3/30/2019									
21	CASA 6.0 release	6/30/2019									
23	MSv3 report	3/30/2019									
	CASA Pipeline										
24	Pipeline Cycle 6 release	12/31/2018									
	SSA										
27	PST/OPT Proposal/Observing Update	12/31/2018									
28	PST/OPT Proposal/Observing Update	6/30/2019									
29	PHT TAC update	3/30/2019									
31	YUPPI-mode supported in OPT	6/30/2019									
	SRDP										

NRAO Quarterly Status Update
April - June 2019
QSU3 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment			Q3 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope	Cost	Schedule	Scope
32	SRDP initial release	6/30/2019									
	Testing										
33	CASA 6 test framework	6/30/2019									
	Algorithm Research and Development										
35	Joint single dish-interferometric Imaging	6/30/2019									
36	Full Mueller Imaging	6/30/2019									
37	AW-Project Imaging	6/30/2019									
8.5	**Program Management Department**										
	Headquarters										
1	HQ PM/SE Project Leadership	12/31/2018									
		3/30/2019									
		6/30/2019									
2	HQ Proposal Development	12/31/2018									
		3/30/2019									
		6/30/2019									
3	HQ Documentation Support	12/31/2018									
		3/30/2019									
		6/30/2019									
4	HQ Continuing Education	12/31/2018									
		6/30/2019									
5	Program Management Software Requirements Collection and Analysis	12/31/2018									
6	Program Management Software Solution Implementation	6/30/2019									
7	Multicancha Mass Concrete Works Complete	12/31/2018									
8	Multicancha Beams Erection Complete	12/31/2018									
9	Multicancha Membrane Installation Complete	3/30/2019									
10	Multicancha Sport Flooring Installation Complete	3/30/2019									
12	SRDP Pilot Operations Readiness Review	6/30/2019									
	New Mexico Operations										
14	NM PM/SE Project Leadership	12/31/2018									
		3/30/2019									
		6/30/2019									
15	NM Proposal Development	12/31/2018									
		3/30/2019									
		6/30/2019									
16	NM Documentation Support	12/31/2018									
		3/30/2019									
		6/30/2019									
17	NM Continuing Education	12/31/2018									
		3/30/2019									
		6/30/2019									
18	CIRADA VLASS EDPs Annual Financial and Progress Report	6/30/2019									
21	VLBA St. Croix Repairs - Develop RfP for Steel Repairs and Antenna Painting	12/31/2018									
22	VLBA St. Croix Repairs - Issue Contracts for Steel Repairs and Antenna Painting	3/30/2019									
23	Manage and track Astro2020 Decadal Survey submission package content for ngVLA	3/30/2019									
	Central Development Lab										
25	CDL PM/SE Project Leadership	12/31/2018									
		3/30/2019									
		6/30/2019									
26	CDL Proposal Development	12/31/2018									
		3/30/2019									
		6/30/2019									
27	CDL Documentation Support	12/31/2018									
		3/30/2019									
		6/30/2019									
28	CDL Continuing Education	3/30/2019									
29	ALMA Band 1 LNA Quarterly Report	12/31/2018									
		3/30/2019									
		6/30/2019									
30	CSA-J Annual Report	6/30/2019									

NRAO Quarterly Status Update
April - June 2019
QSU3 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment			Q3 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope	Cost	Schedule	Scope
	ALMA Development										
31	ALMA Correlator Upgrade ASIC Vendor Contract Award	12/31/2018									
32	ALMA Correlator Upgrade Critical Design Review	6/30/2019									
33	ALMA Band 6v2 Receiver Upgrade Project Kickoff	12/31/2018				Cancelled					
9.5	**Education and Public Outreach**										
	News and Public Information										
1	Full editorial guidelines for new news homepage	12/31/2018									
		3/30/2019									
		6/30/2019									
2	Consensus from ngVLA/VLASS teams on topic for AAS press reception	3/30/2019									
	Multimedia Engagement										
3	Plan for workflow for VLASS Quick Look	12/31/2018									
4	Research and development for VLASS image inclusion across various platforms	3/30/2019									
5	Developing and testing first Data2Dome feed	12/31/2018									
6	Develop additional Data2Dome feeds	6/30/2019									
8	Pipeline research and development	3/30/2019									
9	Develop ngVLA flyover animation and science case visuals	12/31/2018									
10	Establish test site for launch of new NSF logo guidelines	9/30/2019									
11	Create VLBA webpage	12/31/2018									
	STEAM										
12	San Pedro participants travel to NM	12/31/2018									
13	NM participants travel to San Pedro	3/30/2019									
14	Revised programming plan	3/30/2019									
15	Recruiting of participants FY2019	6/30/2019							Cancelled		
16	Survey of Charlottesville and Socorro for community needs	12/31/2018									
10.4	**Computing and Information Services**										
	Observatory-Wide Support										
1	Completion of Windows 10 rollout	12/31/2018									
2	Mac OS upgrade	3/30/2019									
3	RHEL 7 image management evaluation	6/30/2019									
4	Virtual Machine management evaluation	3/30/2019									
6	Internal vulnerability scanning tool evaluation	6/30/2019									
8	Cyber security training	6/30/2019									
9	Cyber security program review	3/30/2019									
11	Upgrade of Plone and Wiki services	6/30/2019									
	Site Specific Facilities Infrastructure										
13	System area network upgrade for NAASC	3/30/2019									
14	Replacement of filer storage system in NM	12/31/2018									
	Maintenance and Renewal										
15	Evaluation of video system replacement	3/30/2019									
16	MS campus agreement renewed	6/30/2019									
11.3	**Office of Diversity and Inclusion**										
	Local and National Programs										
1	Diversity Council Meeting and Diversity and Cultural Awareness (DCA) activities	12/31/2018									
		3/30/2019									
		6/30/2019									
2	NAC and LSAMP – Recruitment & Summer Program Initiation	3/30/2019									
		6/30/2019									
3	RAMP-UP	12/31/2018	Cancelled								
	International Partnerships										
6	ODI Chile Undergraduate Recruiting	12/31/2018									
7	ODI Chile Undergrad Research Experience Completed	3/30/2019									
8	NINE Program	6/30/2019									
12.7	**Human Resources**										
	Training and Development										
1	Observatory Leadership Cohort Pilot	12/31/2018									
		3/30/2019									
		6/30/2019									
2	Mid-Career Management Training	3/30/2019									

NRAO Quarterly Status Update
April - June 2019
QSU3 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment			Q2 Performance Assessment			Q3 Performance Assessment		
			Cost	Schedule	Scope	Cost	Schedule	Scope	Cost	Schedule	Scope
	Compensation										
3	JDE Comp Management Module Implementation	12/31/2018									
4	Total Rewards Benchmark Study Debrief	12/31/2018									
5	Benefits Strategy Workshop	6/30/2019									
	Benefits										
7	New Medical Carrier Implementation.	12/31/2018									
8	DBA Audit	6/30/2019									
	Recruitment Employment										
9	Enhanced branding on LinkedIn, Glassdoor, and Stack Overflow	3/30/2019									
	Human Resources										
10	Employee Climate Survey	3/30/2019									
13.2	**Science Communications**										
1	Redesign science community exhibits	12/31/2018									
2	Update Research Facilities brochure	3/30/2019									
3	Submit AAAS science symposium proposal	6/30/2019									
14.6	**Administration**										
	CAP										
2	Install Recordkeeping Software	12/31/2018									
	ESS										
3	Download existing ES&S data to Recordkeeping system	3/30/2019									
4	Hire EMS Specialist for VLA	12/31/2018									
	TTO										
6	Participate in winter I-Corps cohort	3/30/2019									
15.1	**Budget**										
1	Worker's Comp Vendor Visit to GBO	12/31/2018									
2	Position Control Definition	12/31/2018									
3	Position Control V1.0	6/30/2019									
4	Implement FY2019 Budget	12/31/2018									
5	NSF Spring Budget Meeting	3/30/2019									
6	FY2020 Budget Process	6/30/2019									
8	FY2019 ICC Final Rate Submission	3/30/2019									
16.3	**Spectrum Management**										
1	CPM, Geneva	3/30/2019									
2	WP 7D, Geneva	3/30/2019									
3	WP 1A, Geneva	6/30/2019									
4	CORF, Washington DC	6/30/2019									
17.2	**Director's Office**										
	ALMA										
1	ALMA Board Meeting	12/31/2018									
		6/30/2019									
2	ALMA Director's Council	3/30/2019									
	Corporate Meetings										
3	AUI Board of Trustee Meeting	12/31/2018									
		6/30/2019									
4	AUI Executive Committee Meeting	12/31/2018									
		3/30/2019									
		6/30/2019									
5	AUI Visiting Committee	6/30/2019									
	Science Community										
6	Appoint new Users Committee Members	12/31/2018									
7	Users Committee Meeting	6/30/2019									
	Management Reviews										
8	NSF Annual Program Review	12/31/2018									
9	All Hands Meeting	3/30/2019									

Color code: Cost/Schedule/Scope Cells

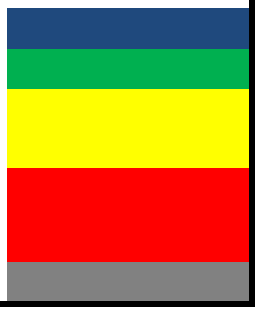
Blue - early

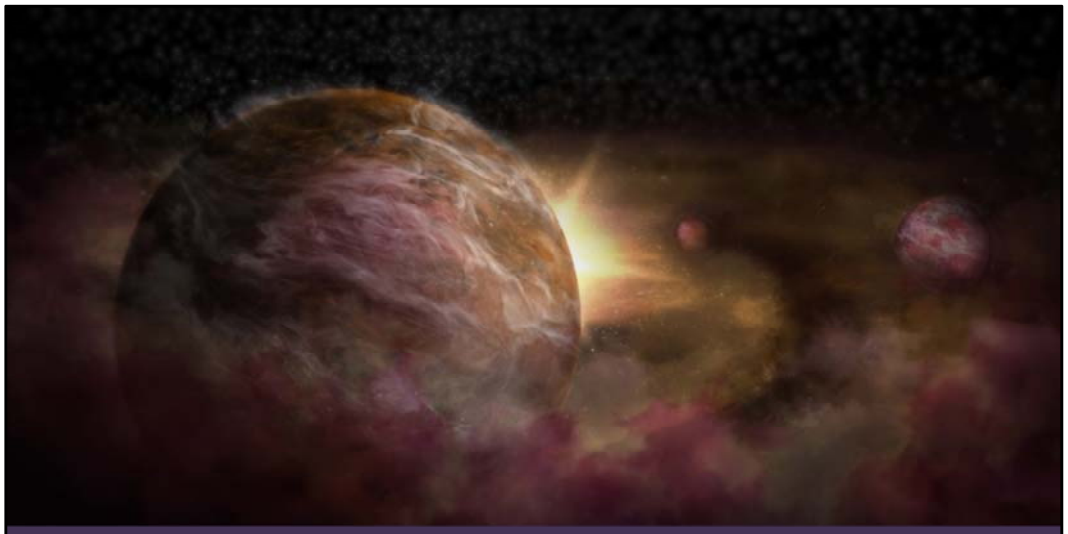
Green - on track

Yellow - expected to miss an upcoming milestone and/or not meet scope, and/or be underspent or overspent on

Red - not completed by due date and/or overspent on budget, and/or unable to perform to the scope

Grey - completed



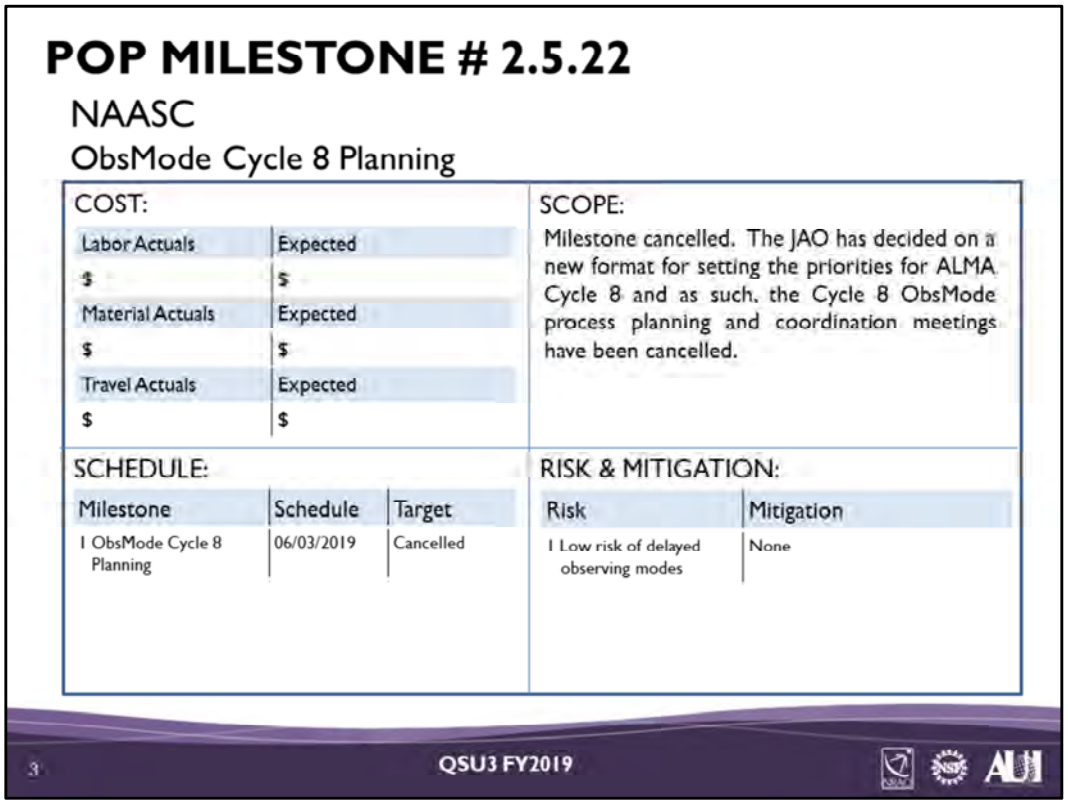


QSU3 FY2019 Report

April – June 2019

FY2019 Milestones

Milestone Progress
Total Q3 2019 milestone deadlines: 106
Total completed on time: 90
Percent completed on time: 85%
Total Q2 2019 milestone deadlines: 111
Total completed on time: 89
Percent completed on time: 80.2%
Total Q1 2019 milestone deadlines: 106
Total completed on time: 91
Percent completed on time: 85.6%

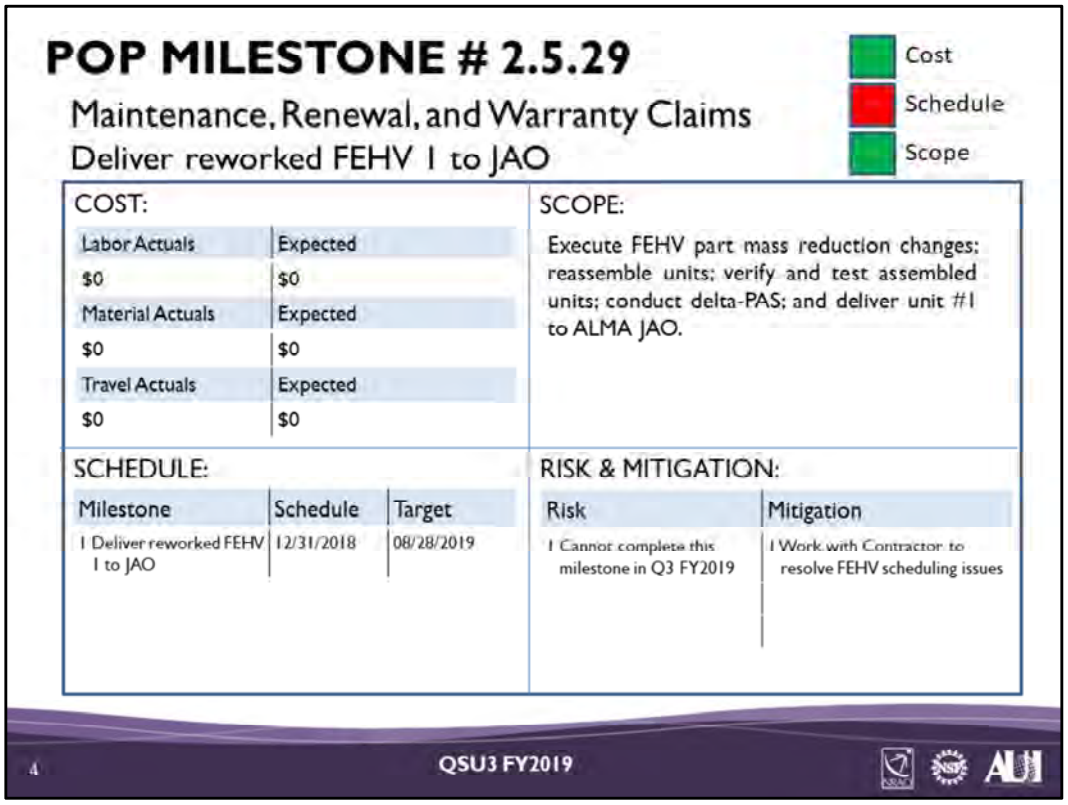


COST: No impact

SCOPE: No impact.

SCHEDULE: This milestone is cancelled. We cannot participate in planning and coordination meetings that do not involve the ARCs.

RISK & MITIGATION: Risk is low but there is a risk that some of the potential observing modes will not be ready for the start of Cycle 8.

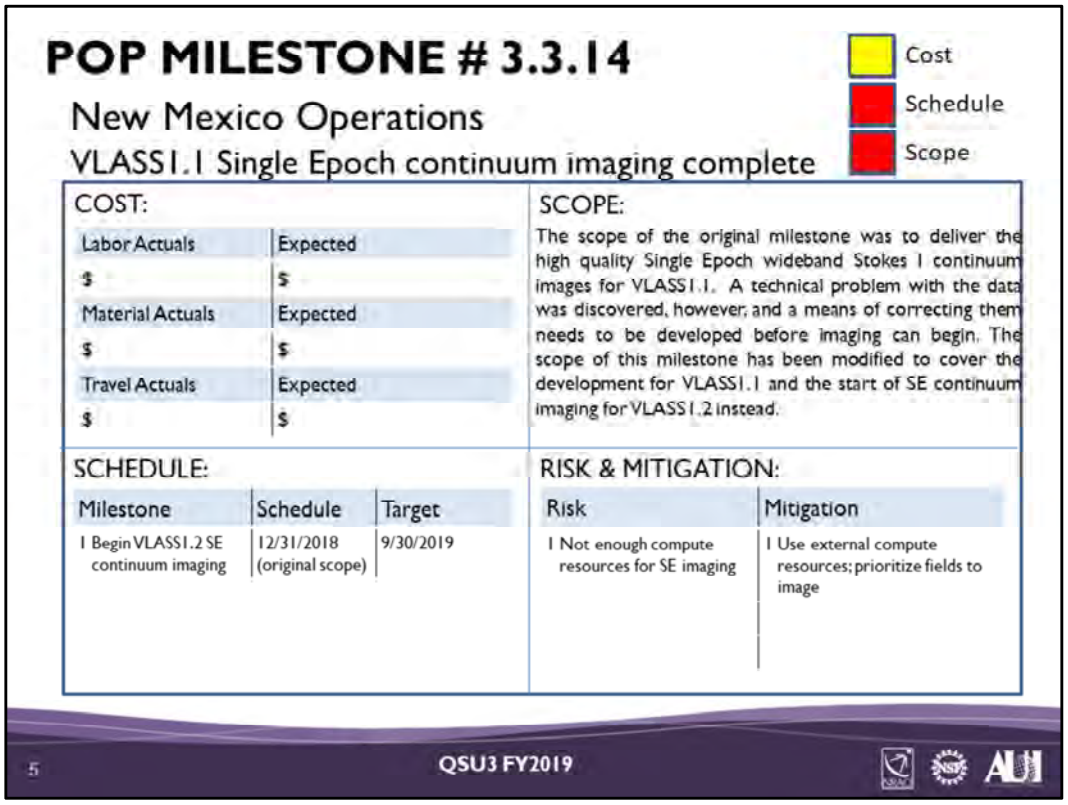


COST: No impact

SCOPE: No change in scope; delivered FEHV to incorporate welding improvements and mass reductions.

SCHEDULE: Mass reduction efforts have been completed on all applicable components of the remaining three FEHV units and re-assembly work is now progressing on the three units (literally) in parallel with the re-assembled first unit continuing to be used in Valdivia as the Parent Unit during the re-assembly process (as note in the QSU1 Report); Current Progress in Valdivia indicates that the production and assembly work on the remaining three items is progressing well. A hands-on preliminary PAI with the ALMA JAO for the last three units was conducted on 30-31 July 2019 in Valdivia; this preliminary PAI identified a pressure leak in the lifting jack on Unit #4 which will require sending the jack assembly back to the Manufacturer for repair. This repair will drive a delay for the final PAI for the four units to 28 August 2019 leading to a planned delivery date to the OSF of 30 September 2019.

RISK & MITIGATION: Until the installations are completed, observationally verified, and all units are working reliably, risk will remain. This risk is primarily borne by the vendor, and is being mitigated by close observational and engineering verification of the work.

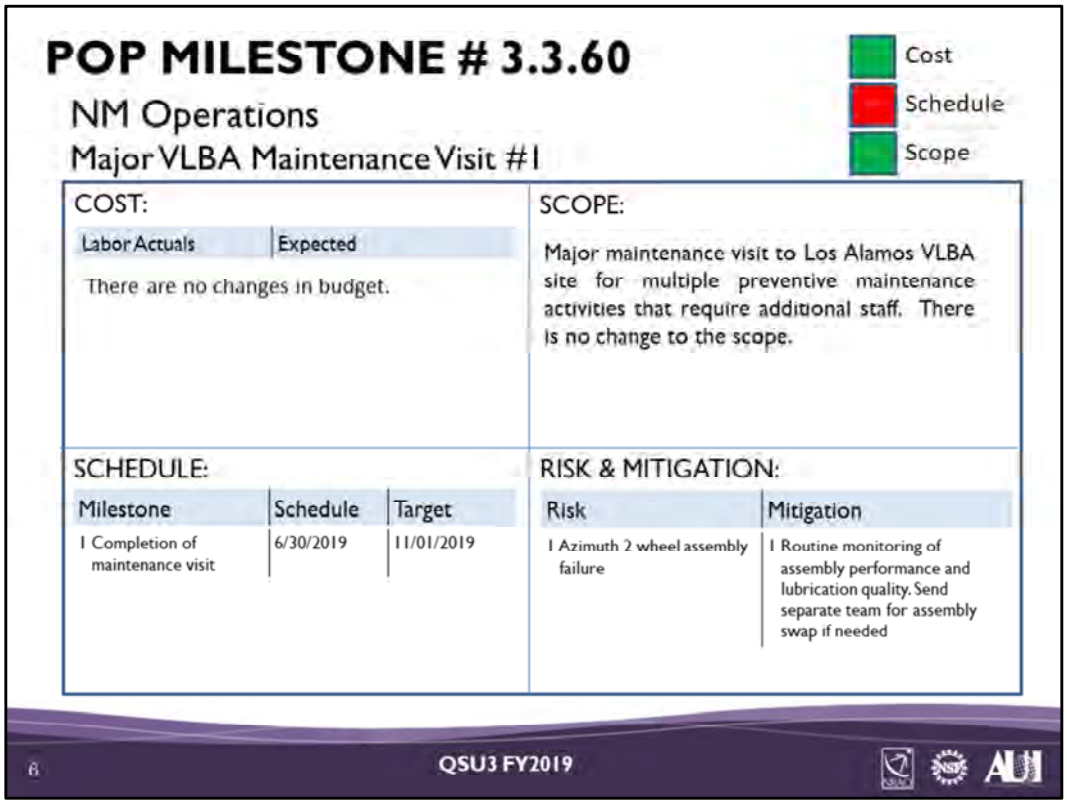


COST: Current tests of the algorithms being developed indicates additional compute resources will be needed to support VLASS SE imaging, but the precise cost has not yet been determined.

SCOPE: A problem with VLASS1.1 data associated with the pointing of two thirds of the VLA antennas was discovered after the FY2019 Program Operating Plan was written, and a means of correcting those data needs to be developed before SE imaging for VLASS1.1 can begin. In addition, it has been determined that w-term corrections (corrections for direction-dependent correlation geometry errors) are needed to provide accurate source positions, flux densities, and spectral indices for SE images; these algorithms require significantly larger compute resources than the Quick Look images. Given these issues, the scope of this milestone was modified in Q1 to cover the development of the data correction algorithms and methods for managing external computing resources, through to the start of SE continuum imaging. The VLASS1.1 data correction algorithms developed so far are too compute-intensive to be practical, so the scope of this milestone is now further modified to start SE continuum imaging for VLASS1.2 instead.

SCHEDULE: An imaging algorithm suitable for VLASS1.2 imaging will be delivered as part of the CASA 5.6 release, currently scheduled for the end of September, along with associated updates to the imaging pipeline. Further algorithm optimization is needed for VLASS1.1, which is scheduled for CASA 5.7.

RISK & MITIGATION: The computing requirements for the SE imaging algorithms limit how much of the sky can be imaged using NRAO resources. This problem is being mitigated by prioritizing areas of sky to be imaged first, by investigating the use of external compute resource, and by extending the overall delivery schedule of VLASS images to the community.

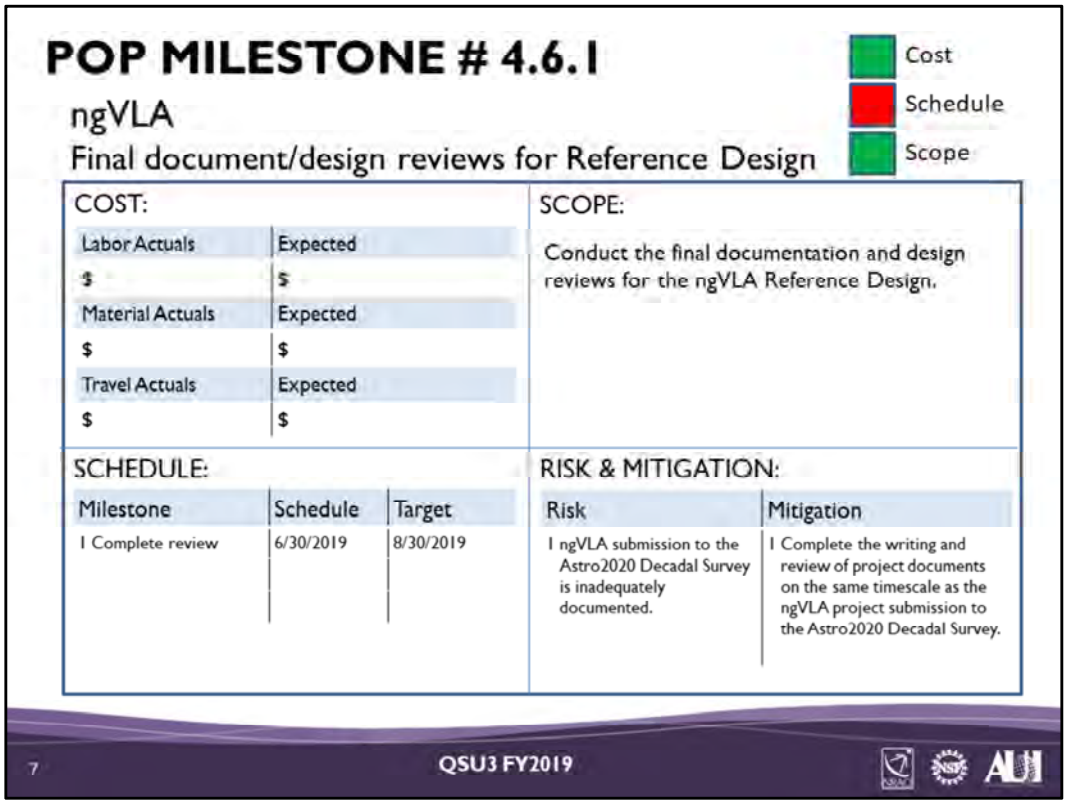


COST: No impact.

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

SCHEDULE: Because of major resource conflicts due to the St. Croix repair project, staff and equipment were unavailable to support this trip. The tiger team visit is postponed until Q1 FY2020 in order to keep the next major maintenance visit to Brewster, WA on schedule. This was chosen due to the higher risk of poor weather impacting a visit in Washington vs. New Mexico.

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. There are no signs this is needed, despite this being the oldest remaining wheel assembly in the VLBA.

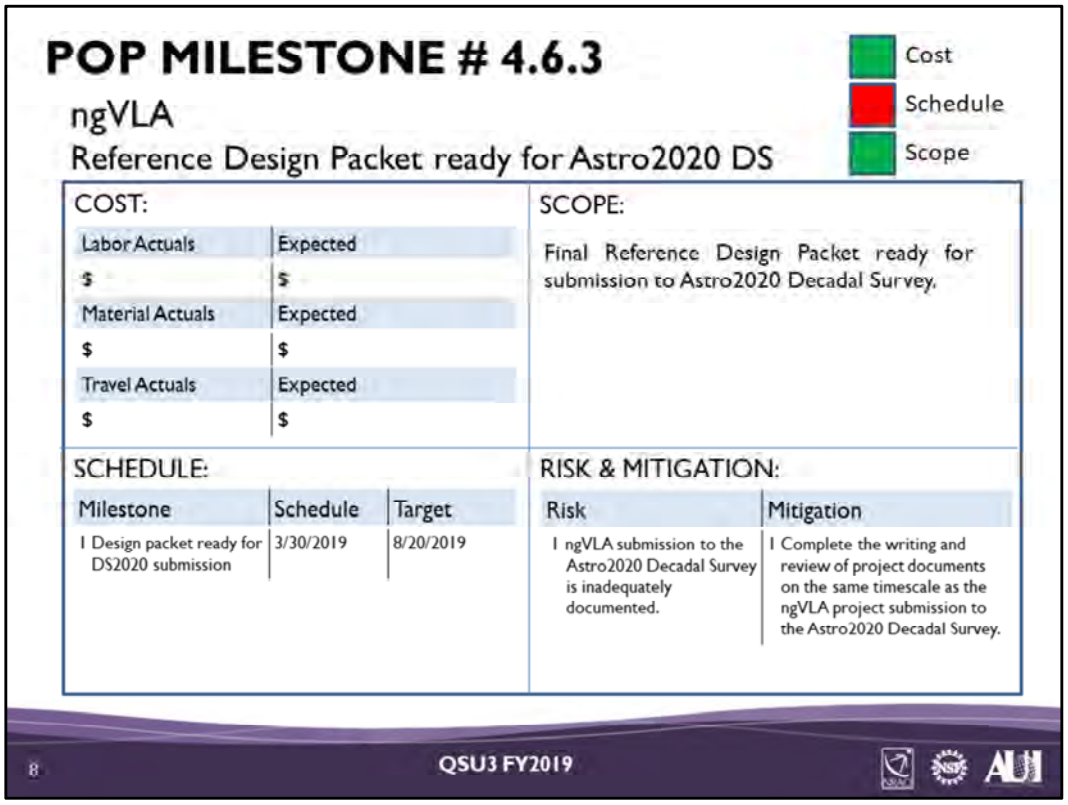


COST: No impact.

SCOPE: No impact.

SCHEDULE: The Reference Design documents are complete and are in the process of being reviewed and released. The project is on schedule to release all design documents by August 2019.

RISK & MITIGATION: The risk to the project of a delayed completion of this milestone is an incomplete submission of the ngVLA Reference Design to the Astro2020 Decadal Survey. The mitigation to the risk is to complete the writing of the documents and their review on the same timescale as the submission of the ngVLA project white paper to DS2020.

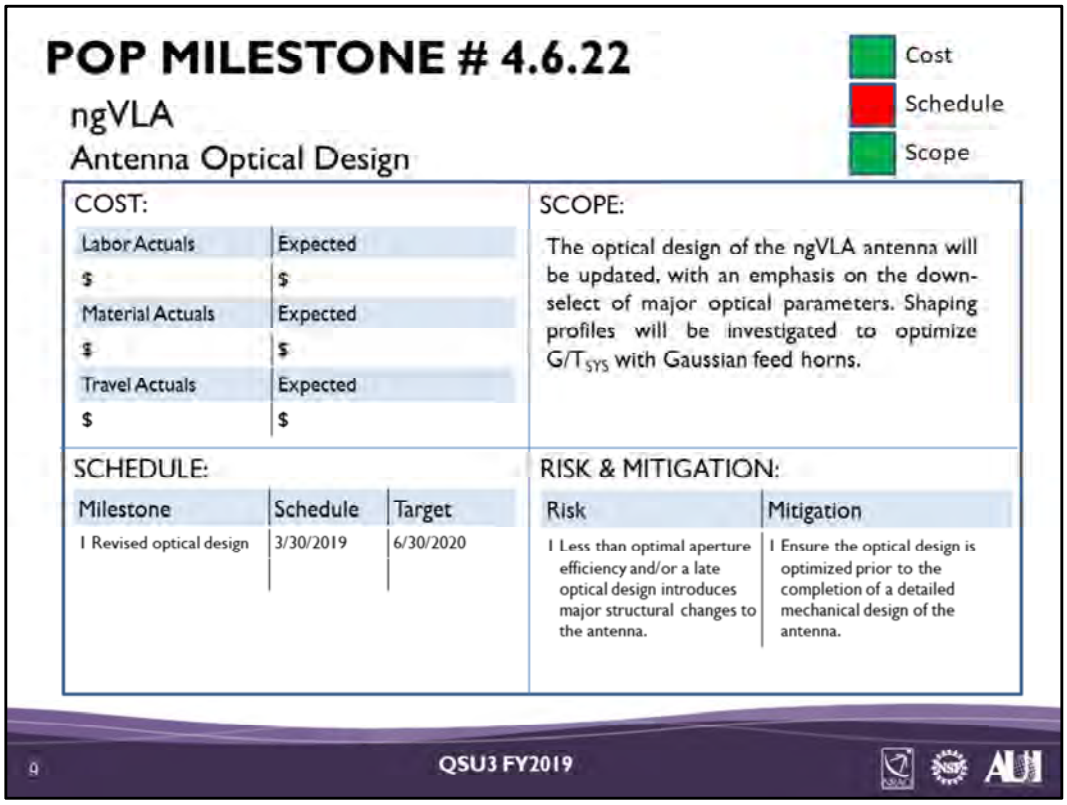


COST: No impact.

SCOPE: No impact.

SCHEDULE: The Reference Design was largely complete by the end of CY2018, with minor refinements at the sub-system level for architectural coherence expected in Q1 CY2019, incorporating feedback from the review conducted the prior fiscal year. The Reference Design Packet will be assembled once all design documents are reviewed and released (see e.g. Milestone 4.6.1). The packet will be ready for submission to DS2020 by August 2019.

RISK & MITIGATION: The risk to the project of a delayed completion of this milestone is an incomplete submission of the ngVLA Reference Design to the Astro2020 Decadal Survey. The mitigation to the risk is to complete the writing of the documents and their review on the same timescale as the submission of the ngVLA project white paper to DS2020.

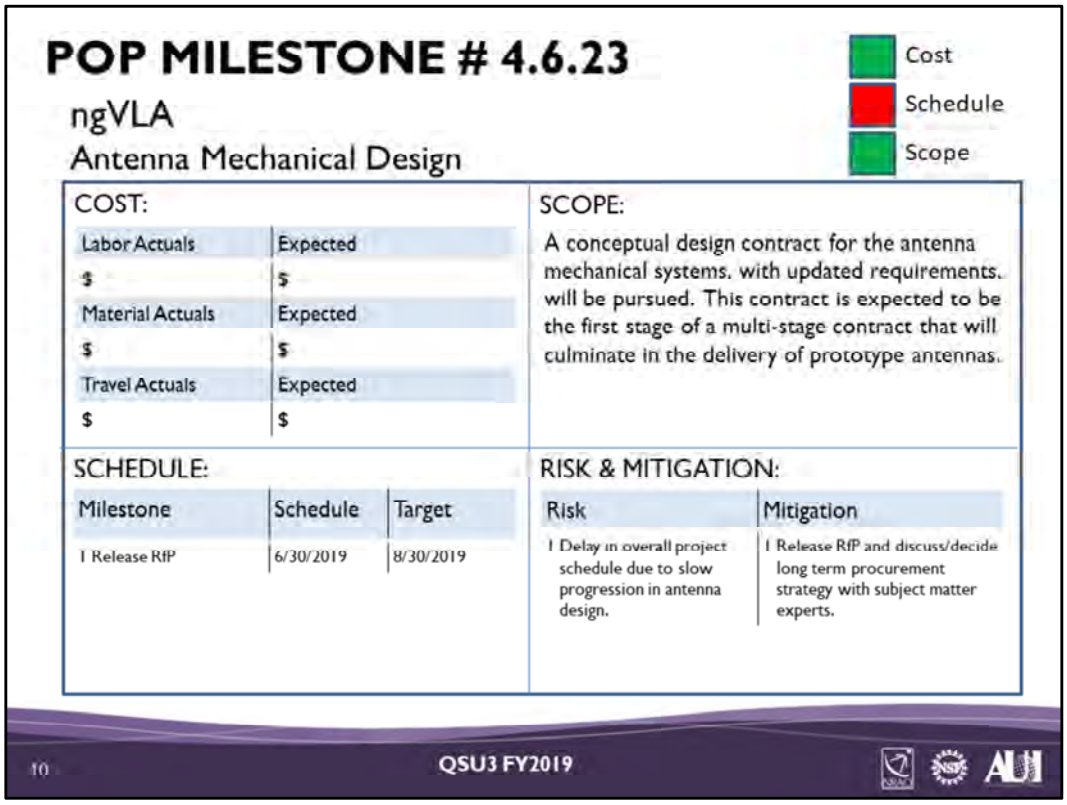


COST: No impact.

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 urgency of completing this milestone has greatly diminished. Considering other priorities and project needs, the new optical design does not need to be completed until Q3 FY2020. The delay should not affect the overall mechanical design as that process appears more lengthy than originally anticipated.

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 (at some level). 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.

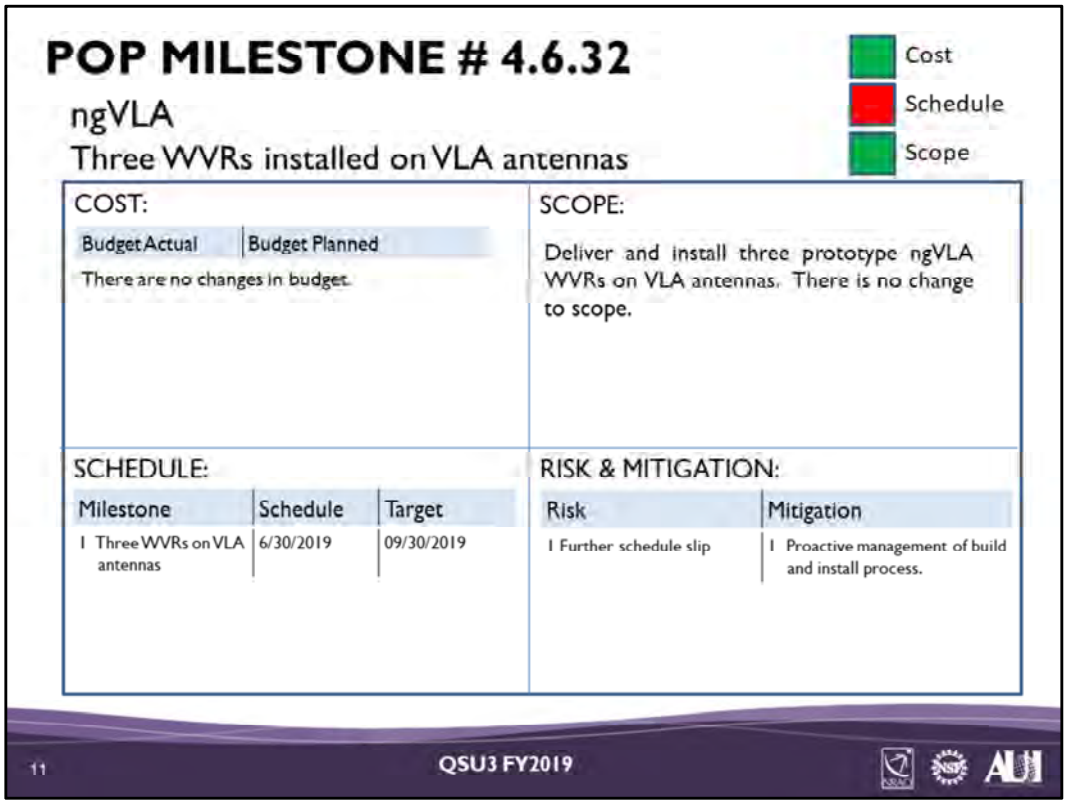


COST: No impact.

SCOPE: No impact.

SCHEDULE: Progress on the antenna mechanical design has been delayed due to the need to complete trade studies, document design choices, and refine the antenna procurement strategy. Instead of focusing on a detailed mechanical design, the design concept for the antenna will be further explored. A request for proposal for a costed concept antenna design has been written. Its submission in August 2019 will mark the completion of this milestone.

RISK & MITIGATION: Since the antennas are approximately half the project cost and are the major project deliverable, delays in the mechanical design could lead to a protracted overall schedule. The mitigation to the risk is to gather design concepts with the RfP as planned, and converge on an antenna procurement strategy. A procurement advisory workshop will be convened to solicit input and decide upon the strategy.



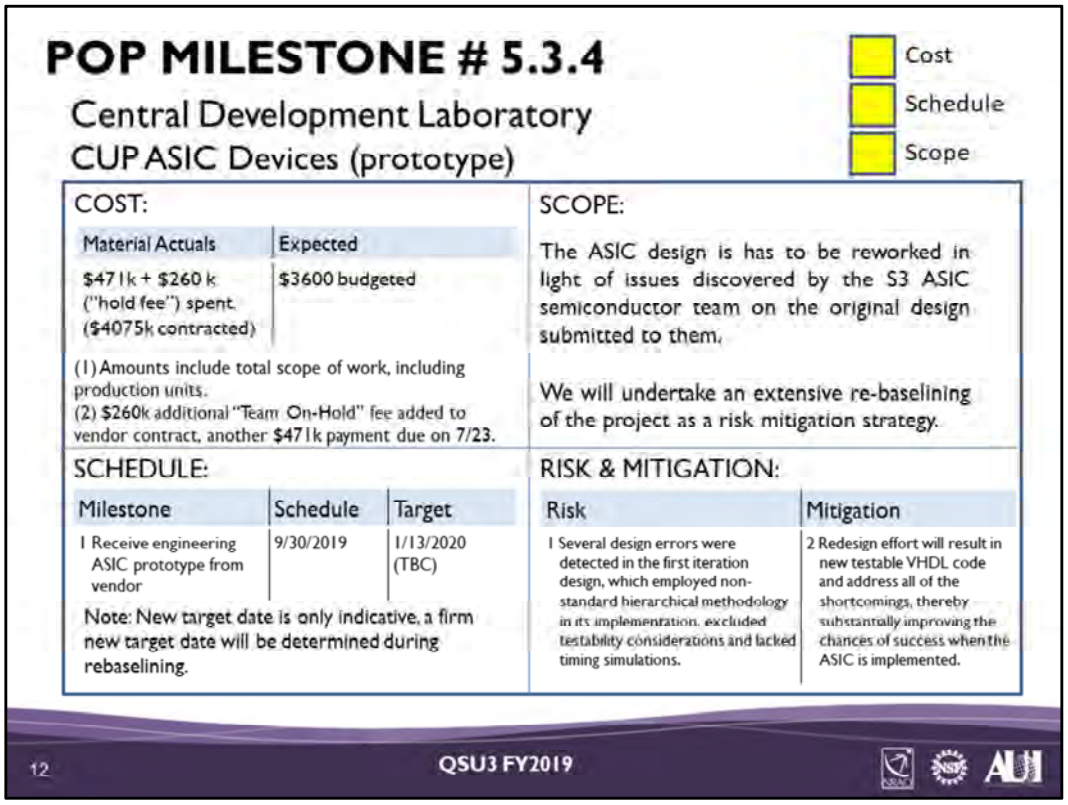
Owner: Bryan Butler

COST: No impact.

SCOPE: No impact.

SCHEDULE: Schedule has slipped by three months, mostly from problems found after installation of the first WVR, and during building of the second.

RISK & MITIGATION: Risk of further schedule slip is small, but proactive management has already been started, with regular status/progress meetings scheduled.



COST:

- The S3 ASIC vendor assessed a one time, team on-hold fee of $260k to agree to NRAO's request for schedule change to allow time to correct the VHDL design.
- Budgeted amount was set at the PDR, but the actual ASIC RFPs were sent out afterwards. Four out of five bids came out above what was budgeted and the one under didn't meet the technical requirements and got a low score.
- Difference between the contracted and budgeted values will be paid by using contingency funds (sufficient contingency funds were budgeted and are available).
- Another $471k payment due on July 23rd for the mid-point review. We do expect to pay this, and the most likely scenario is to cancel or pause the contract after this point, pending rebaselining effort.
- Extensive rebaselining will determine revised/new cost moving forward.

SCOPE:

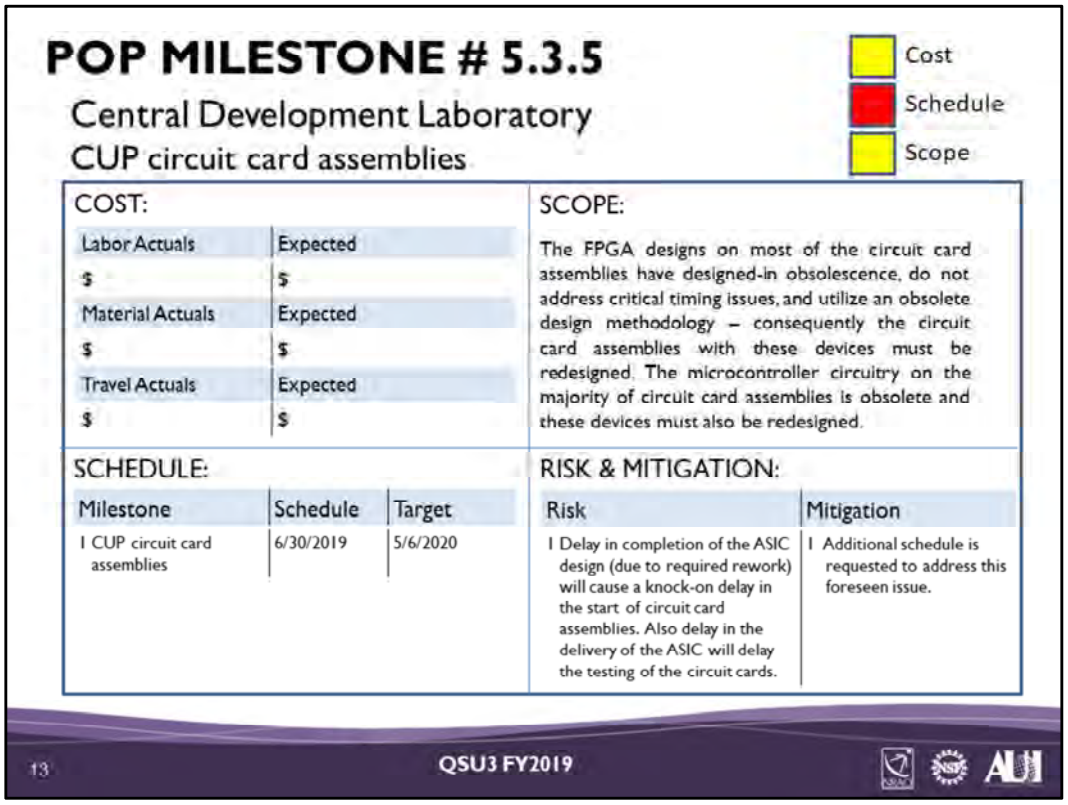
- Numerous architectural and implementation issues have been uncovered on the ASIC at the heart of the correlator engine. These issues carry a high risk of failure, and they have been found to be systemic, not just isolated issues.
- Extensive rebaselining will determine revised scope moving forward.

SCHEDULE: Extensive rebaselining will determine revised schedule.

RISK & MITIGATION: The ASIC development is at very high risk due to:

- Several design errors in the first iteration design.
- Non-standard hierarchical design methodology that was adopted.
- Use of non-standard implementation practices.
- Exclusion of considerations for testability.
- No timing data simulations were performed on the first iteration VHDL design.
- Amount of rework to correct all of the above deficiencies add a lot of risk.

The redesign effort will result in new VHDL code and address all of the above, thereby substantially improving the chances of success when the ASIC is implemented.

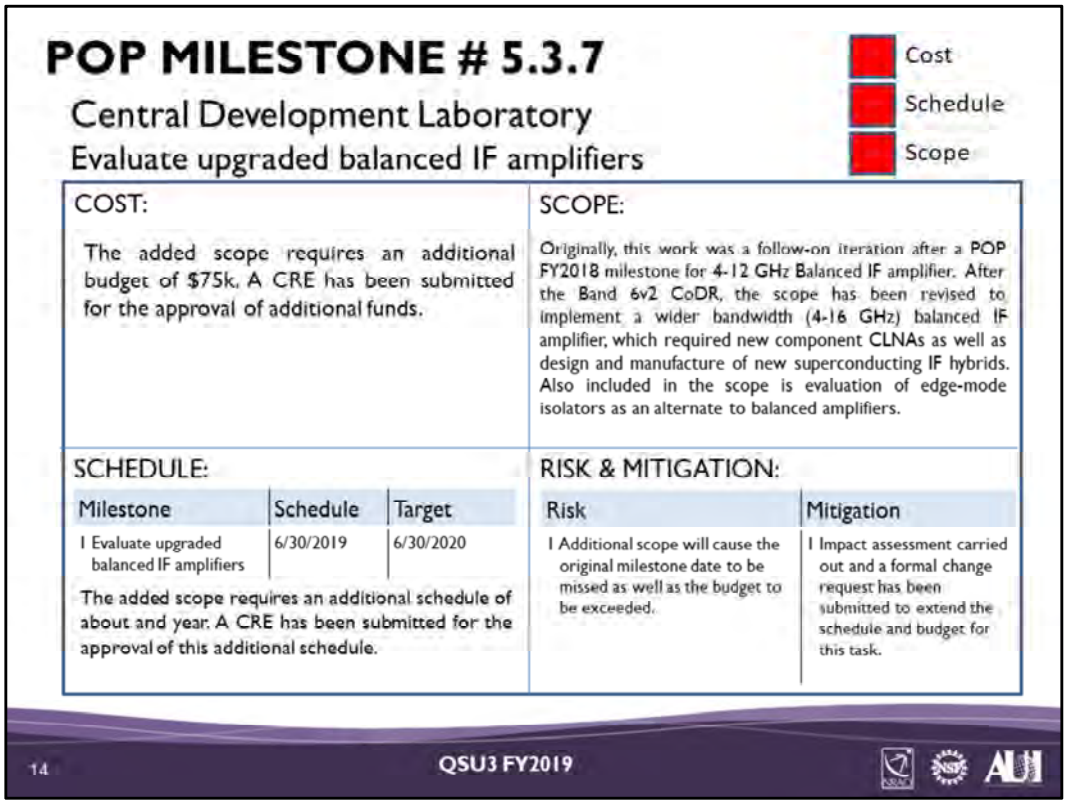


COST: Extensive rebaselining will determine revised/new cost moving forward.

SCOPE: The FPGA designs on most of the circuit card assemblies have designed-in obsolescence, do not address critical timing issues, and utilize an obsolete design methodology – consequently the circuit card assemblies with these devices must be redesigned. The microcontroller circuitry on the majority of circuit card assemblies is obsolete and these devices must also be redesigned. Extensive rebaselining will determine revised scope moving forward.

SCHEDULE: Additional schedule is requested to accommodate delay in designing these cards due to added work scope for the ASIC redesign (milestone #5.3.4) and also to accommodate the delay in delivery of the ASIC. Extensive rebaselining will determine revised schedule.

RISK & MITIGATION: Delay in completion of the ASIC design (due to required rework) will cause a "knock-on" delay in the start of redesign of circuit card assemblies. Also delay in the delivery of the ASIC will delay the testing of the circuit cards. Additional schedule is requested to address this foreseen issue.

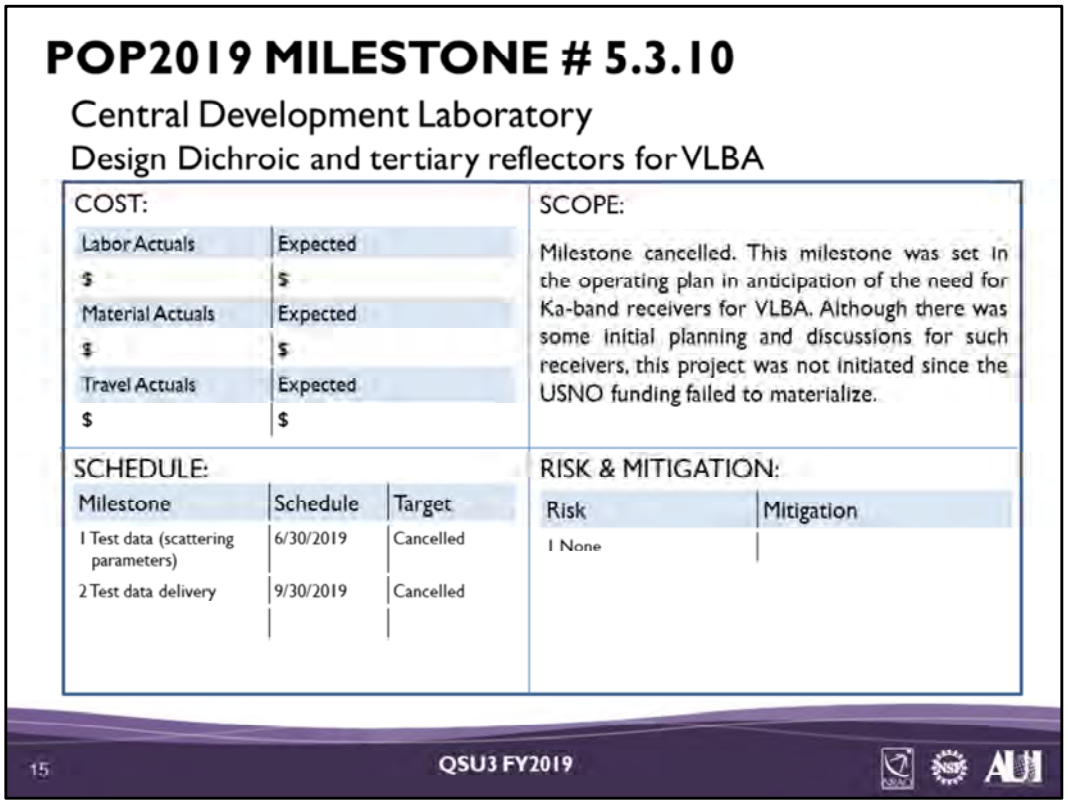


COST: Cost impact assessment indicated that the added scope requires an additional budget of $75k. A CRE has been submitted for the approval of additional funds.

SCOPE: Originally, this work was a follow on iteration after a POP2018 milestone for 4-12 GHz Balanced IF amplifier. After the Band 6v2 CoDR, the scope has been revised to implement a wider bandwidth (4-16 GHz) balanced IF amplifier, which required new component CLNAs as well as design and manufacture of new superconducting IF hybrids. Also included in the scope is evaluation of edge-mode isolators as an alternate to balanced amplifiers.

SCHEDULE: Schedule impact assessment indicated that the added scope requires an additional schedule of 12 months. A CRE has been submitted for the approval of this additional schedule.

RISK & MITIGATION: Additional scope will cause the original milestone date to be missed as well as the budget to be exceeded. Impact assessment is in progress at the time of writing this four-square after which a formal change request will be submitted to extend the schedule and budget for this task.

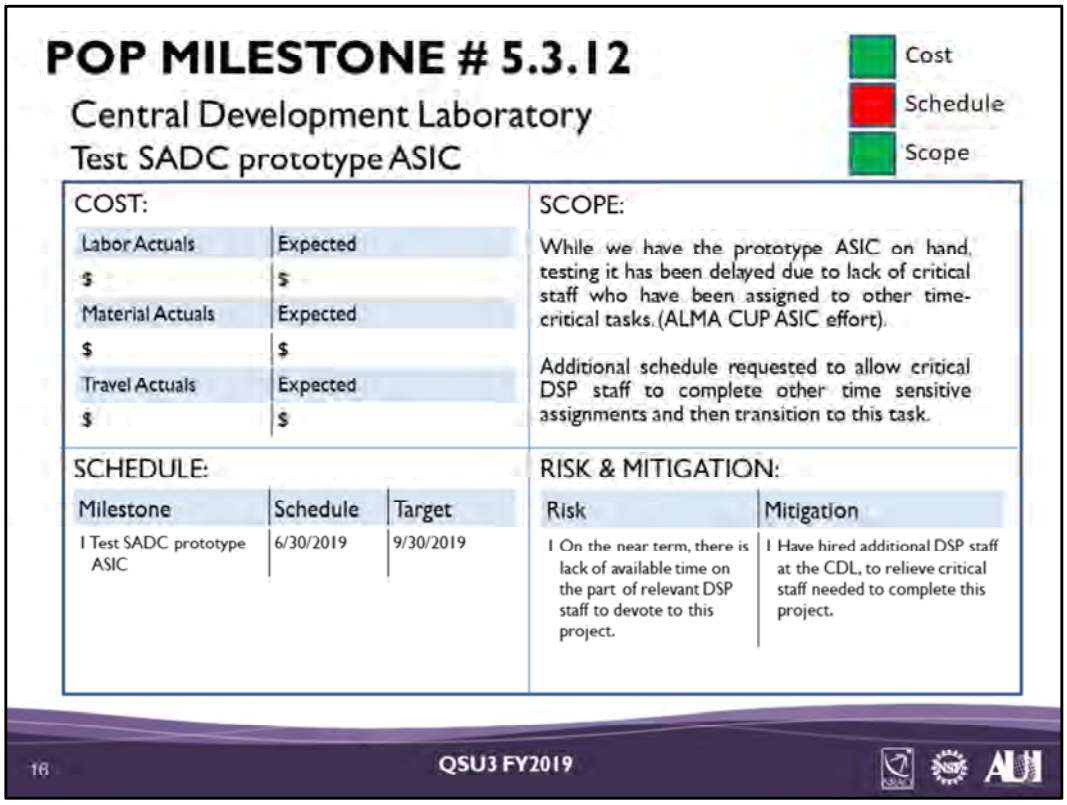


COST: No impact.

SCOPE: This milestone was set in the operating plan in anticipation of the need for Ka-band receivers for VLBA. Although there was some initial planning and discussions for building such receivers, this project was not initiated since the USNO funding failed to materialize.

SCHEDULE: No impact.

RISK & MITIGATION: No impact.

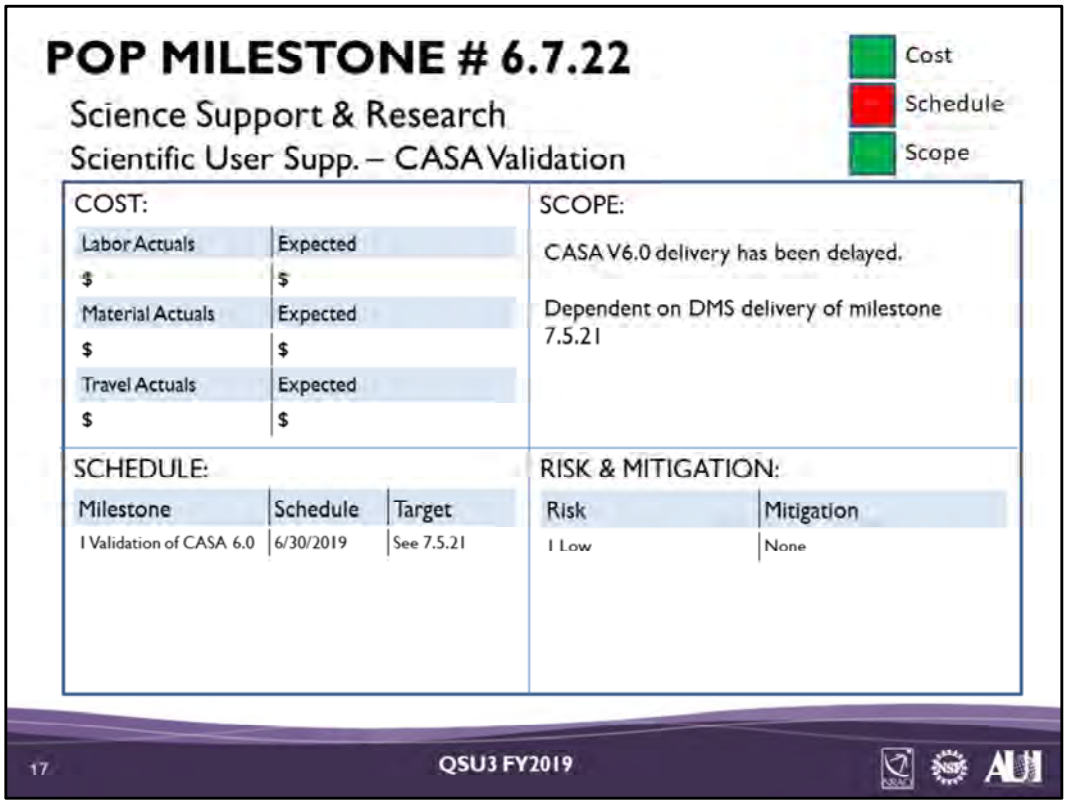


COST: No impact.

SCOPE: No impact.

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

RISK & MITIGATION: On a near term, there is lack of available time on the part of relevant DSP staff to devote to this project. While additional schedule should help, CDL has also hired additional DSP staff at the CDL, to relieve critical staff needed to complete this project.

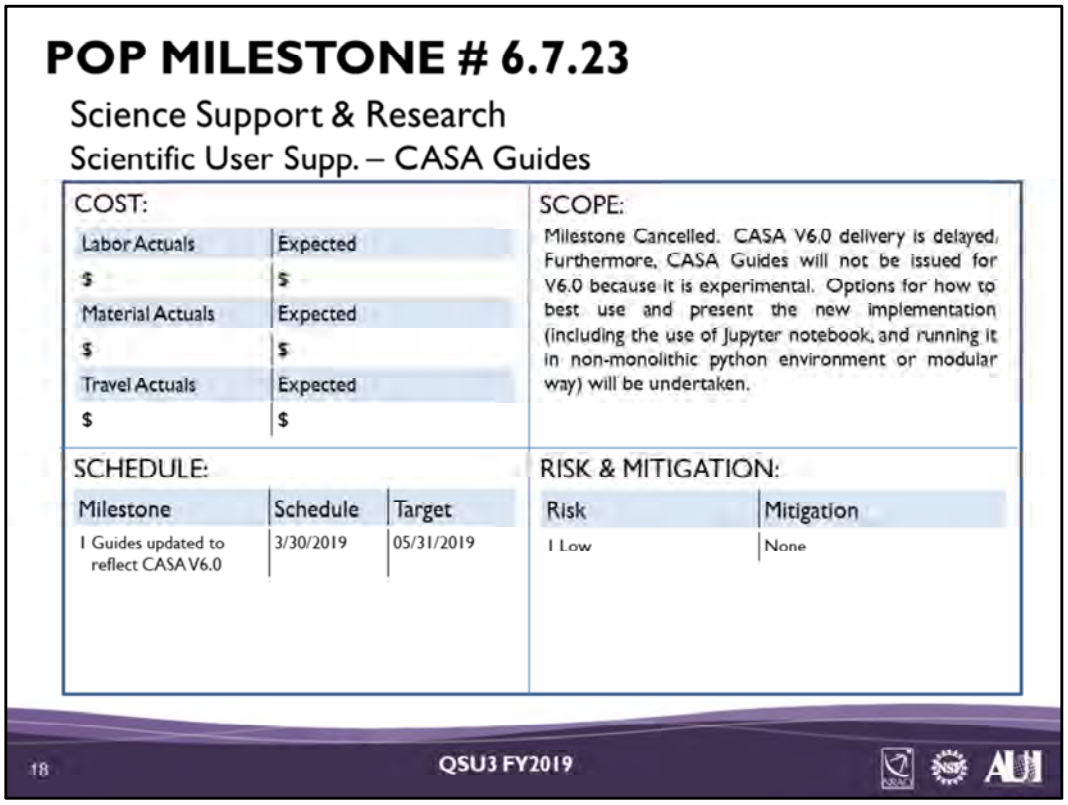


COST: No impact.

SCOPE: No impact.

SCHEDULE: Dependent on Milestone 7.5.21.

RISK & MITIGATION: Risk is low. No specific mitigation required at present.

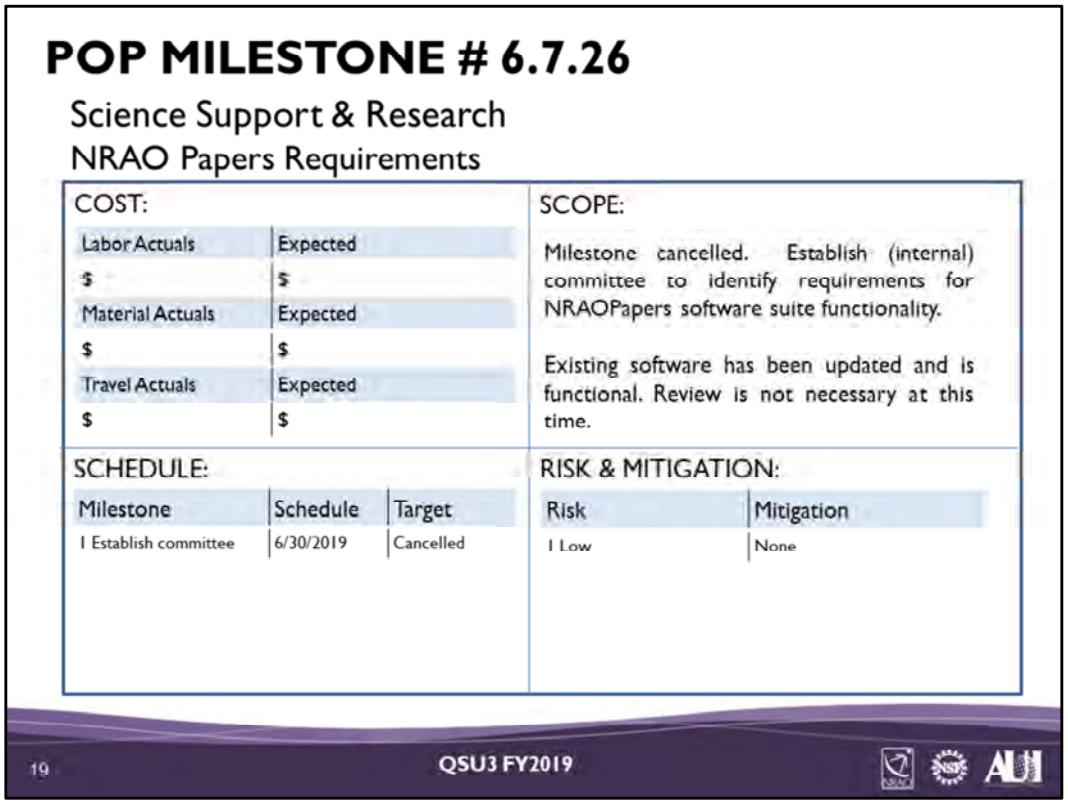


COST: No impact.

SCOPE: No impact.

SCHEDULE: This milestone is cancelled. The next update will address only the CASA Pipeline Guide (CASA V5.6, Milestone 6.7.25, nominal due date 30 Sep.)

RISK & MITIGATION: Risk is low.

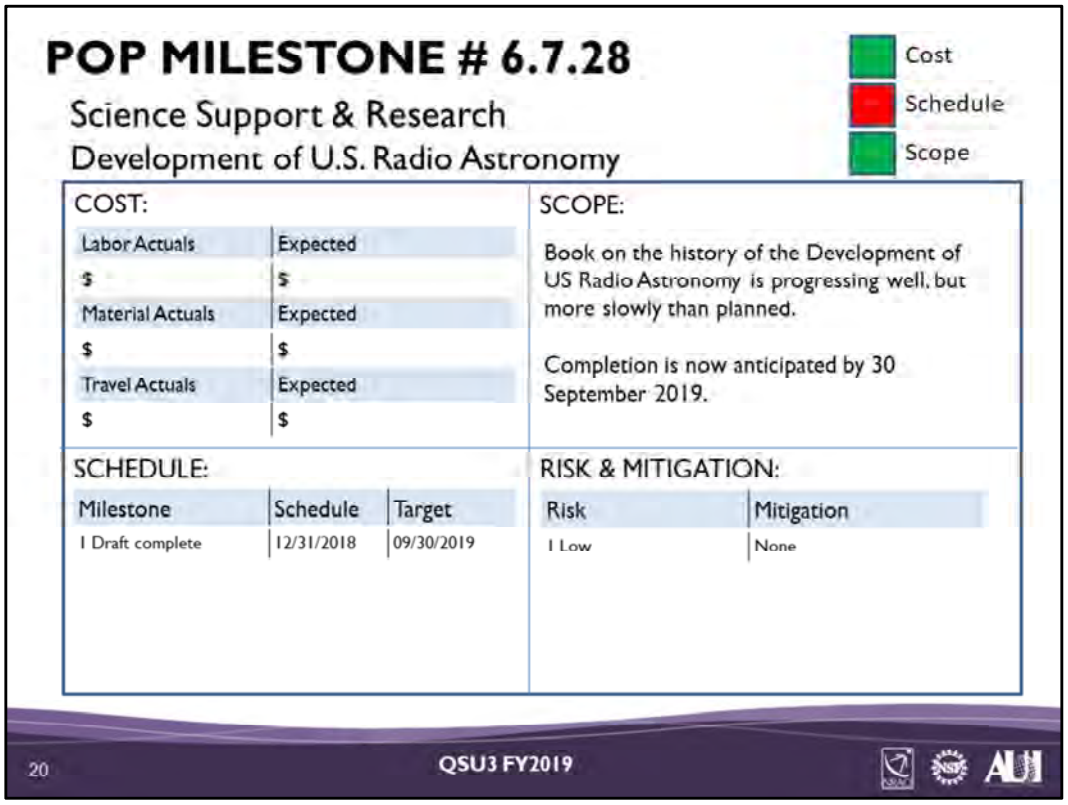


COST: No impact.

SCOPE: No impact.

SCHEDULE: Milestone canceled.

RISK & MITIGATION: Risk is low.

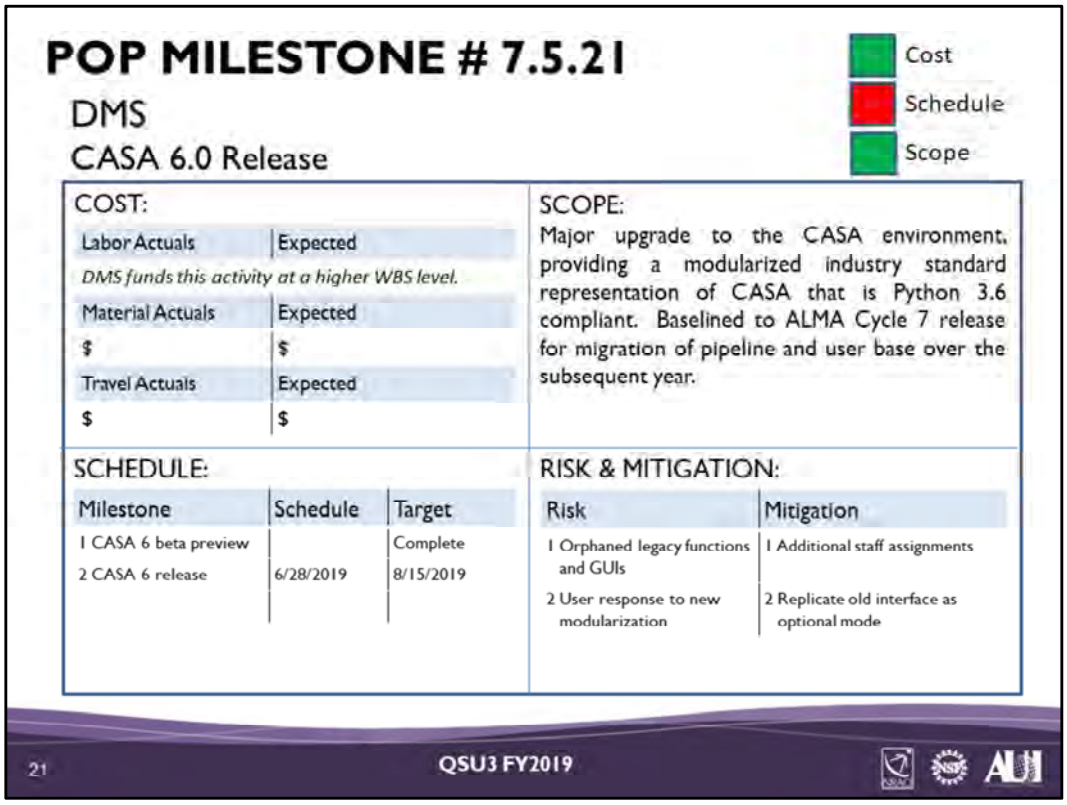


COST: No impact

SCOPE: No impact.

SCHEDULE: Good progress is being made but the expected date of completion has slipped further and completion is anticipated by end Q4.

RISK & MITIGATION: Risk is low. No mitigation required.

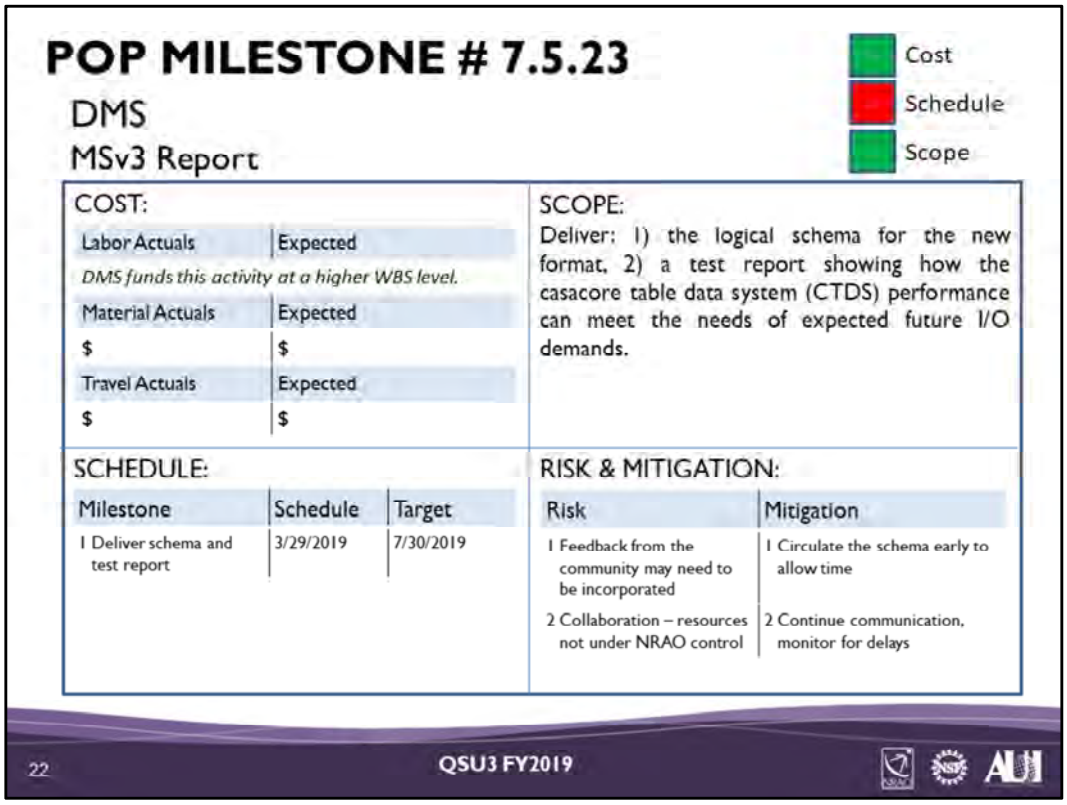


COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: Major upgrade to the CASA environment, providing a modularized industry standard representation of CASA that is Python 3.6 compliant. Baselined to ALMA Cycle 7 release for migration of pipeline and user base over the subsequent year.

SCHEDULE: CASA 6.x is being developed to provide a parallel testing path for the 5.x series of production releases. The original schedule was changed to align with ALMA Cycle 7 so that ALMA can migrate to CASA 6 for Cycle 8 using with the ALMA Cycle 7 as a comparison baseline.

RISK & MITIGATION:
1) CASA has functions and GUI's which the current development team does not have experience with. Staff will be reassigned from other CASA tasks to provide migration support.
2) Many current users are used to a monolithic package containing a custom environment preconfigured for them. For users that prefer this, the old interface will be replicated as an optional mode. Note that our new industry standard approach will be more familiar to the Python community and provide more flexibility.

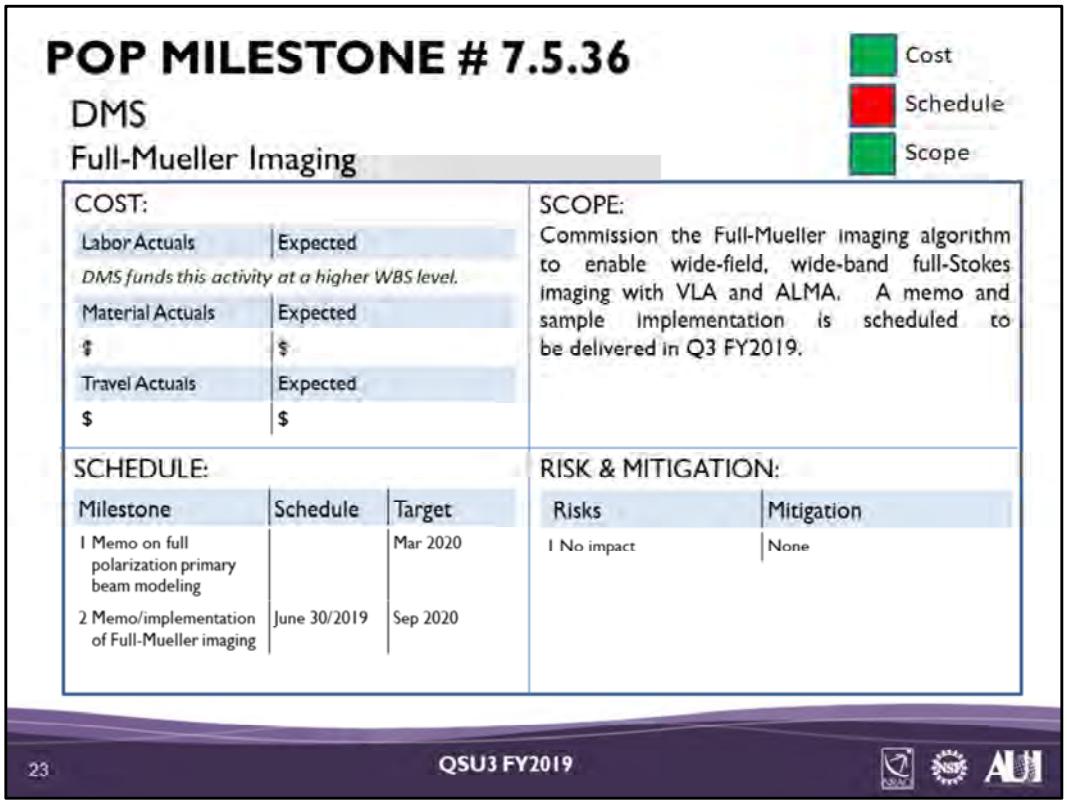


COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: Deliver: 1) the logical schema for the new format and 2) a test report showing how the casacore table data system (CTDS) performance can meet the needs of expected future I/O demands.

SCHEDULE: Work is done as a cooperative effort between NRAO, ASTRON, and SKA resources. All organizations have had critical projects which has pulled resources away from this and created the delay in the deliverables. Much of the work has been completed, and a schedule has been created to complete the final tasks, with resources assigned.

RISK & MITIGATION:
1) One of the tasks for completion is to circulate the revised schema to the community for feedback. While the changes are primarily extensions to the schema, there may be questions which need to be addressed. The schema will be circulated early in Q3 FY2019 to provide time for feedback.
2) Further delays are still possible which are outside of NRAO control. We will continue regular communication and monitor for delays.

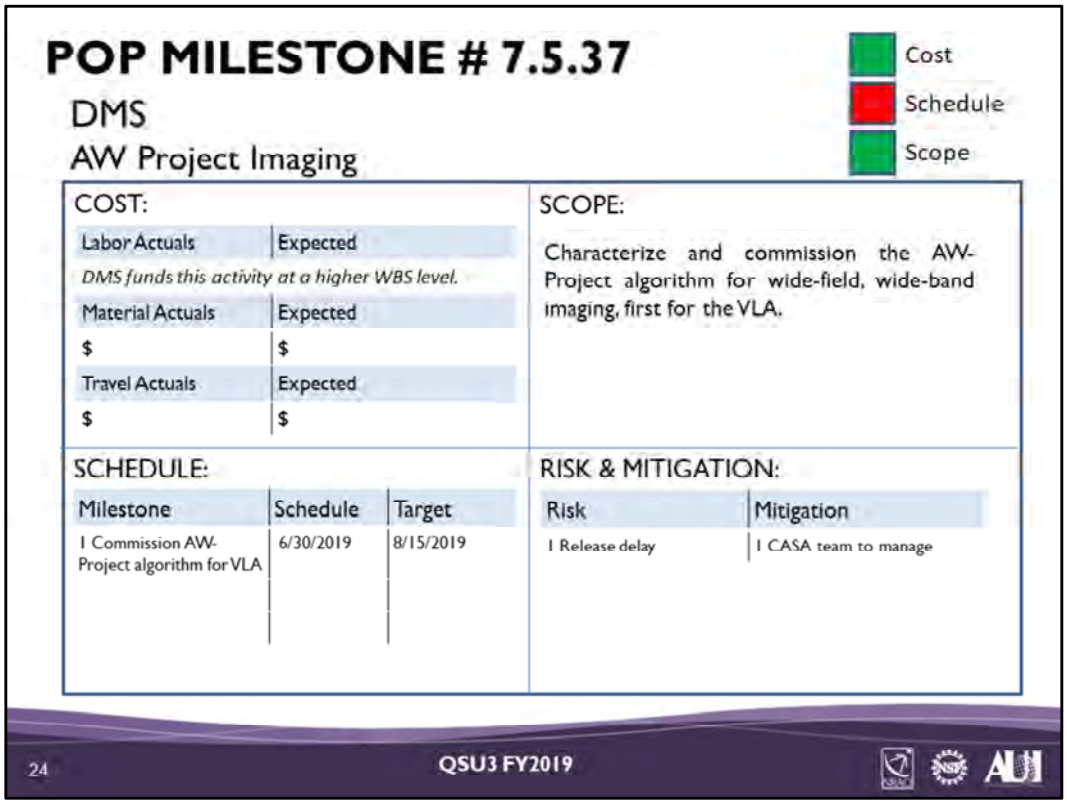


COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: Commission the Full-Mueller imaging algorithm to enable wide-field, wide-band full-Stokes imaging with VLA and ALMA. This work requires code implementation, scientific verification with simulated and real data, and documentation (software design, scientific test results). A memo and sample implementation is scheduled to be delivered in Q3 FY2019.

SCHEDULE: The priority for this task was lowered in favor of AW-Projection algorithm commissioning work required due to a change in VLASS priories. The infrastructure code for this task has been implemented. Work for scientific verification with simulated and real data, and the associated memo is still in progress.

RISK & MITIGATION: No impact.



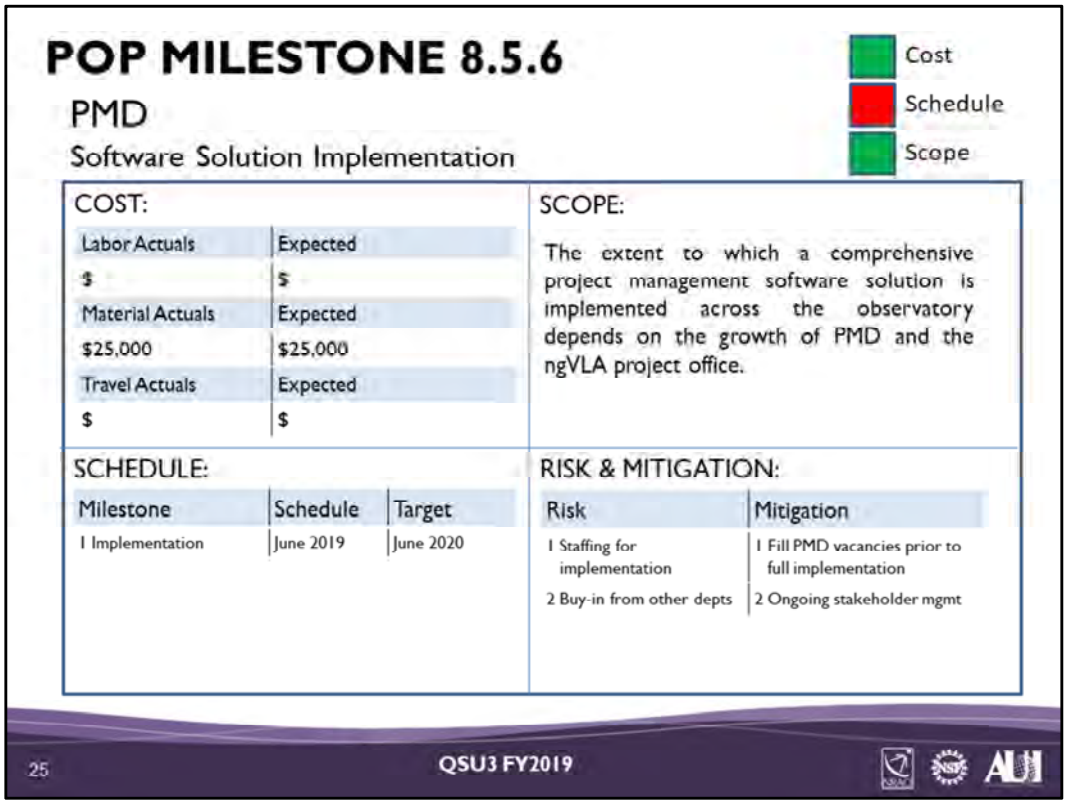
COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: Characterize and commission the AW-Project algorithm for wide-field, wide-band imaging, first for the VLA.

SCHEDULE: This task is in advanced stages of completion. The implementation is targeted for general release in the impending CASA 5.6 release. In collaboration with CASA Group's imaging team, scientific testing of the code has been finished. The code is ready for CASA Testing team and for CASA Stakeholder tests before merging with the CASA production branch. After testing, release is scheduled on 8/15/2109.

Unplanned extra work: Feature to correct for antenna pointing offsets in a fully heterogeneous-array sense was added to this task due to changing VLASS imaging priorities. This feature has also undergone scientific testing and is slated for release in CASA 5.6.

RISK & MITIGATION: There is a risk that the final release could be delayed by other items also scheduled for CASA 5.6. The CASA team will manage all features and fixes scheduled for this release in an effort to deliver it by the due date. Blocking items found in testing will be discussed and prioritized to taking into account both release timing with reliability.

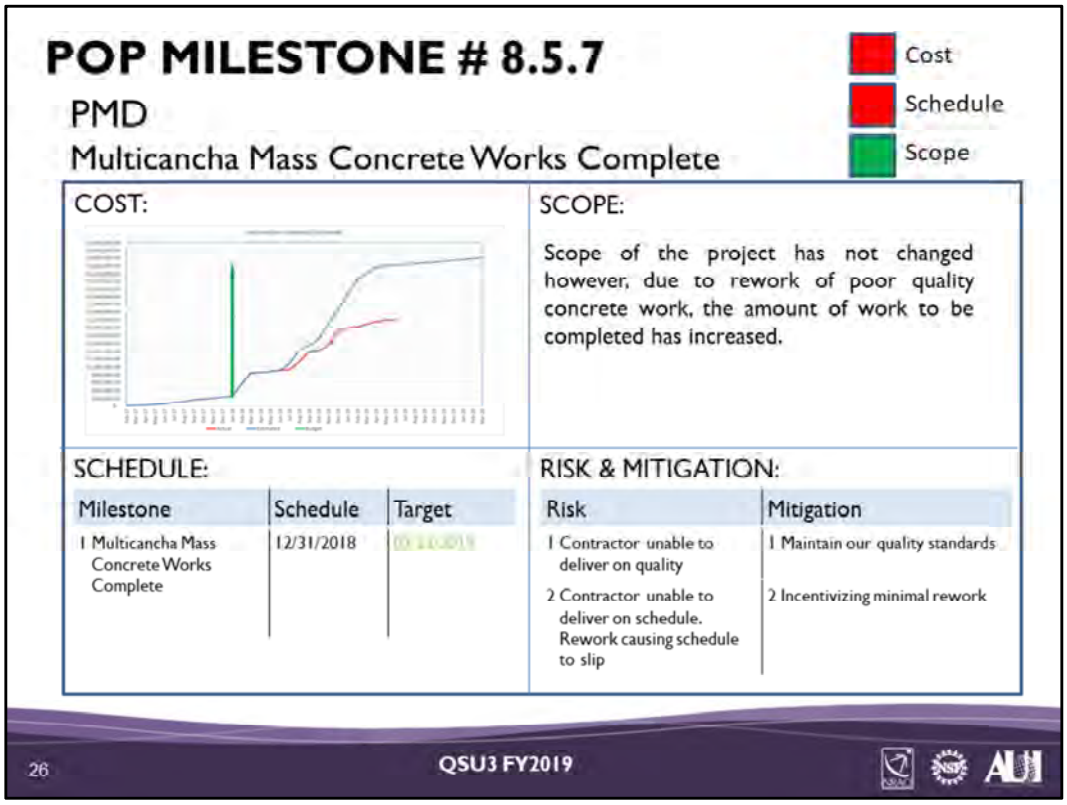


COST: Costs incurred thus far include 10 licenses of Oracle Primavera Cloud (one year) and training from Oracle consulting team.

SCOPE: No changes in scope have been made; however, the exact extent to which the software solution will be implemented has not yet been decided.

SCHEDULE: With the PMD AD position vacant, no final decision was made on whether to proceed with Oracle Primavera Cloud. PMD has recently completed training and will be finalizing a requirements analysis comparing different tools. Following this, and in conjunction with the expected build-up of the ngVLA project team, PMD will make a decision on the path forward.

RISK & MITIGATION:
1) The effort for implementation requires migrating all current projects to a new database, changing numerous department processes, and working with other departments (Budget, Director's Office) to change the way we process project data and conduct reporting. In order to ensure success, this will need to wait until PMD returns to full staffing levels.
2) This will represent a major change in how projects are managed with broad impacts to other departments. Other departments need to be engaged early and often so that all requirements are fully known and there are no surprises during the process.

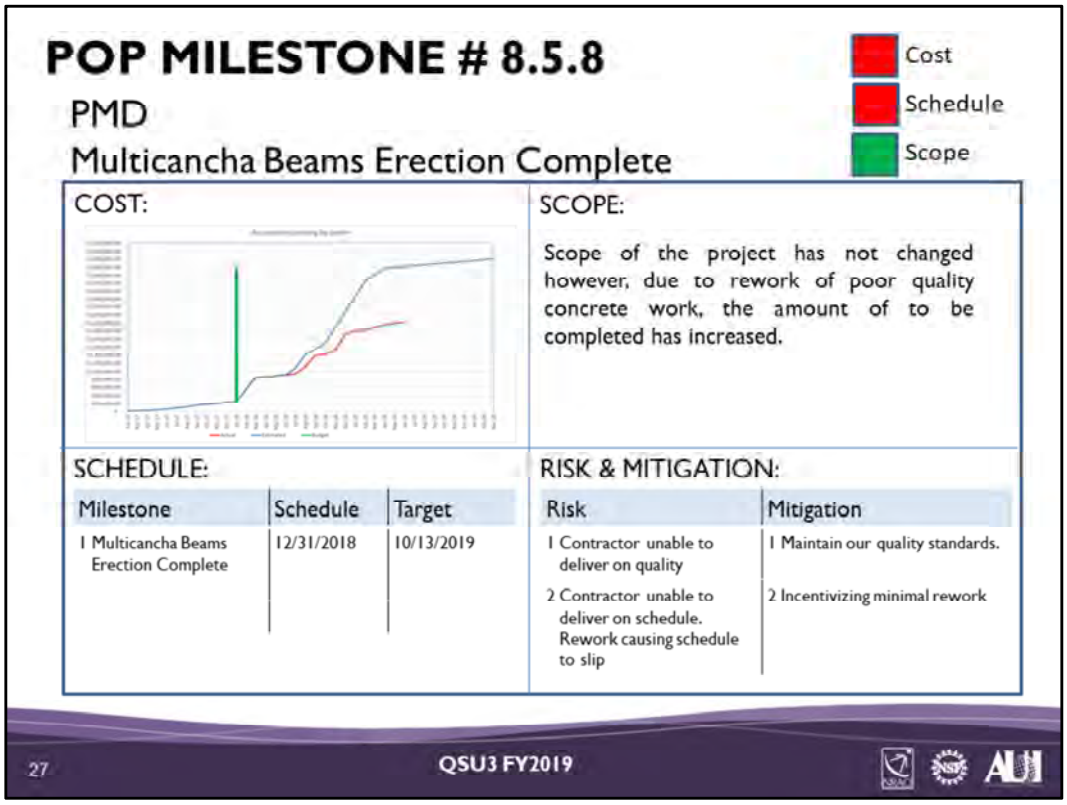


COST: This is a fixed price contract represented by the green bar in the chart, however the contractor is $650,000.00 over budget, behind on schedule, and at risk of withdrawal from the contract. NRAO is negotiating a contract addendum which includes a series of bonuses to Toptent and a new more realistic project term date. Currently, we are waiting for the delivery of backup information, for instance, time extension of guarantee bond of Faithful Performance of the Contract and construction insurances. Once Toptent agrees to the conditions and provides the backup information, we will submit a change request for a construction extension until late December 2019, and the hand over to ALMA process until late March 2020, the management overcost will be ~USD220k, which should be covered by the project contingency.

SCOPE: No change in scope.

SCHEDULE: Contractor sent an updated construction schedule with a construction term date on late December 2019

RISK & MITIGATION: Quality remains an issue. We have closely monitored the quality of work and submitted non conformance reports on each issue. We also have recommended a change of site management to the contractor as part of the contract renegotiation with incentives**.** Contractor accepted this request and changed most of this technical office on site. In addition, Contractor added more technical staff to improve performance. The contractor changed some key positions on site including the construction manager, field chiefs, quality supervisor (two on site), and project controller.

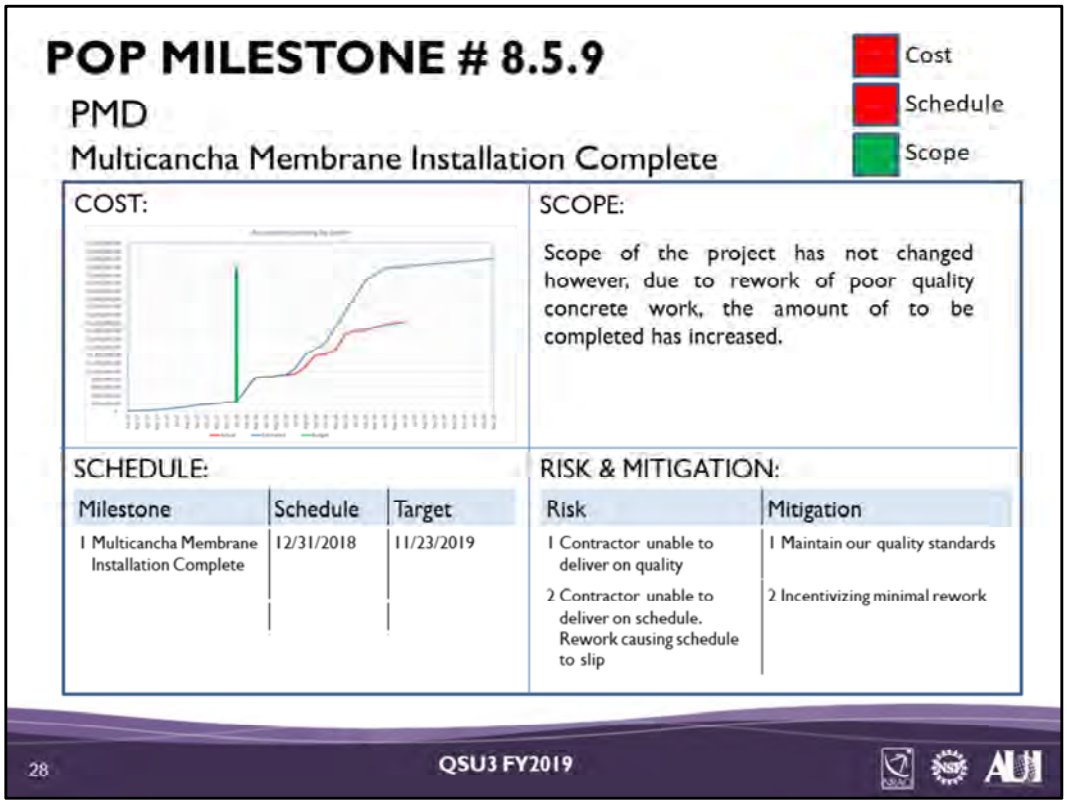


COST: This is a fixed price contract represented by the green bar in the chart, however the contractor is $650,000.00 over budget, behind on schedule and at risk of withdrawal from the contract. NRAO is negotiating a contract addendum which includes a series of bonuses to Toptent and a new more realistic project term date. Currently, we are waiting for the delivery of backup information, for instance, time extension of guarantee bond of Faithful Performance of the Contract and construction insurances. Once Toptent agrees to the conditions and provides the backup information, we will submit a change request for a construction extension until late December 2019, and the hand over to ALMA process until late March 2020, the management overcost will be ~USD220k, which should be covered by the project contingency.

SCOPE: No change in scope.

SCHEDULE: Contractor sent an updated construction schedule with a construction term date of late December 2019

RISK & MITIGATION: Quality remains an issue. We have closely monitored the quality of work and submitted non conformance reports on each issue. We also have recommended a change of site management to the contractor as part of the contract renegotiation with incentives**.** Contractor accepted this request and changed most of this technical office on site. In addition, Contractor added more technical staff to improve performance. The contractor changed some key positions on site including the construction manager, field chiefs, quality supervisor (two on site), and project controller.

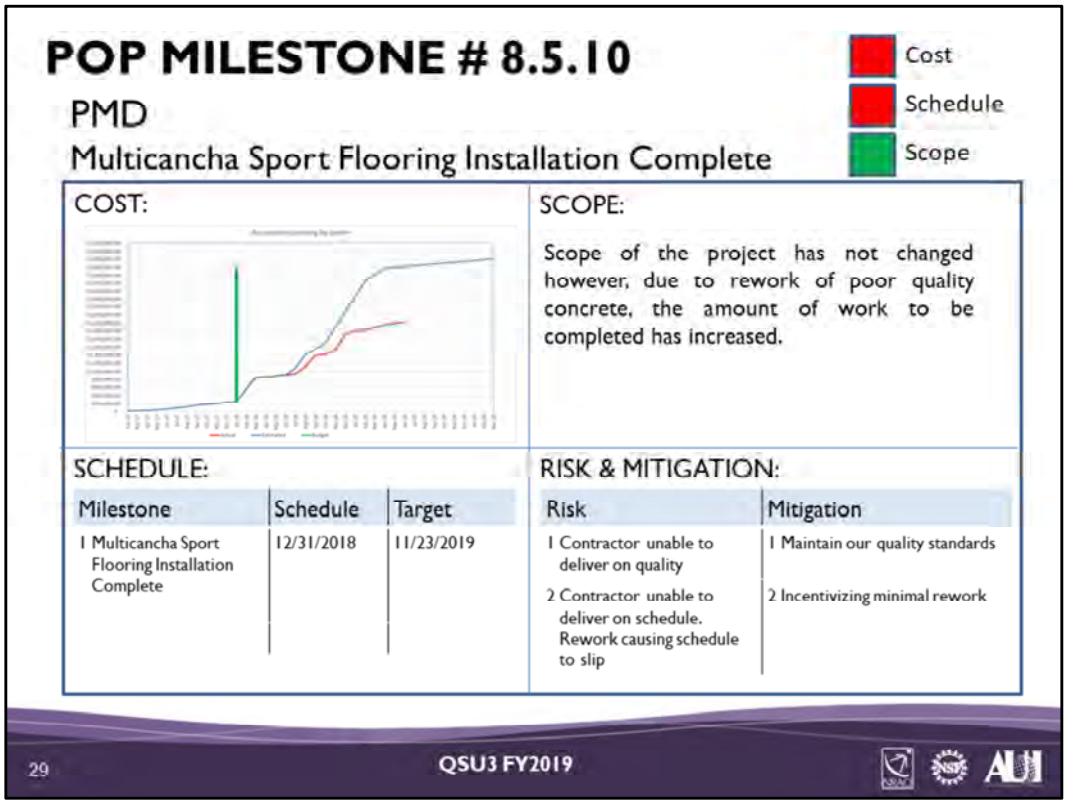


COST: This is a fixed price contract represented by the green bar in the chart, however the contractor is $650,000.00 over budget, behind on schedule and at risk of withdrawal from the contract. NRAO is negotiating a contract addendum which includes a series of bonuses to Toptent and a new more realistic project term date. Currently, we are waiting for the delivery of backup information, for instance, time extension of guarantee bond of Faithful Performance of the Contract and construction insurances. Once Toptent agrees to the conditions and provides the backup information, we will submit a change request for a construction extension until late December 2019, and the hand over to ALMA process until late March 2020, the management overcost will be ~USD220k, which should be covered by the project contingency.

SCOPE: No change in scope.

SCHEDULE: Contractor sent an updated construction schedule with a construction term date of late December 2019

RISK & MITIGATION: Quality remains an issue. We have closely monitored the quality of work and submitted non conformance reports on each issue. We also have recommended a change of site management to the contractor as part of the contract renegotiation with incentives**.** Contractor accepted this request and changed most of this technical office on site. In addition, Contractor added more technical staff to improve performance. The contractor changed some key positions on site including the construction manager, field chiefs, quality supervisor (two on site), and project controller.

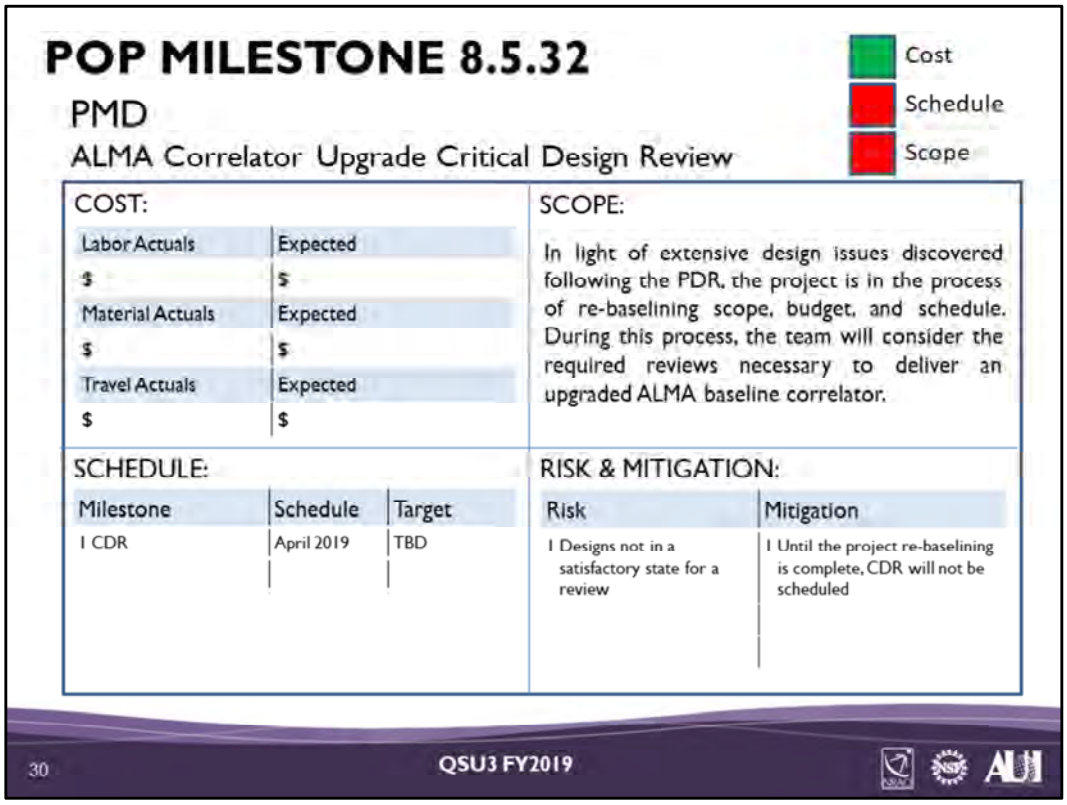


COST: This is a fixed price contract represented by the green bar in the chart, however the contractor is $650,000.00 over budget, behind on schedule and at risk of withdrawal from the contract. NRAO is negotiating a contract addendum which includes a series of bonuses to Toptent and a new more realistic project term date. Currently, we are waiting for the delivery of backup information, for instance, time extension of guarantee bond of Faithful Performance of the Contract and construction insurances. Once Toptent agrees to the conditions and provides the backup information, we will submit a change request for a construction extension until late December 2019, and the hand over to ALMA process until late March 2020, the management overcost will be ~USD220k, which should be covered by the project contingency.

SCOPE: No change in scope.

SCHEDULE: Contractor sent an updated construction schedule with a construction term date of late December 2019

RISK & MITIGATION: Quality remains an issue. We have closely monitored the quality of work and submitted non conformance reports on each issue. We also have recommended a change of site management to the contractor as part of the contract renegotiation with incentives**.** Contractor accepted this request and changed most of this technical office on site. In addition, Contractor added more technical staff to improve performance. The contractor changed some key positions on site including the construction manager, field chiefs, quality supervisor (two on site), and project controller.

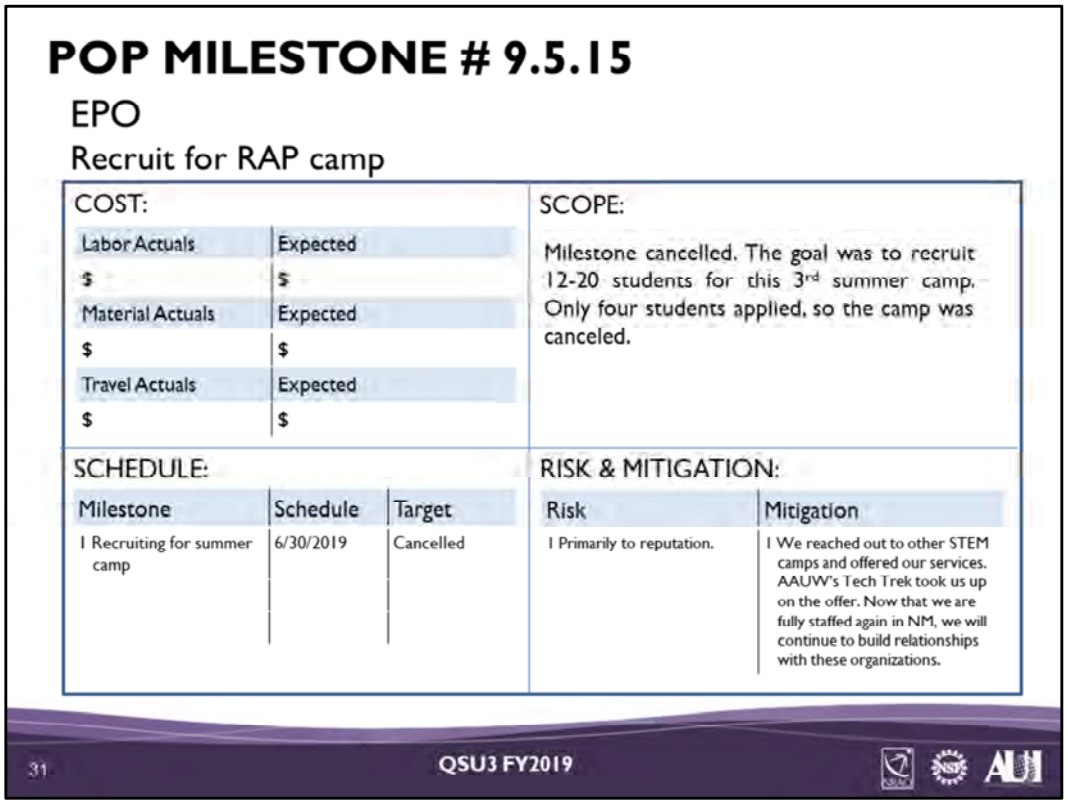


COST: No effort has been expended on preparing for the CDR.

SCOPE: In light of extensive design issues discovered following the PDR, the project is in the process of re-baselining scope, budget, and schedule. During this process, the team will consider the required reviews necessary to deliver an upgraded ALMA baseline correlator.

SCHEDULE: Following the PDR in March 2018, the CDR was scheduled for April 2019. Following the transition from the retiring PI to new leadership within CDL, holding a CDR this early proved unrealistic due to design issues discovered in the Application Specific Integrated Circuit (ASIC) and the project being understaffed. Once the re-baselining effort is complete, a new preliminary date can be set for the CDR.

RISK & MITIGATION:
If a CDR was held with the designs not in a satisfactory state, the project would risk failing the review. For this reason, it is critical to determine a viable path forward with the project prior to scheduling the review.

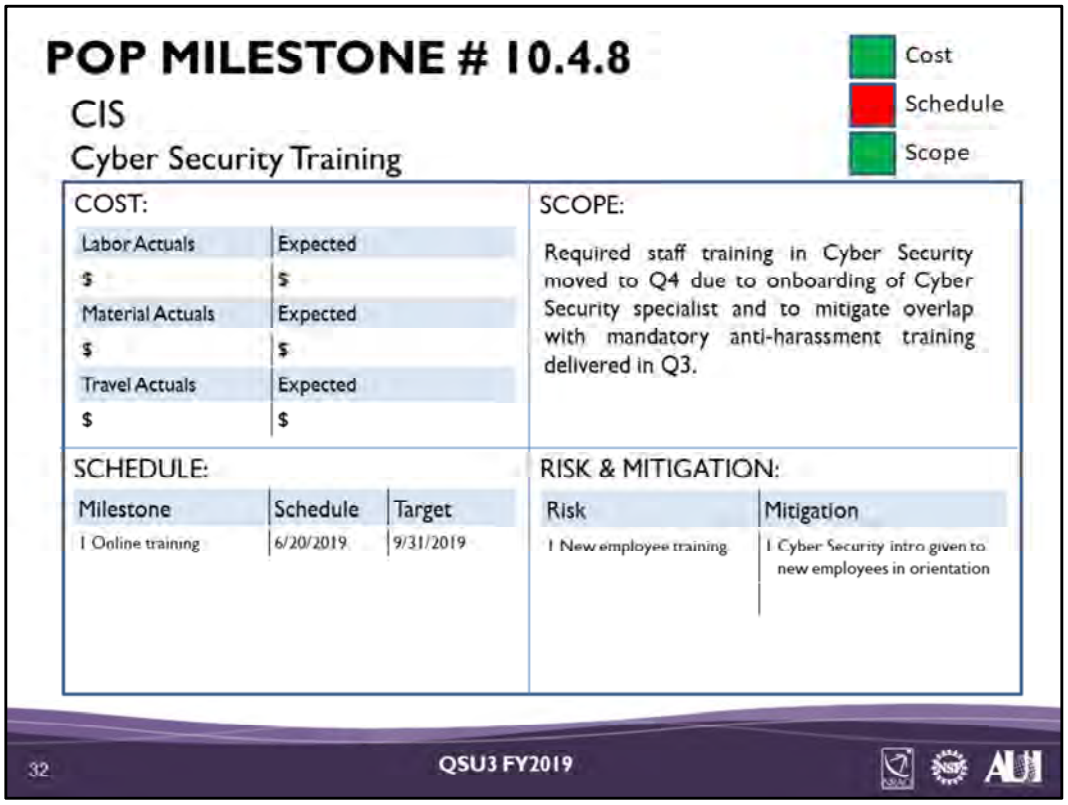


COST: No change, significant budgeted expenses are saved ($12,000 for dorms, food, and additional mentors).

SCOPE: Goal was 20 students, only four applied.

SCHEDULE: Camp would have been in June.

RISK & MITIGATION: Primary risk is to our reputation. The first two RAP-NM camps had low registrations but four was simply too low to justify the effort and expense, so the camp was cancelled. We reached the milestone of recruiting, but are cancelling the deliverable. The mitigation strategy was to reach out to other summer camps to provide our activities. The response was very positive, with EPO staff presenting at Tech Trek by AAUW for two separate sessions.

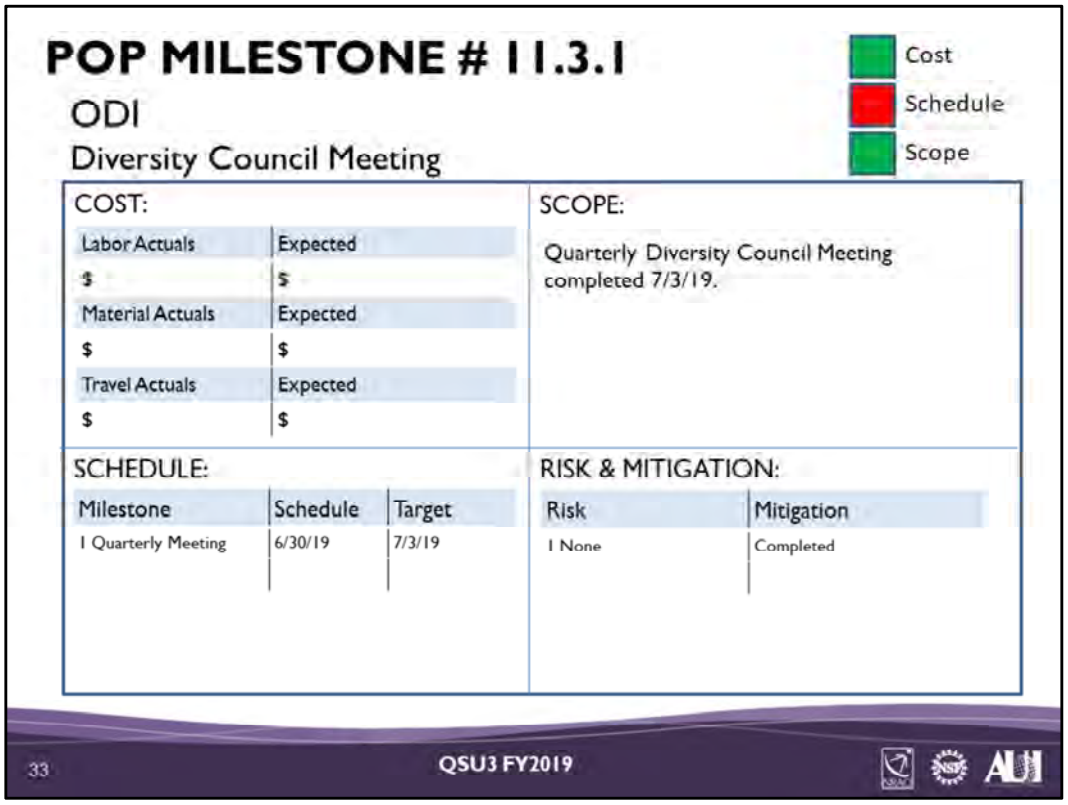


COST: No impact.

SCOPE: No impact.

SCHEDULE: Moved to Q4.

RISK & MITIGATION: Cyber security training delivered during onboarding until Q4.

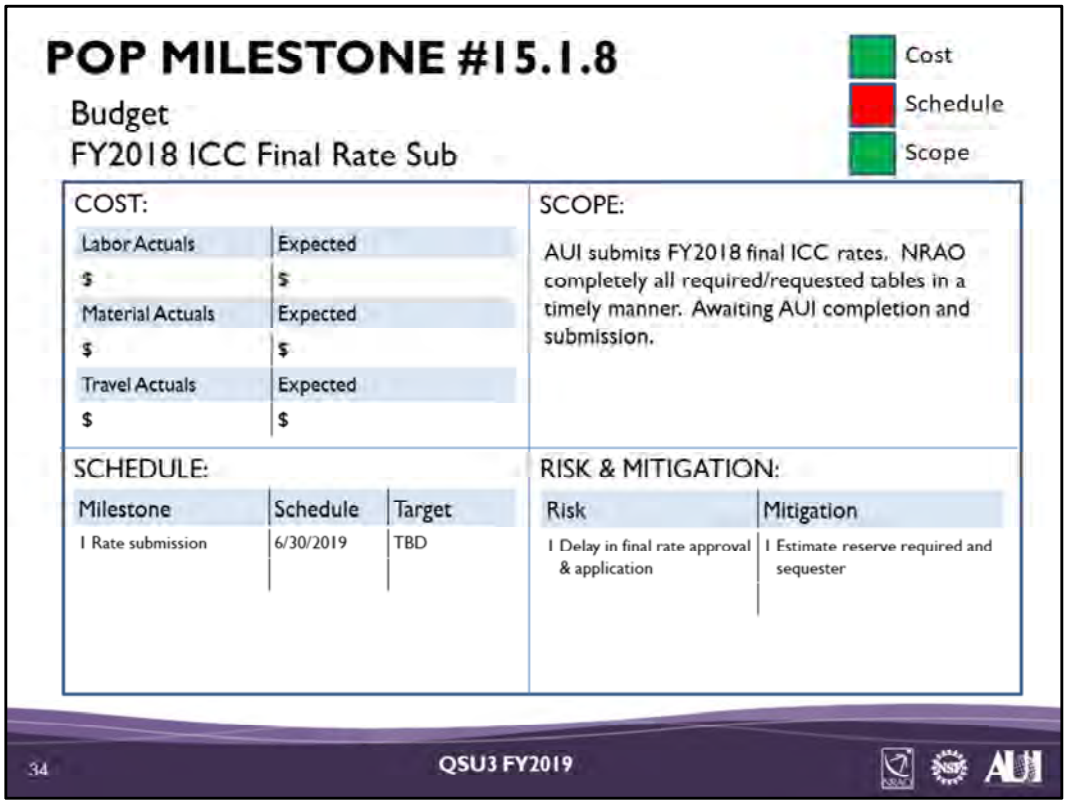


COST: No impact.

SCOPE: Complete

SCHEDULE: Completed three days late.

RISK & MITIGATION: None.

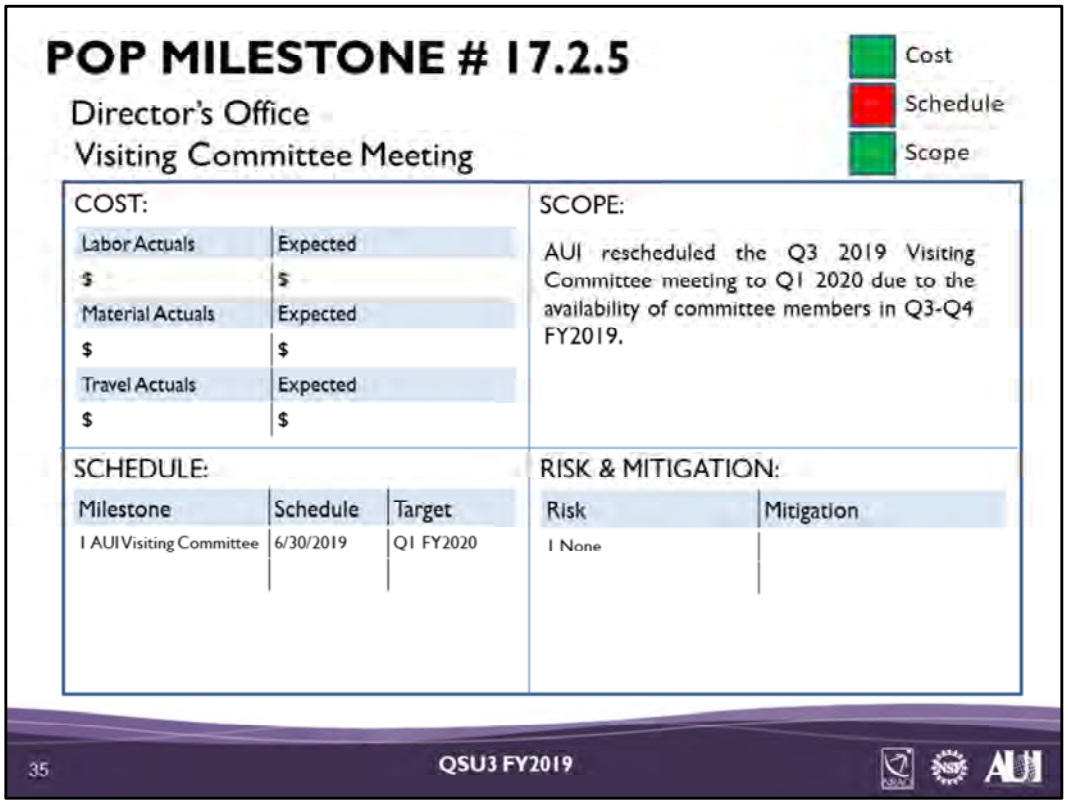


COST: No impact.

SCOPE: No impact.

SCHEDULE: Unknown, AUI will submit when they are ready.

RISK & MITIGATION: Estimated total variance across all fund sources is small.



COST: No impact

SCOPE: No change

SCHEDULE: Meeting rescheduled to Q1 FY2020.

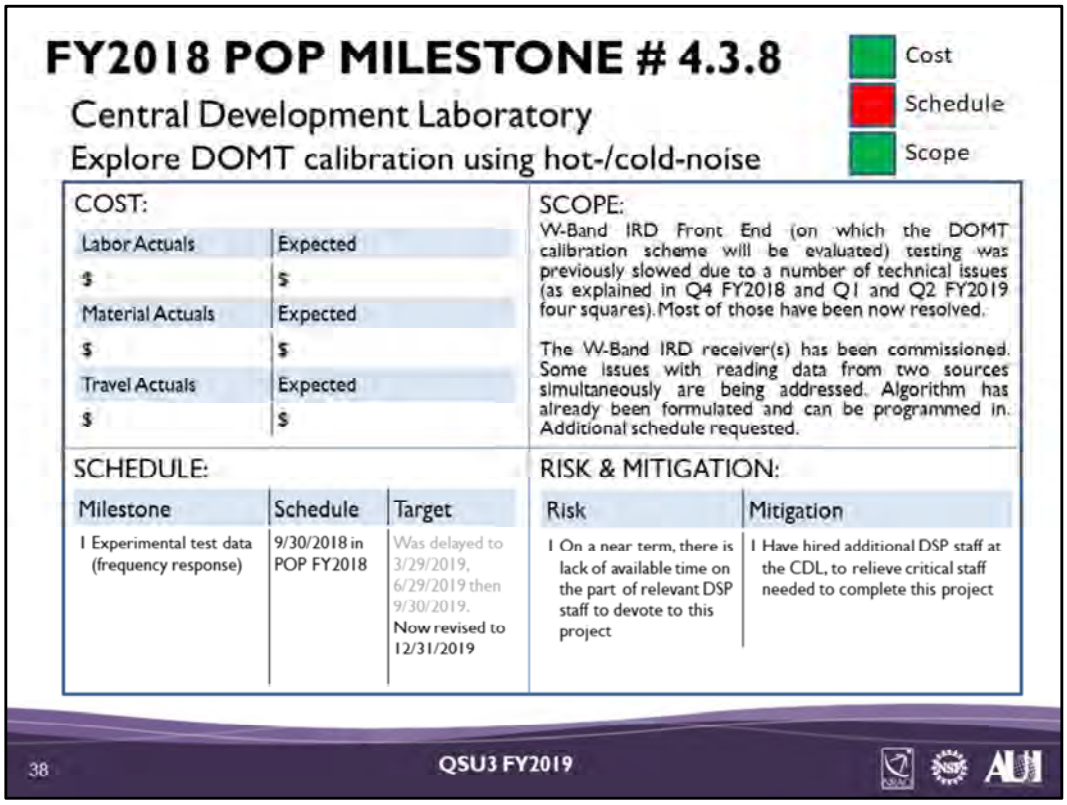
RISK & MITIGATION: Low, no mitigation

FY2018 Milestone Carryover Chart

POP Section	POP Milestone	Milestone	POP Completion Date		Q3 FY2019 Cost	Sched	Scope
2.5		**Atacama Large Millimeter/submillimeter Array (ALMA)**					
		Maintenance, Renewal and Warranty Claims					
	29	NA Antenna Surface Accuracy Installation (25 antennas)	2/21/2018	Complete Q5			
	32	Deliver FEMs 1 & 2 to JAO	2/21/2018	FY19 POP			
	33	Deliver FEMs 3 & 4 to JAO	6/20/2018	FY19 POP			
3.4		**Very Large Array**					
		VLA Development					
	27	Realtime operational for limited observing modes	9/30/2018	Complete Q3			
4.3		**Central Development Laboratory**					
		Research and Development					
	8	Explore DOMT calibration using hococalibration	9/30/2018	4 Square			
	9	Demonstrate high-bandwidth unformatted serial link with integrated FE	9/30/2018	Complete Q3			
	10	Balanced 4-12 GHz IF amplifier	9/30/2018	Complete Q3			
5.6		**Science Support and Research**					
		Scientific User Support & Student Programs					
	28	CASA Guides	6/30/2018	Complete Q1			
	33	Student Observing Support Selection (ALMA)	9/30/2018	Complete Q1			
6.5		**Data Management & Software**					
		Scientific Information Services					
	6	NGAS software replacement	9/30/2018	Complete Q2			
		SSA					
	25	Archive Access Tool release 4.0	9/30/2018	Complete Q3			
		ARDG					
	33	Algorithm R&D Roadmap v1	6/30/2018	Complete Q1			
7.5		**Program Management Department**					
		Headquarters					
	34	PMSE Training/Workshop	9/30/2018	Complete Q1			
		Sport facility at ALMA OSF					
	38	Sport facility at ALMA OSF Construction Complete	9/30/2018	Complete Q3			
		VLA Electrical Infrastructure Upgrade					
	32	VLA Electrical Infrastructure Upgrade Closeout	6/30/2018	Complete Q3			

FY2018 Milestone Carryover Chart

POP Section	POP Milestone	Milestone	POP Completion Date		Q3 FY2019 Cost	Sched	Scope
8.5		**Education and Public Outreach**					
		STEAM					
	3	NM participants travel to Chile	9/30/2018	Complete Q3			
10.3		**Office of Diversity & Inclusion**					
		Local and National Programs					
	5	NAC Annual Workshop	9/30/2018	Complete Q2			
13.7		**Administration**					
		Budget					
	2	Develop and test tool for use in budget planning	6/30/2018	Complete Q2			
		ngVLA					
2		***Antenna Reference Design***					
	3	Conduct formal documentation and design reviews of ngVLA Reference Design	9/30/2018	FY19 POP			
4		***Conceptual Design & Development***					
	5	Release first issue of Array Calibration document	9/30/2018	Complete Q2			
	12	Algorithmic Study released	9/30/2018	4-Square			
	15	RFI Mitigation study released	9/30/2018	4-Square			
	19	WVR Testing begins	9/30/2018	Complete Q2			
5		***Administration and Management***					
5.6		**Requirements Management**					
	6	Conduct gap analysis of stakeholder and system requirements	6/30/2018	Complete Q2			
	8	Release concept documents, system requirements and updated RVTM	9/30/2018	Complete Q2			
3.11		**Long Baseline Observatory**					
		Operational Activities					
	9	VME replacement program will be complete	9/30/2018	4-Square			
	10	Complete VLBA upgrade roadmap	9/30/2018	Complete Q1			

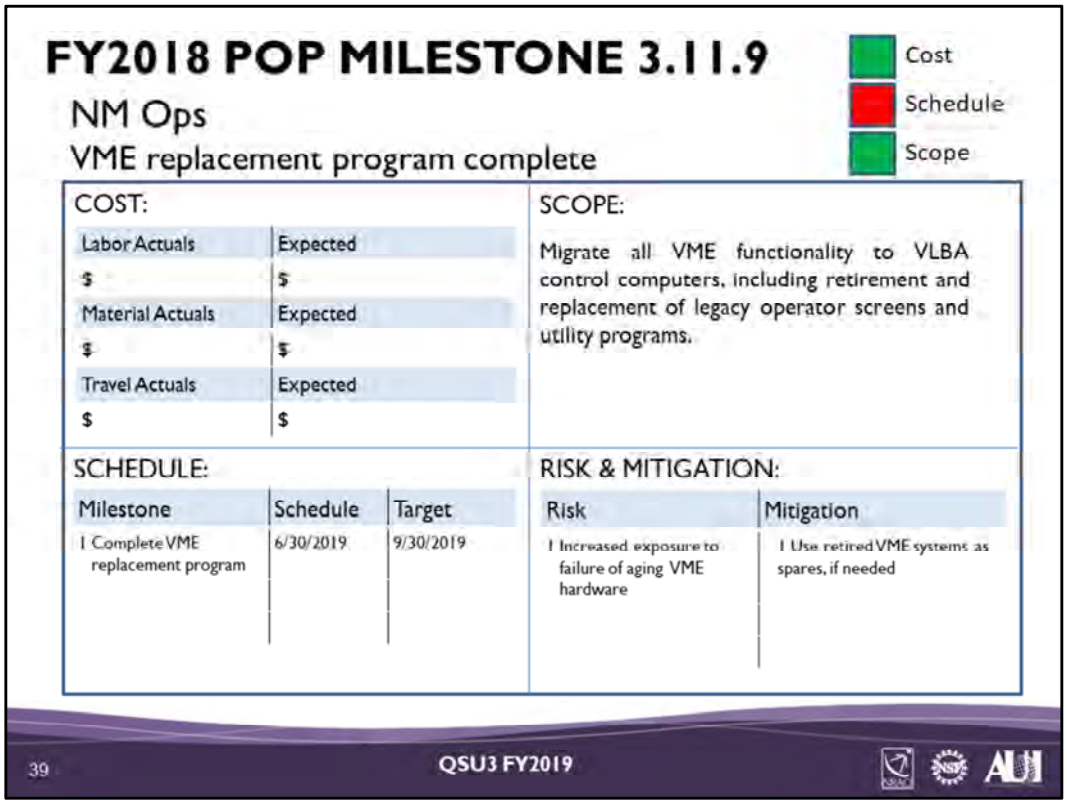


COST: No consequential change in cost performance.

SCOPE: No change in scope, originally proposed experimental test data (streaming spectra) is still proposed to be collected and delivered.

SCHEDULE: This milestone requires a second W-band Front End, which has been built. Currently working on reading two sources simultaneously. Consequently, we are requesting another quarter to complete this milestone.

RISK & MITIGATION: On a near term, there is lack of available time on the part of relevant DSP staff to devote to this project. Have hired additional DSP staff at the CDL, to relieve critical staff needed to complete this project.

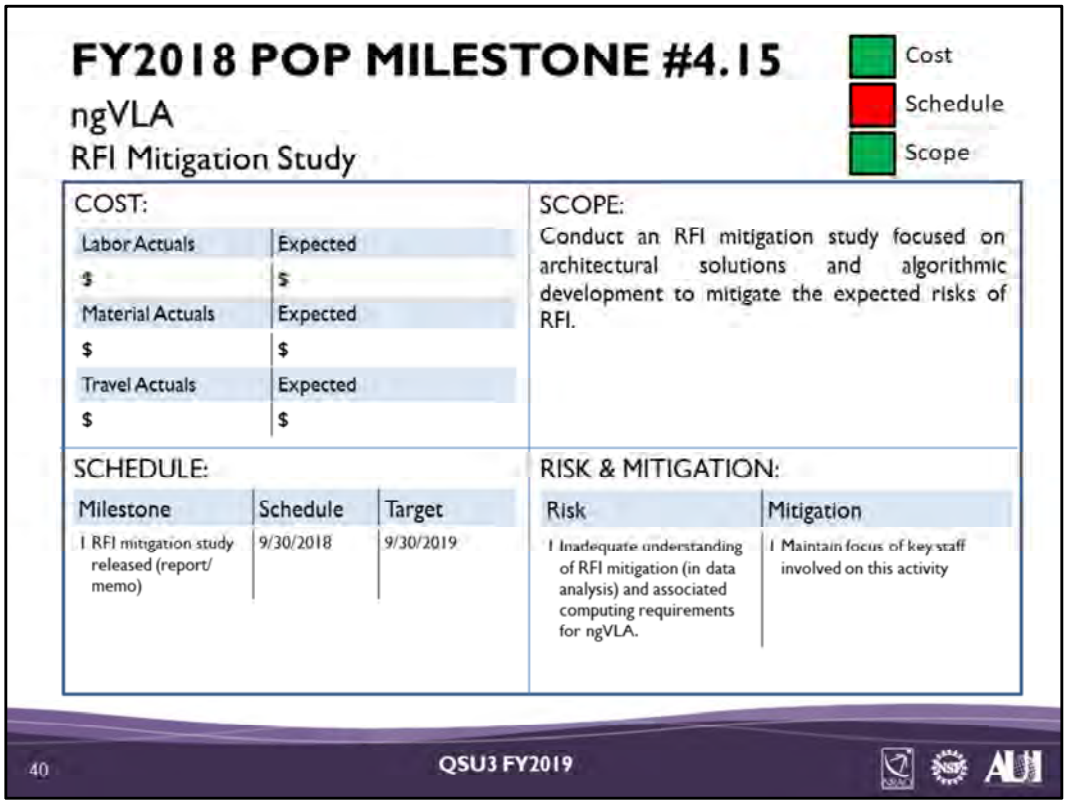


COST: No impact.

SCOPE: No impact.

SCHEDULE: The migration of all VME functionality to VLBA control computers was delayed by technical issues with new noVME hardware at the MK site. Also, the SC site cannot be converted to noVME until it is restored to service after completion of the hurricane repair project. Operational software has reached a usable level of completion with improvements continuing to be developed. At present, seven stations have been moved to the VLBA control computers. FD and OV were converted to noVME during Q3. The remaining sites, SC, PT, and MK, are scheduled to be completed by the end of Q4.

RISK & MITIGATION: The risk of further delay is increased exposure to failure of aging VME hardware between now and the end of full deployment of the new system. Now that some of the stations have been moved we have spares available, if needed.



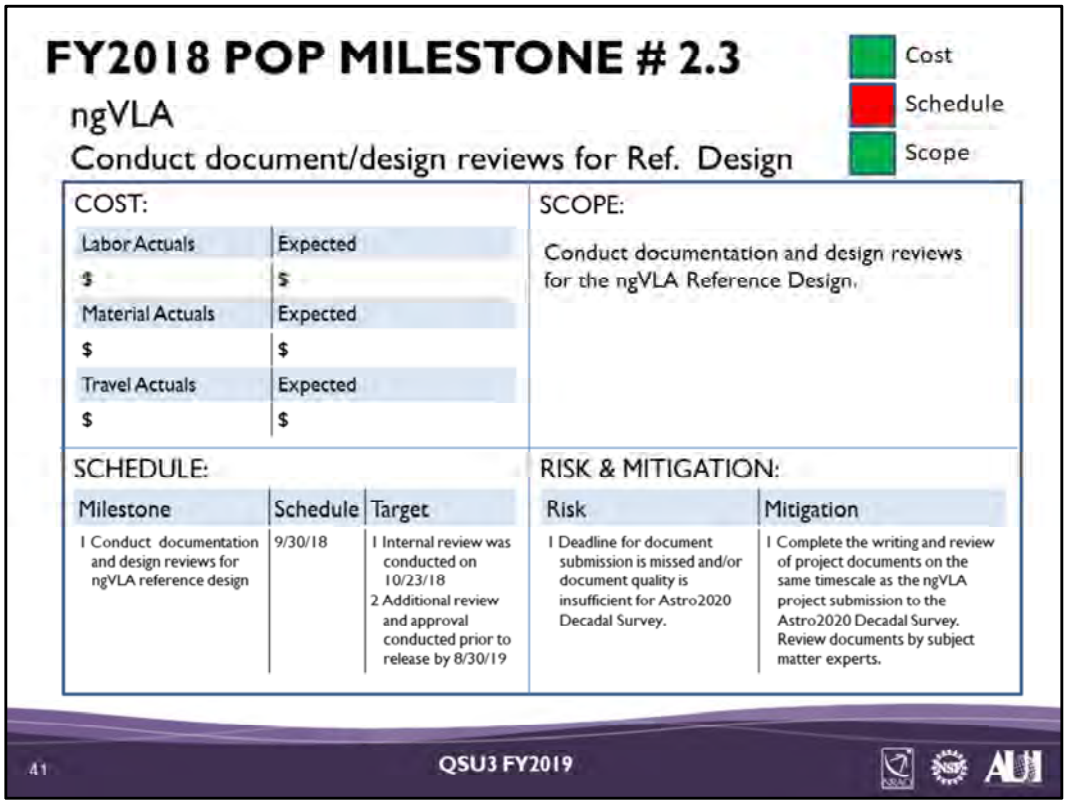
Owner: Rafael Hiriart

COST: No impact

SCOPE: An RFI mitigation report was issued in 2018. It focuses on estimating what the RFI environment might be on the timescale of 2030. No impact at this time.

SCHEDULE: Competing initiatives within the NRAO (e.g. VLASS) have slowed progress on this milestone, and there are currently insufficient resources within NRAO to complete the RFI mitigation study on the timescale of DS2020. The new target date for this milestone is September 2019 (Q4 FY2019).

RISK & MITIGATION: The risk of not completing the RFI mitigation study is an inadequate understanding of the data analysis requirements needed to minimize or remove the effects of RFI from ngVLA data. This could lead to a lack of RFI mitigation techniques in data analysis for ngVLA and an underestimate of its computing requirements. It would also 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 on writing the report.

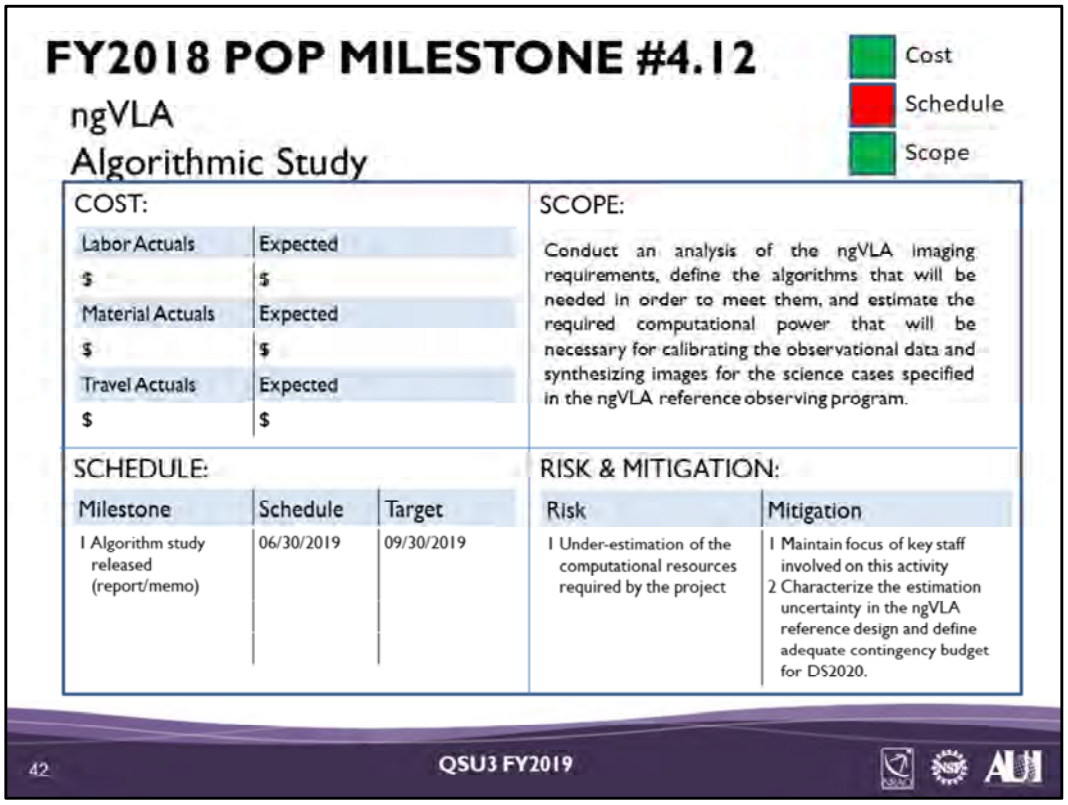


COST: No impact.

SCOPE: No impact.

SCHEDULE: An internal review of the reference design documentation was conducted in October 2018. Reference design documents were reviewed by subject matter experts (SMEs) by component (e.g. PM, SE, Science, Technical).The Reference Design documents are complete and are in the process of being released. The project is on schedule to release all design documents by August 2019.

RISK & MITIGATION: The risk to the project of a delayed completion of this milestone is an incomplete submission of the ngVLA Reference Design to the Astro2020 Decadal Survey. The mitigation to the risk is to complete the writing of the documents and their review on the same timescale as the submission of the ngVLA project white paper to DS2020.

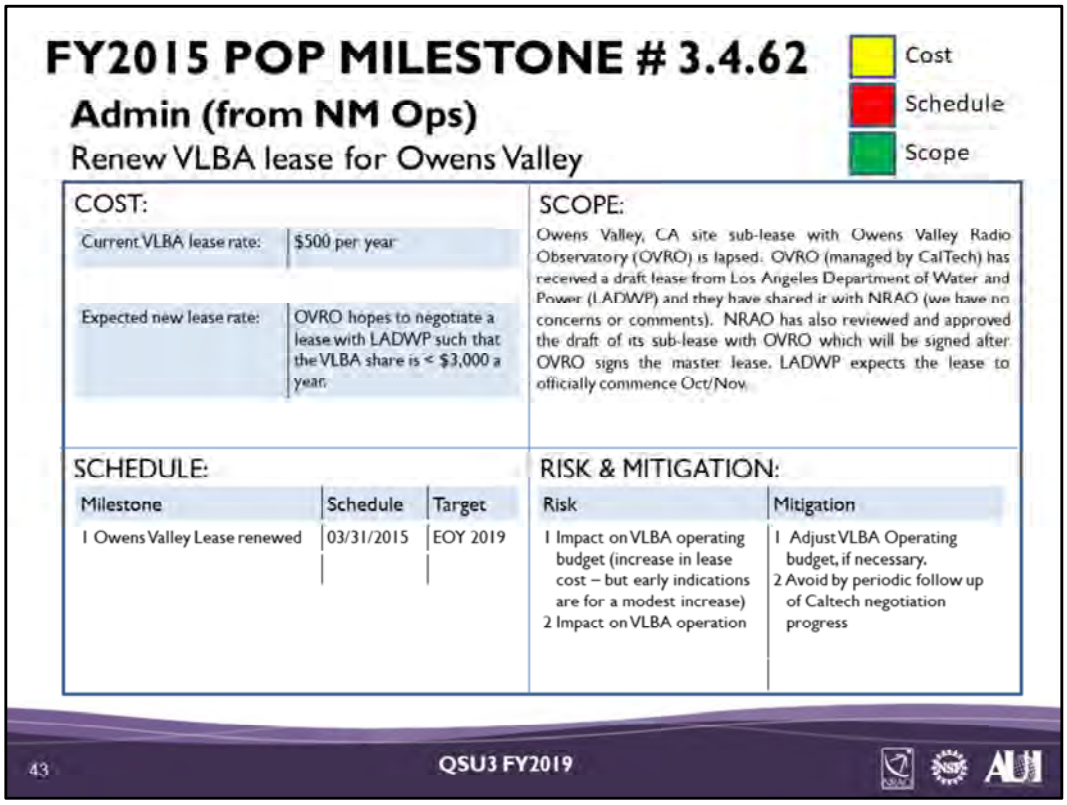


COST: No impact.

SCOPE: No impact.

SCHEDULE: Competing priorities within NRAO have delayed the completion of this milestone. In addition, input information from the ngVLA reference observing program has only recently been completed. Although delayed, recent progress indicates that the study is on track to be completed before the next quarter (FY19 Q4). The new target date for this milestone is September 2019.

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 on writing the report. It would also be adequate to conduct a review of this report in anticipation of requests for additional information from DS2020.

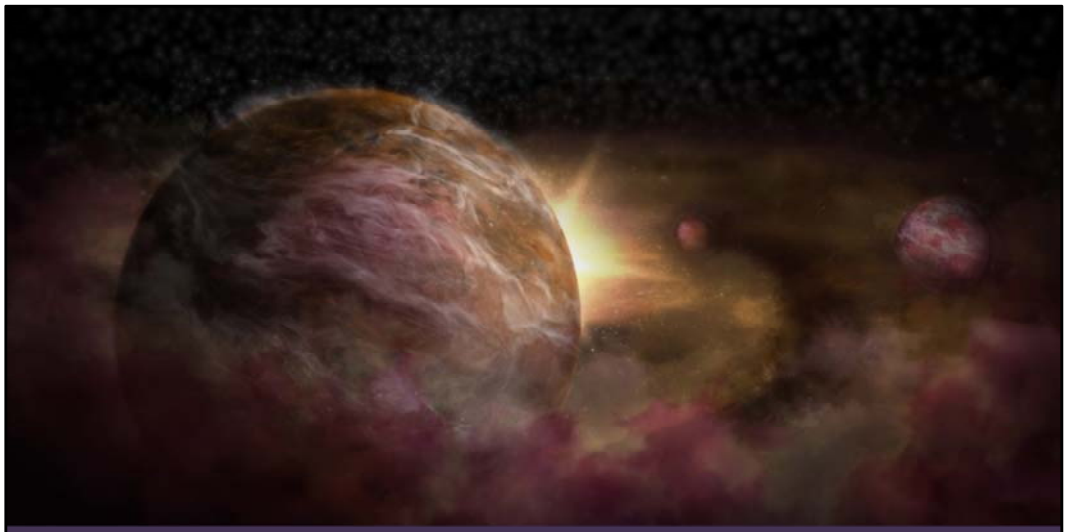


Updated 07/8/2019
COST: Future lease costs are subject to the status of Caltech's re-negotiation of the lease with Los Angeles Water and Power.

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.



QSU3 FY2019 Budget Report

Laura Lockledge

Budget Overview: Q3 FY2019

- ICC/IDC reflect FY2018 provisional rates (revised rates submitted in September).
- Generally underspent
  - Shutdown
  - ngVLA
- Benefits @ 31.6 vs. 36% budget
  - Insurance billing (worker's comp – front loaded)
  - Vacation contribution (NSF has asked us not to make this)
  - Medical vendor change (Probably haven't hit steady state yet)
  - Net credited across all fund sources – in Director's Office WBS ~$1.5M

CSA-V Q3 Results

- ngVLA underspent – staffing lag and major contract as yet to be let.
- Director's Office includes benefits surplus.
- Science Ops includes multiyear DMS surge funds.

	FY19 POP Budget	FY19 Rev. Budget	FY19 YTD Expenses	YTD % Rev Budget
NSF	38,850	38,850	38,850	100.0%
Carryforward/Other	1,165	5,215	5,215	0.0%
Total CSA-V Revenu	**40,015**	**44,065**	**44,065**	100.0%
Telescope Ops	11,003	12,195	7,217	59.2%
Development	3,575	3,123	1,820	58.3%
Science Ops	6,829	8,439	4,686	55.5%
Admin Services	10,249	10,293	6,041	58.7%
Director's Office	2,659	2,289	1,377	60.2%
Education & Public Out	782	793	499	62.9%
ngVLA	4,918	6,947	3,809	54.8%
FY19, Total	**40,015**	**44,079**	**25,449**	**57.7%**
FY19 CSA-V Net	**0**	**-14**	**18,616**	

CSA-A Q3 Results

- Development includes multi-year development project funds.
- Director's office includes benefits surplus.

	FY19 POP Budget	FY19 Rev. Budget	FY19 YTD Expenses	YTD % Rev Budget
NSF	40,280	40,280	40,280	100.0%
Carryforward	9,363	10,790	10,790	100.0%
Canadian Contribution	2,809	2,809	0	0.0%
Other	848	848	634	100.0%
Total CSA-A Revenues	**53,300**	**54,727**	**51,704**	94.5%
Telescope Ops	24,149	25,435	15,843	62.3%
Development	6,249	7,800	2,426	31.1%
Science Ops	6,783	7,157	4,454	62.2%
Admin Services	9,994	9,670	5,904	61.1%
Director's Office	3,617	3,231	1,925	59.6%
Education & Public Outreach	698	694	409	58.9%
FY19, Total	**51,490**	**53,987**	**30,961**	**57.3%**
FY19 CSA-A Net	**1,810**	**740**	**20,743**	

CSA-L Q3 Results

- Awaiting contract renewal from MPIfR.
- All USNO $ rec'd.
- Admin services reflects charges that were budgeted to Telescope Ops.
- Director's Office reflects benefits surplus.
- Awaiting reobligation of $330K LBO surplus. (1030 filed in July.)

	FY19 POP Budget	FY19 Rev. Budget	FY19 YTD Expenses	YTD % Rev Budget
NSF	3,430	3,430	3,430	100.0%
Telescope Time Sales	4,439	4,439	4,264	96.1%
Other	285	285	24	8.4%
Total CSA-L Revenues	**8,154**	**8,154**	**7,718**	94.7%
Telescope Ops	6,157	6,062	3,185	52.5%
Development	0	0	0	
Science Ops	1	1	1	100.0%
Admin Services	1,470	1,565	1,549	99.0%
Director's Office	526	526	-25	-4.7%
Education & Public Outreach	0	0	0	
FY19, Total	**8,154**	**8,154**	**4,710**	**57.8%**
FY19 CSA-L Net	**0**	**0**	**3,007**	

CSA's F&H Q3 Results

	CSA H Budget	ITD Expenses	% Budget	CSA-F Budget	ITD Expenses	% Budget
NSF	2,000	939	47.0%	2,500	122	4.9%

- CSA-H spent $400K last quarter. Work continuing at that pace.
- CSA-F includes fiber payments extending over multiple years. Expect a no-cost extension.

ICC Q3 Results

- Small overrecovery. Note: would be underrecovered wrt FY2019 prelim rates.
- Strong external recoveries.
- Telescope ops is international spectrum management.
- Director's Office reflects benefits credit.

	FY19 POP Budget	FY19 Rev. Budget	FY19 YTD Expenses	YTD % Rev Budget
NRAO Recoveries	15,176	15,176	9,923	65.4%
External Recoveries	1,412	1,412	1,106	78.3%
Total ICC Revenues	**16,588**	**16,588**	**11,029**	66.5%
Telescope Ops	108	109	110	100.9%
Development	462	464	353	76.1%
Science Ops	2,567	2,594	1,924	74.2%
Admin Services	11,450	11,385	7,476	65.7%
Director's Office	2,001	2,029	1,049	51.7%
FY19, Total	**16,588**	**16,581**	**10,912**	**65.8%**
FY19 ICC Net	**0**	**7**	**117**	

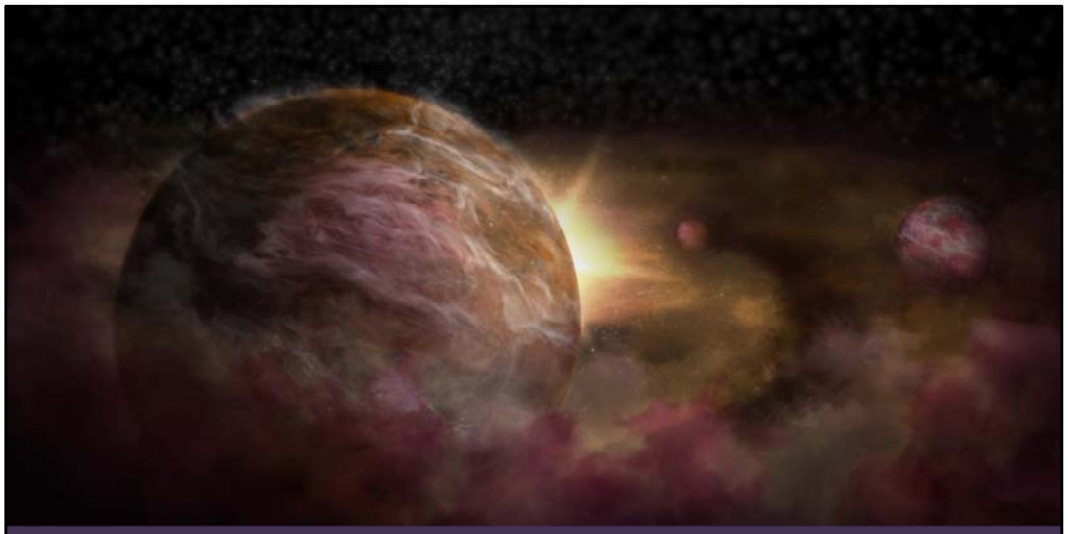
Year End Preview

- CSA-V: $6.5M cash less expected (formal) open commitments of $2.3M. Carryover includes ongoing commitments to DMS surge.
- CSA-A: $9.4M includes development reserve.
- CSA-L: $.7M

Notes: All fund sources positively impacted by fringe surplus.

All fund sources impacted by delay in rate approval with both ICC and IDC slated to reduce.

Expect ICC to be modestly under-recovered wrt FY2019 preliminary rates.

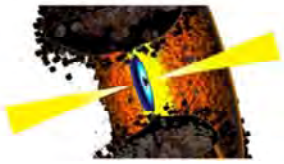


QSU3 FY2019 Exception Report

Suzanne Gurton, EPO

Education and Public Outreach

News: VLA



VLA Makes First Direct Image of Key Feature of Powerful Radio Galaxies

April 2, 2019 at 1:19 pm / News Release

A dusty, doughnut-shaped feature long thought to be an essential part of the "engines" at the cores of active galaxies, is seen for the first time in one of the most powerful galaxies in the Universe.

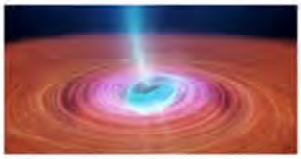
Statement on Starlink and 'Constellations' of Communication Satellites

May 31, 2019 at 9:37 am / Announcement

Radio astronomy facilities are working with the communications industry to preserve clear views of the radio universe.

Education and Public Outreach

News: VLBA



Black Hole's Tug on Space Pulls Fast-Moving Jets in Rapid Wobble

April 29, 2019 at 11:00 am | News Release

A spinning black hole pulls in material from a companion star, and its gravitational effect causes ejected jets of material to wobble like a child's spinning top.

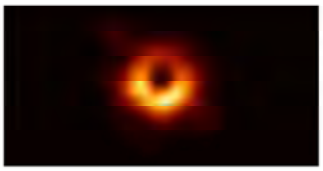
The Giant In Our Backyard

April 16, 2019 at 9:55 am | News Feature

For decades astronomers have dreamed of seeing a black hole. That dream may soon become a reality.

Education and Public Outreach

News: ALMA



Radio Astronomy and Black Holes

April 10, 2019 at 9:07 am | News Room

Using the EHT, with ALMA as its most sensitive component, astronomers have captured the first direct visual evidence of a black hole: an image of the supermassive black hole at the center of Messier 87 (M87), a giant elliptical galaxy 55 million light-years from Earth.

Cool, Nebulous Ring around Milky Way's Supermassive Black Hole

June 5, 2019 at 1:00 pm | News Release

New ALMA observations reveal a never-before-seen disk of cool, interstellar gas wrapped around the supermassive black hole at the center of the Milky Way.

Planetary Rings of Uranus 'Glow' in Cold Light

June 20, 2019 at 12:00 pm | News Feature

Using the both ALMA and the VLT, astronomers have imaged the cold, rock-strewn rings encircling the planet Uranus. Rather than observing the reflected sunlight from these rings, ALMA and the VLT imaged the millimeter and mid-infrared "glow" naturally emitted by the frigidly cold particles of the rings themselves.

Education and Public Outreach

News: NRAO

Chilean Senate Distinguishes ALMA For 1st Image of Black Hole

April 17, 2019 at 3:55 pm / Announcement

The Senate of Chile recognized ALMA for its role in obtaining the first image of a black hole as part of the Event Horizon Telescope.

AUI/NRAO Representative in Chile to Join Advisory Council of ComunidadMujer

May 15, 2019 at 2:02 pm / Announcement

Paulina Bacaz, the AUI Representative and NRAO Assistant Director for Chile, has been selected to join the Advisory Council of "ComunidadMujer."

Dosvedanya and Farewell, RadioAstron

June 11, 2019 at 2:47 pm / Announcement

On May 30, 2019, the Russian RadioAstron satellite — the farthest element of an Earth-to-space radio-telescope system — ended its service.

2019 Jansky Lectureship Awarded to Caltech Professor

June 12, 2019 at 10:59 am / News Release

Dr Anneila Sargent of Caltech is honored for her research accomplishments, leadership in the astronomical community, and mentoring of younger scientists.

Skype Call – Casco Bay High School – April 10, 2019

Education Specialist Faith Vowler participated in the yearly Skype call with Anne Loughlin's astronomy class from Casco Bay High School in Portland, Maine, on April 10. STEAM Ed. staff provided a one hour-long career and Q&A about general astronomy session with the students. A total of 27 students participated in the Skype call.

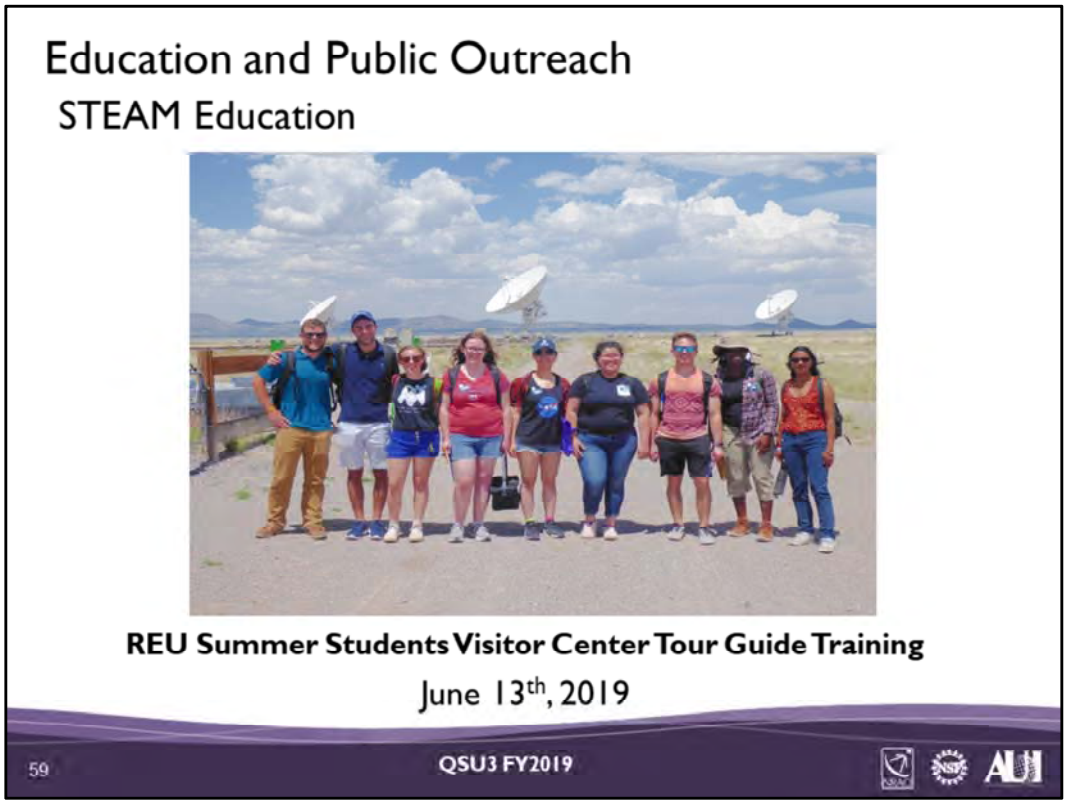
Education and Public Outreach

STEAM Education

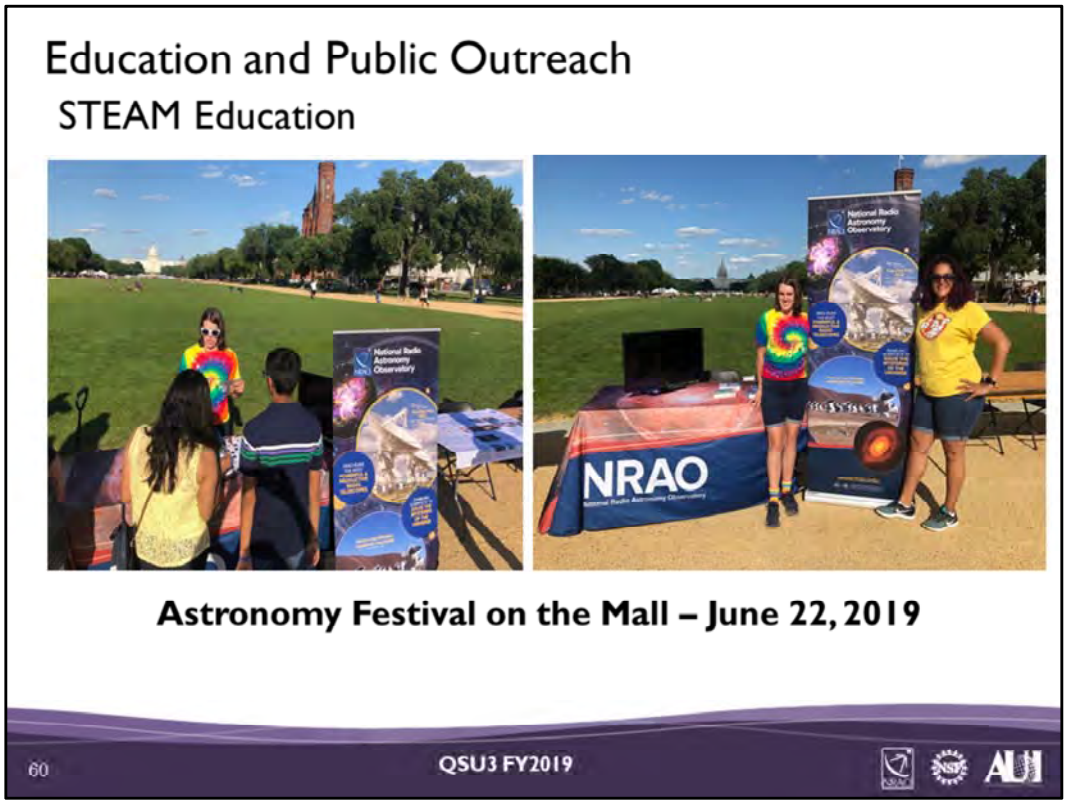
- **Science and Math Night at Parkview Elementary School - April 16th,2019**

58 QSU3 FY2019

Education Specialist Faith Vowler participated in the Parkview Elementary School's annual Science and Math Night on April 16. STEAM Ed staff give a demonstration for the visiting students using radio images together with red and blue glasses. An estimated 60-70 people participated.



On Thursday, June 13, EPO staff (Faith, Dave, and Carmen) and VLA operator on duty provided the NRAO REU summer students with guided tours training. Each student is required as part of their internship to give guided tours at the Visitor Centers on two different dates. This training covered information about the VLA (fact sheet), tour procedures, and "do's and don'ts" of engaging with the public. The training also established the tour schedule for the REU students and a demonstration of a guided tour by EPO staff. These REU Summer Tours are being hosted out at the VLA every weekend from late June through the end of July. Nine of the ten REU students attended the training.



STEAM Ed. staff, Faith Vowler and Jessica Harris, participate in the 10th Annual Astronomy Festival on the National Mall.

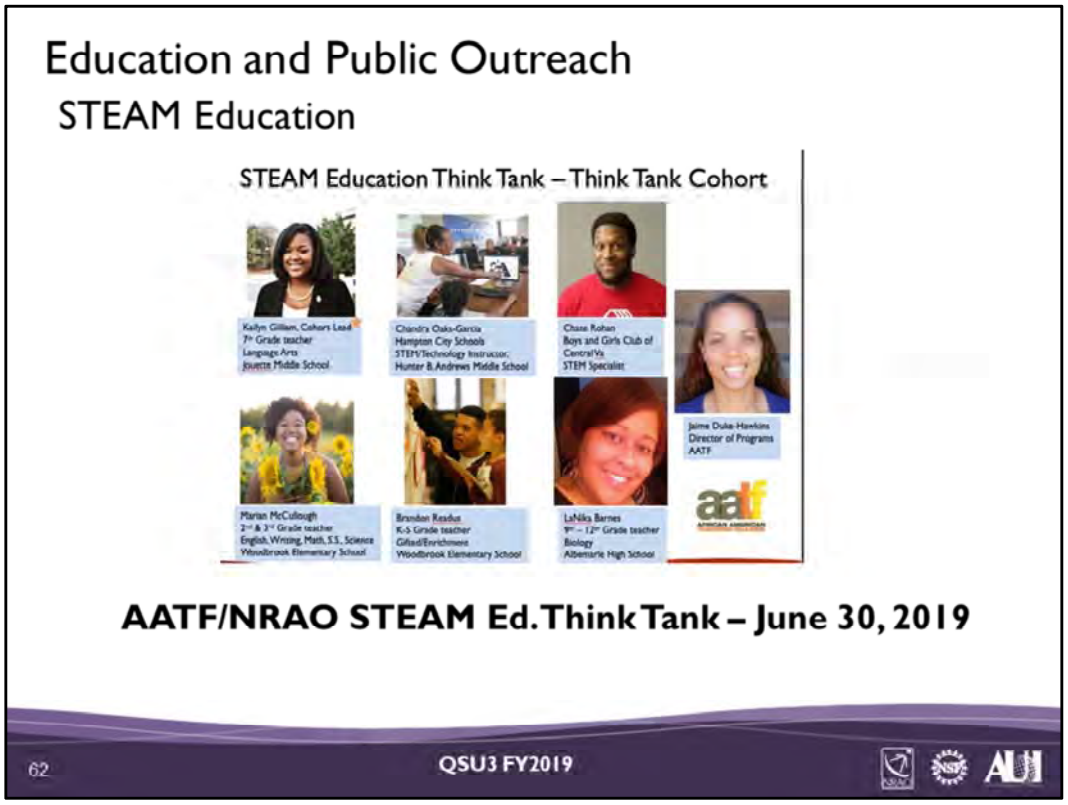
The free event in Washington, D.C. was organized by Dr. Donald Lubowich, Coordinator of Astronomy Outreach at Hofstra University. The Astronomy Festival on the National Mall (AFNM) featured solar, optical, and radio telescope observations; hands-on activities, demonstrations, hand-outs, posters, banners, and videos; a planetarium show under a 25-foot blow-up dome, and a chance for visitors to mingle with astronomers.

This year the *Astronomy Festival on the National Mall* was presented in association with the Smithsonian *Solstice Saturday* events. The National Air and Space Museum and the Smithsonian Museums were open until midnight featuring free parties, programs, and performances.

STEAM Ed. staff was able to give out about 400 postcards between Crab Nebula and ngVLA artist impressions.
Link to event: https://www.hofstra.edu/academics/colleges/hclas/physic/physic-nationalmall.html

Socorro Public Library's Summer Reading Program – June 26, 2019

STEAM Ed. staff led a one-hour afternoon program for the Socorro Public Library's Summer Reading Program on June 26, showing the attending visitors the Visitor Center's 23-minute VLA documentary, our red-and-blue-glasses demonstration, and the various features on the Explore page of our NRAO public website. A total of two visitors participated in the Reading Program.

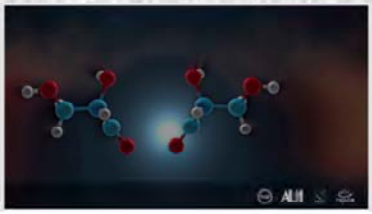


The African American Teaching Fellows (AATF) and NRAO STEAM Education Think Tank completed their eight-month Think Tank Cohort on June 30, 2019. The Think Tank created 20 cross-curriculum scaffolded lesson plans which are tied to Virginia Standards of Learning (SOLs) and Common Core. These lesson plans were scaffolded to elementary, middle, and high school students.

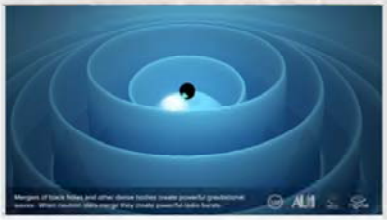
Education and Public Outreach

Multimedia Group

Cosmic Origins of Life: ngVLA Key Science Goal 2



Black Holes & Neutron Stars: ngVLA Key Science Goal 5

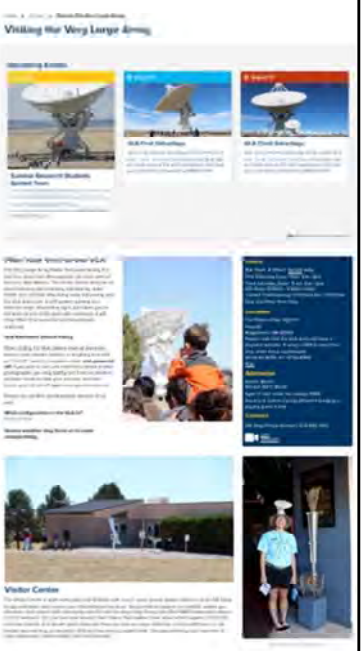


https://ngvla.nrao.edu/video/ksg2
https://ngvla.nrao.edu/video/ksg5

Education and Public Outreach

Multimedia Group

- More people
- Better driving directions
- Link to Configurations



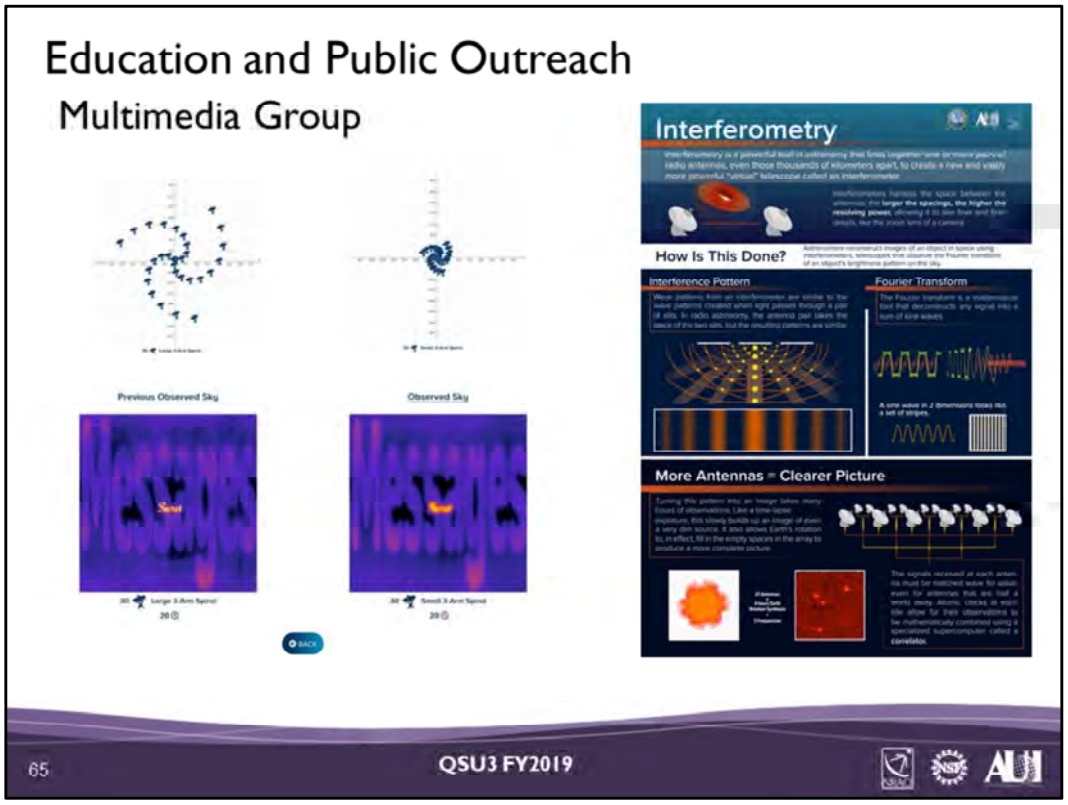
Want to see a different configuration?

Try clicking on any configuration in the list to see how the antenna locations change. Note how the scale changes with each configuration. You can then zoom and pan to explore the array.

The VLA Configuration

2019 Feb 20 - 2019 Jul 7

Semester	Observing Period	Configuration
2021A	2021 Jun 10 - 2021 Sep 06*	C
2021A	2021 Mar 05 - 2021 May 31*	D
2020B	2020 Nov 06 - 2021 Feb 15*	A
–	2020 Oct 09 - 2020 Oct 26*	BnA
2020A	2020 May 27 - 2020 Oct 05*	B
2020A	2020 Feb 13 - 2020 May 11*	C
2019B	2019 Nov 15 - 2020 Feb 03*	D
2019A	2019 Aug 2 - 2019 Oct 28*	A
–	2019 Jul 5 - 2019 Jul 22*	BnA
2019A	2019 Feb 20 - 2019 Jul 7	B
2018B	2018 Nov 19 - 2019 Feb 04	C
2018A	2018 Aug 31 - 2018 Nov 13	D
2018A	2018 Mar 02 - 2018 Jun 11	A
–	2018 Feb 02 - 2018 Feb 16	BnA



The multimedia group tackled the subject of interferometry on our website. We created a gif for the News Room section of the EHT release. There's an app that we've been working on with Urvashi in Socorro, where you can build your own array, add dishes, spread them out or gather them together to see how it affects your resolution and sensitivity. https://public.nrao.edu/interferometry-explained/

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

The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.