



16049 - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Cycle: 27, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) BORISOV	COS/FUV COS/NUV	2	02-Jan-2020 13:00:17.0	yes
02	(1) BORISOV	COS/FUV COS/NUV	2	02-Jan-2020 13:00:19.0	yes
03	(1) BORISOV	COS/FUV COS/NUV	2	02-Jan-2020 13:00:21.0	yes

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
04	(1) BORISOV	COS/FUV COS/NUV	2	02-Jan-2020 13:00:22.0	yes
05	(1) BORISOV	COS/FUV COS/NUV	2	02-Jan-2020 13:00:24.0	yes
06	(1) BORISOV	COS/FUV COS/NUV	2	02-Jan-2020 13:00:26.0	yes
07	(1) BORISOV	COS/FUV COS/NUV	2	02-Jan-2020 13:00:27.0	yes
08	(1) BORISOV	COS/FUV COS/NUV	1	02-Jan-2020 13:00:29.0	yes
11	(2) BORISOV-JPL49	COS/FUV COS/NUV	1	02-Jan-2020 13:00:29.0	yes
12	(2) BORISOV-JPL49	COS/FUV COS/NUV	1	02-Jan-2020 13:00:30.0	yes
13	(3) BORISOV-JPL50	COS/FUV COS/NUV	2	02-Jan-2020 13:00:32.0	yes
14	(3) BORISOV-JPL50	COS/FUV COS/NUV	1	02-Jan-2020 13:00:32.0	yes

20 Total Orbits Used

ABSTRACT

Interstellar comets provide a unique opportunity to sample the physical and chemical properties of small bodies from other planetary systems and to contextualize the formation and evolution of our solar system. We request HST/COS observations of interstellar object 2I/Borisov to determine what volatiles drive its activity and to characterize its chemical composition of volatiles (C, S, CO). We request time through the HST Cycle 27 Midcycle because this object had not been discovered at the time of the regular Cycle 27 deadline, and it is anticipated to be too faint to be observed in Cycle 28.

OBSERVING DESCRIPTION

1. Overall observational strategy

We plan to observe the target in one single instrument setting G140L 800 A mode. The FOV will be centered at the comet. Therefore, we will use almost the same observing sequence for all the visits.

The sequence in each orbit is:

ACQ/SEARCH with 2x2 mosaic in NUV MIRROR A with PSA setting, 30 s exposure

ACQ/IMAGE in NUV MIRROR A with PSA setting, 30 s exposure

G140L FP-POS# 1860 s

G140L FP-POS# 2300 s

ACQ/IMAGE in NUV MIRROR A with PSA setting, 30 s exposure

We will alternate the FP positions to cycle through all four FP-POS. The first 6 visits will cycle through the three FP-POS times. The 7th visit cycle FP-POS=1 and FP-POS=2. The last visit contains only one orbit, splitting the spectroscopy time into two for FP-POS=3 and 4, and the last ACQ/IMAGE is removed to save science time. The exposure time is based on COS ETC (run # COS.ta.1390955, COS.sp.1390967, COS.sp.1390973).

The total exposure times in FP-POS=1 and 2 are 8200 s, and those in FP-POS=3 and 4 are 6770 s. The total exposure time in all FP-POS is about 30,000 s.

2. Comet position uncertainty and acquisition:

All this is based on having astrometry at 0.1" every five days from today to December 8, which I think is a reasonable assumption.

Assuming continuous collection of astrometric data of 2I every five days from now to December 8 with 0.1" astrometry uncertainty, we expect a 3-sigma uncertainty range of 1.5" in mid-December. We plan to use the 2x2 ACQ/SEARCH pattern, covering a box of 4" on the side to cover the

predicted region of the target with some margin.

3. Constraints

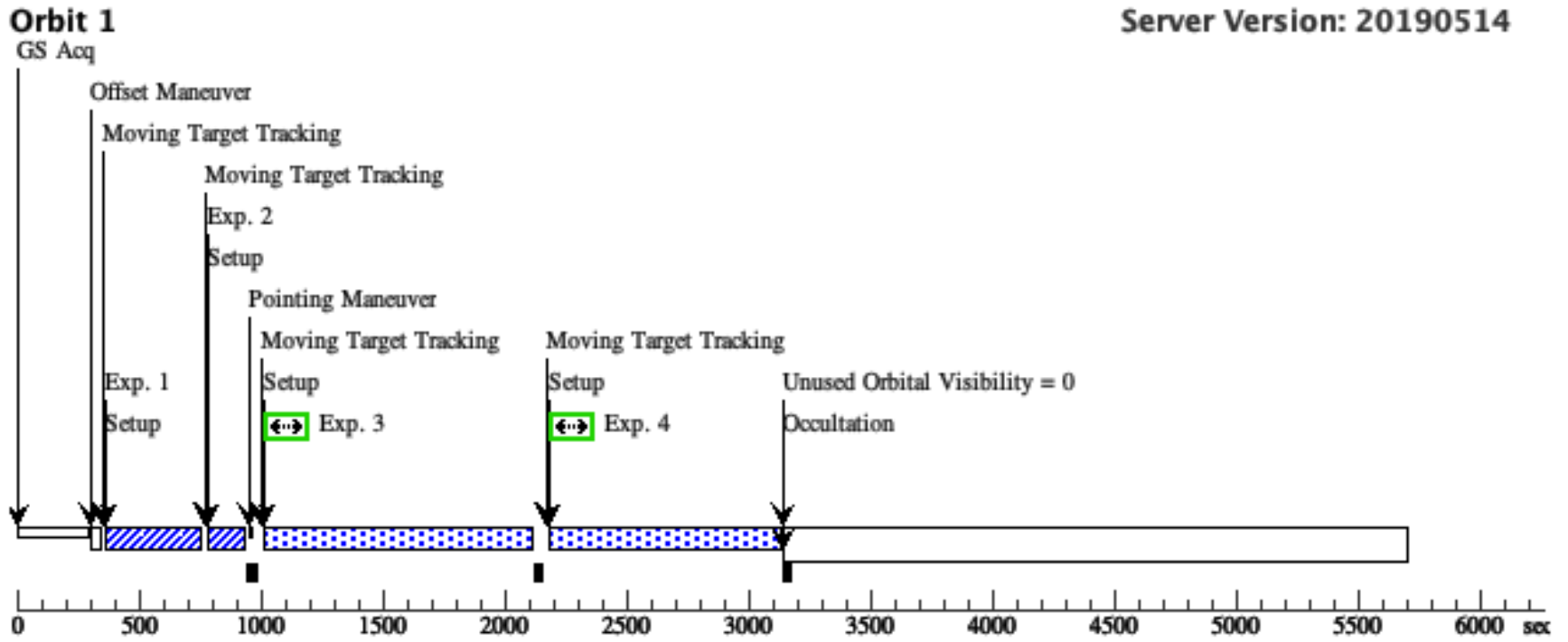
The observations should be scheduled close to the maximum brightness of the comet, expected to be around its perigee in December 10 and 29. The predicted total magnitude of the comet is about 16.2.

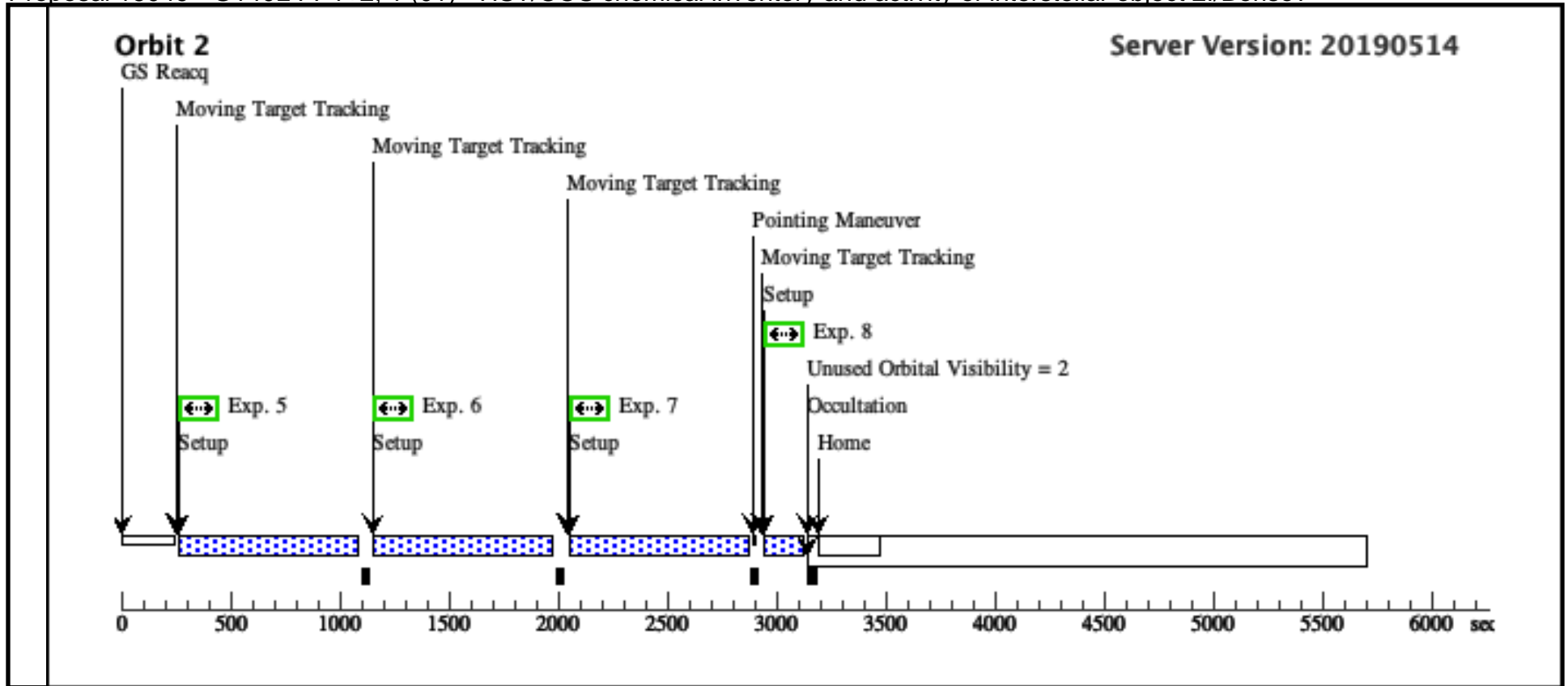
Proposal 16049 - G140L FP1+2, 1 (01) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:33 GMT 2020

Visit	Proposal 16049, G140L FP1+2, 1 (01), completed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 29-DEC-2019:00:00:00																																																																																																			
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Orbit Structure



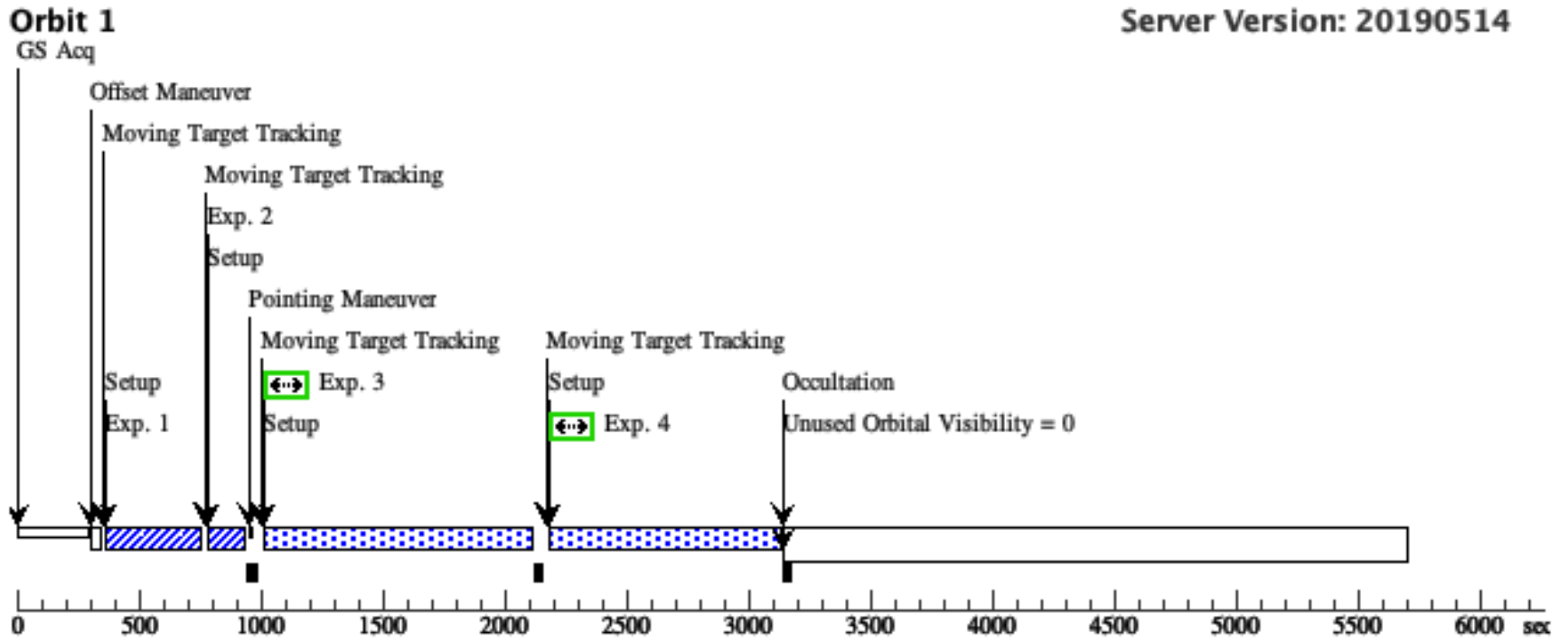


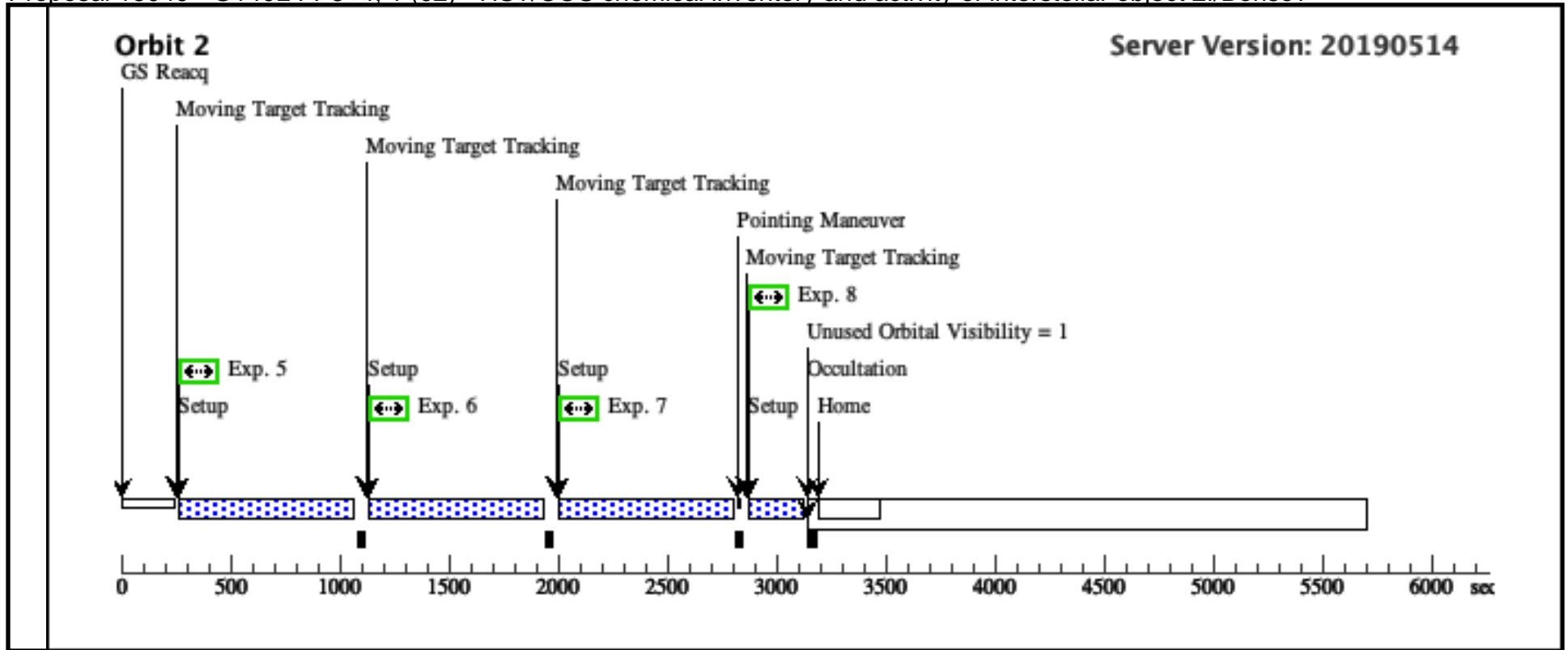
Proposal 16049 - G140L FP3+4, 1 (02) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:33 GMT 2020

Visit	Proposal 16049, G140L FP3+4, 1 (02), failed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 29-DEC-2019:00:00:00																																																																																																			
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	2	ACQ IMAGE (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR VISIT2	Sequence 1-4 Non-Int in G140L FP3+4, 1 (02)	30 Secs (30 Secs) [==>]	[1]																																																																																										
	3	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=6000	REQ EPHEM CORR VISIT2	Sequence 1-4 Non-Int in G140L FP3+4, 1 (02)	897 Secs (897 Secs) [==>]	[1]																																																																																										
	4	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=6000	REQ EPHEM CORR VISIT2	Sequence 1-4 Non-Int in G140L FP3+4, 1 (02)	897 Secs (897 Secs) [==>]	[1]																																																																																										
	5	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=6000	REQ EPHEM CORR VISIT2	Sequence 5-8 Non-Int in G140L FP3+4, 1 (02)	748 Secs (748 Secs) [==>]	[2]																																																																																										
	6	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=6000	REQ EPHEM CORR VISIT2	Sequence 5-8 Non-Int in G140L FP3+4, 1 (02)	748 Secs (748 Secs) [==>]	[2]																																																																																										
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Orbit Structure



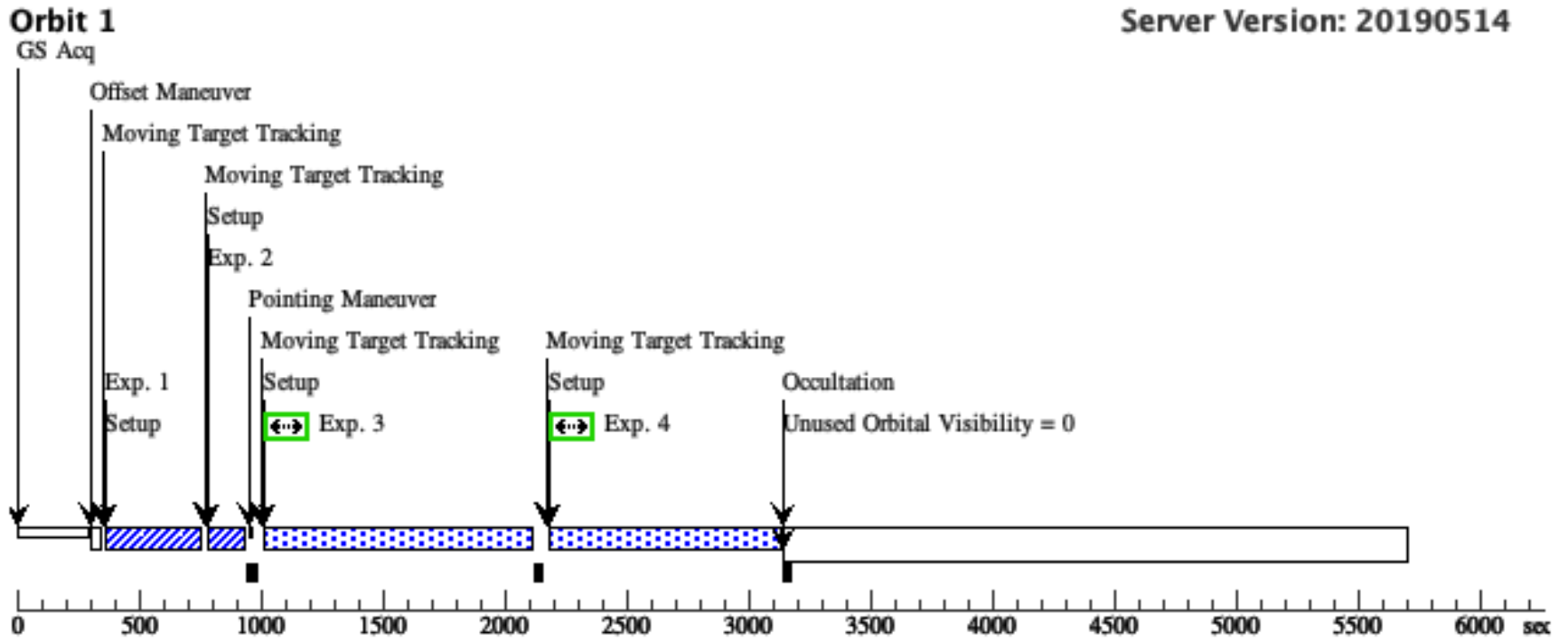


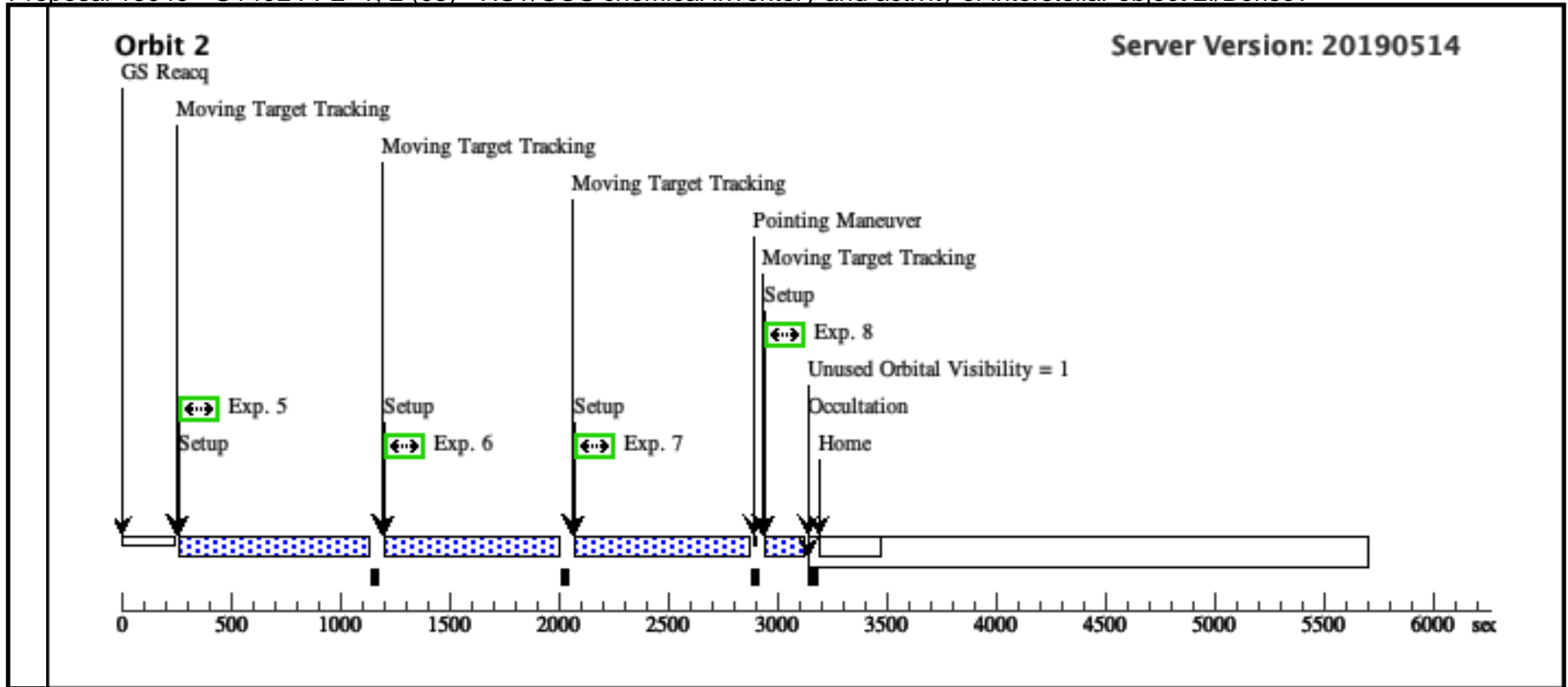
Proposal 16049 - G140L FP2+1, 2 (03) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:33 GMT 2020

Visit	Proposal 16049, G140L FP2+1, 2 (03), completed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 29-DEC-2019:00:00:00									
	Diagnostics	(G140L FP2+1, 2 (03)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (G140L (03.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (03.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (03.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (03.006)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (03.007)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.								
Solar System Targets		#	Name	Level 1	Level 2	Level 3	Window	Ephem Center		
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<i>Comments: Description=Interstella object I2/Borisov Extended=YES Ephemeris Uncertainty: 5 Secs</i>										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ SEARTH (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=2	REQ EPHEM CORR VISIT3; GS ACQ SCENARIO ONEB1BE	Sequence 1-4 Non-Int in G140L FP2+1, 2 (03)	30 Secs (30 Secs) [==>]	[1]
	2	ACQ IMAG E (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR VISIT3	Sequence 1-4 Non-Int in G140L FP2+1, 2 (03)	30 Secs (30 Secs) [==>]	[1]
	3	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=2; BUFFER-TIME=6000	REQ EPHEM CORR VISIT3	Sequence 1-4 Non-Int in G140L FP2+1, 2 (03)	897 Secs (897 Secs) [==>]	[1]
	4	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=2; BUFFER-TIME=6000	REQ EPHEM CORR VISIT3	Sequence 1-4 Non-Int in G140L FP2+1, 2 (03)	897 Secs (897 Secs) [==>]	[1]
	5	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=1; BUFFER-TIME=6000	REQ EPHEM CORR VISIT3	Sequence 5-8 Non-Int in G140L FP2+1, 2 (03)	748 Secs (748 Secs) [==>]	[2]
	6	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=1; BUFFER-TIME=6000	REQ EPHEM CORR VISIT3	Sequence 5-8 Non-Int in G140L FP2+1, 2 (03)	748 Secs (748 Secs) [==>]	[2]
	7	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=1; BUFFER-TIME=6000	REQ EPHEM CORR VISIT3	Sequence 5-8 Non-Int in G140L FP2+1, 2 (03)	748 Secs (748 Secs) [==>]	[2]
	8	NUV IMAG E (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACCUM, PSA	MIRRORA		REQ EPHEM CORR VISIT3	Sequence 5-8 Non-Int in G140L FP2+1, 2 (03)	30 Secs (30 Secs) [==>]	[2]

Orbit Structure



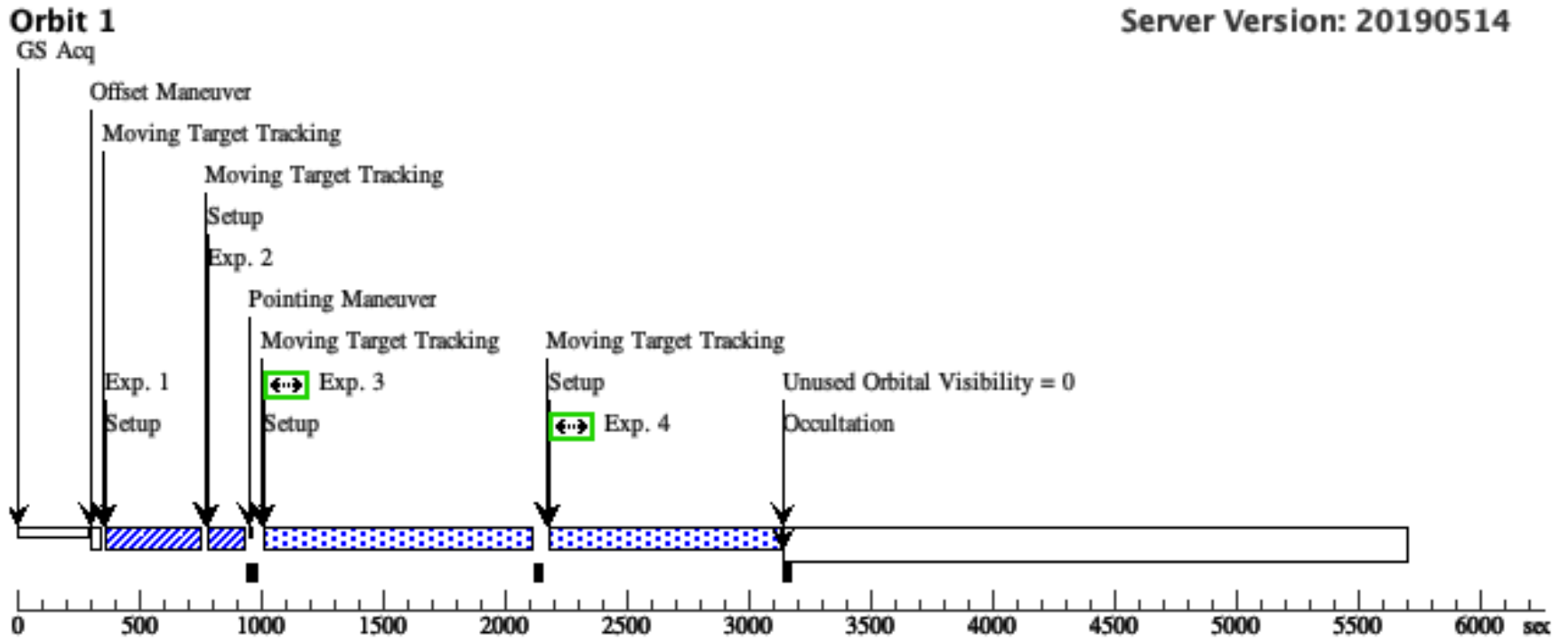


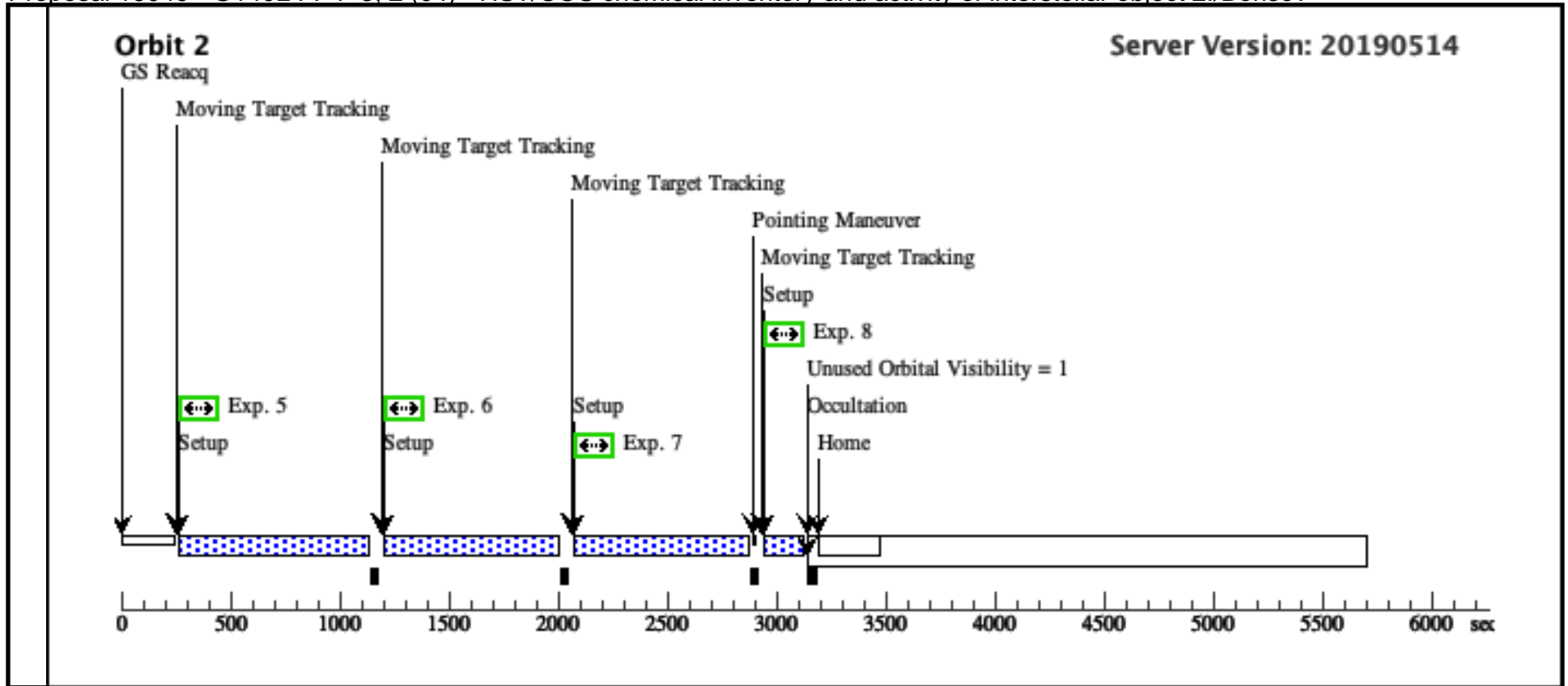
Proposal 16049 - G140L FP4+3, 2 (04) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:33 GMT 2020

Visit	Proposal 16049, G140L FP4+3, 2 (04), scheduling Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 29-DEC-2019:00:00:00																																																																																																			
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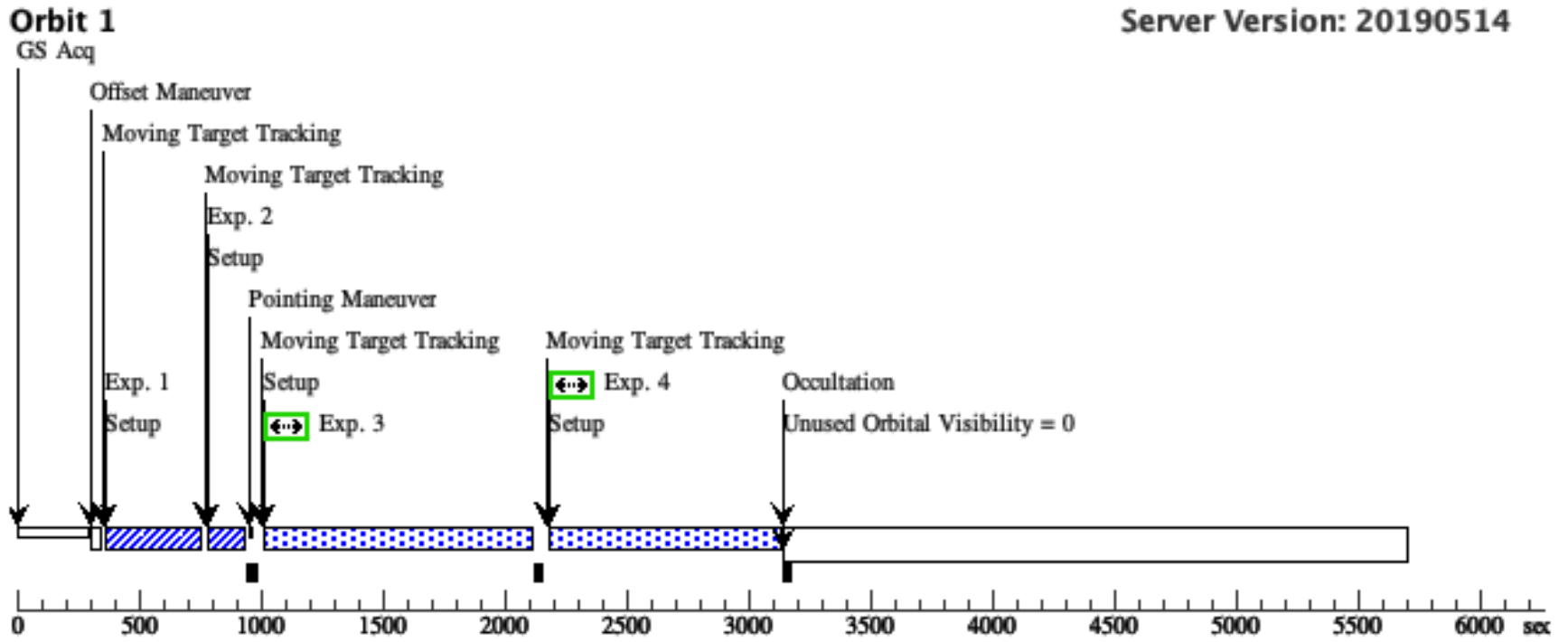


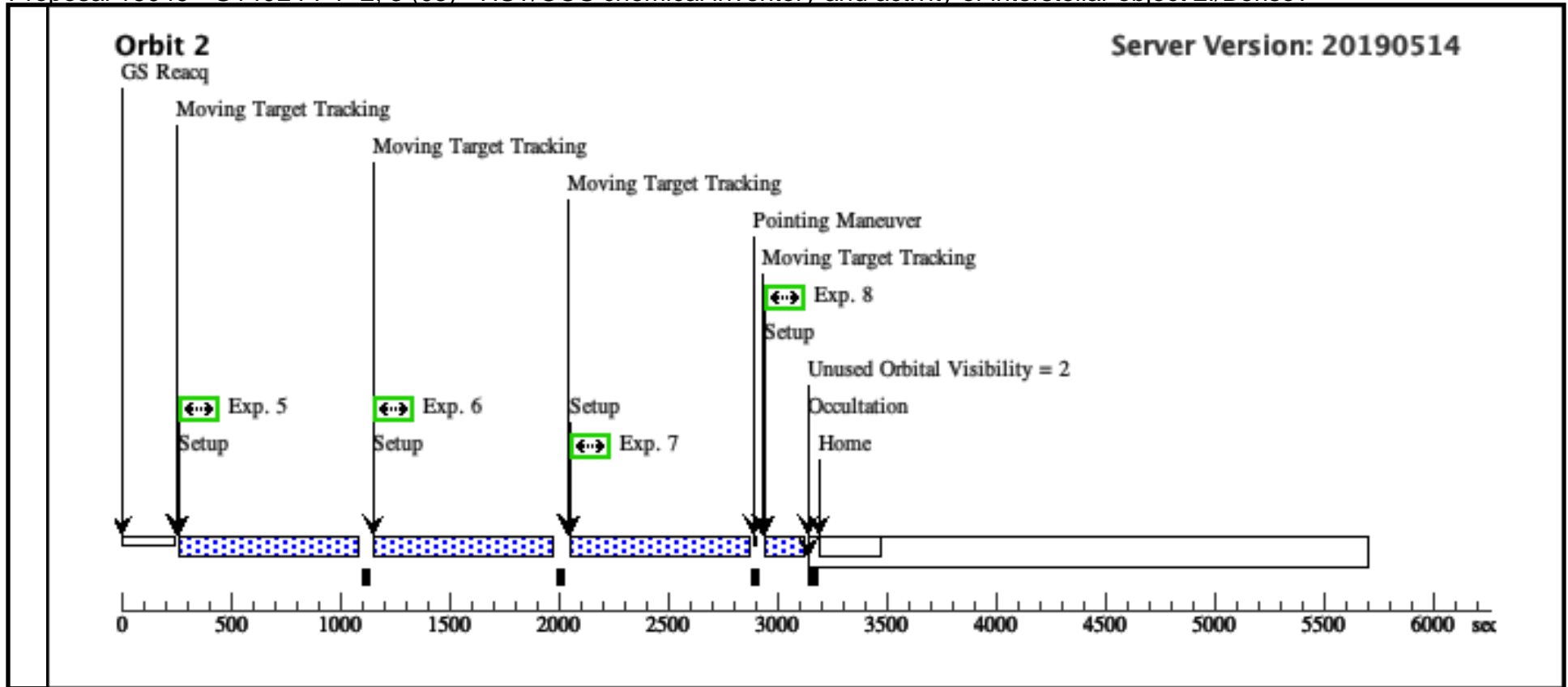
Proposal 16049 - G140L FP1+2, 3 (05) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:34 GMT 2020

Visit	Proposal 16049, G140L FP1+2, 3 (05), completed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 29-DEC-2019:00:00:00																																																																																																			
	Diagnostics	(G140L (05.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (05.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (05.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (05.006)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (05.007)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.																																																																																																		
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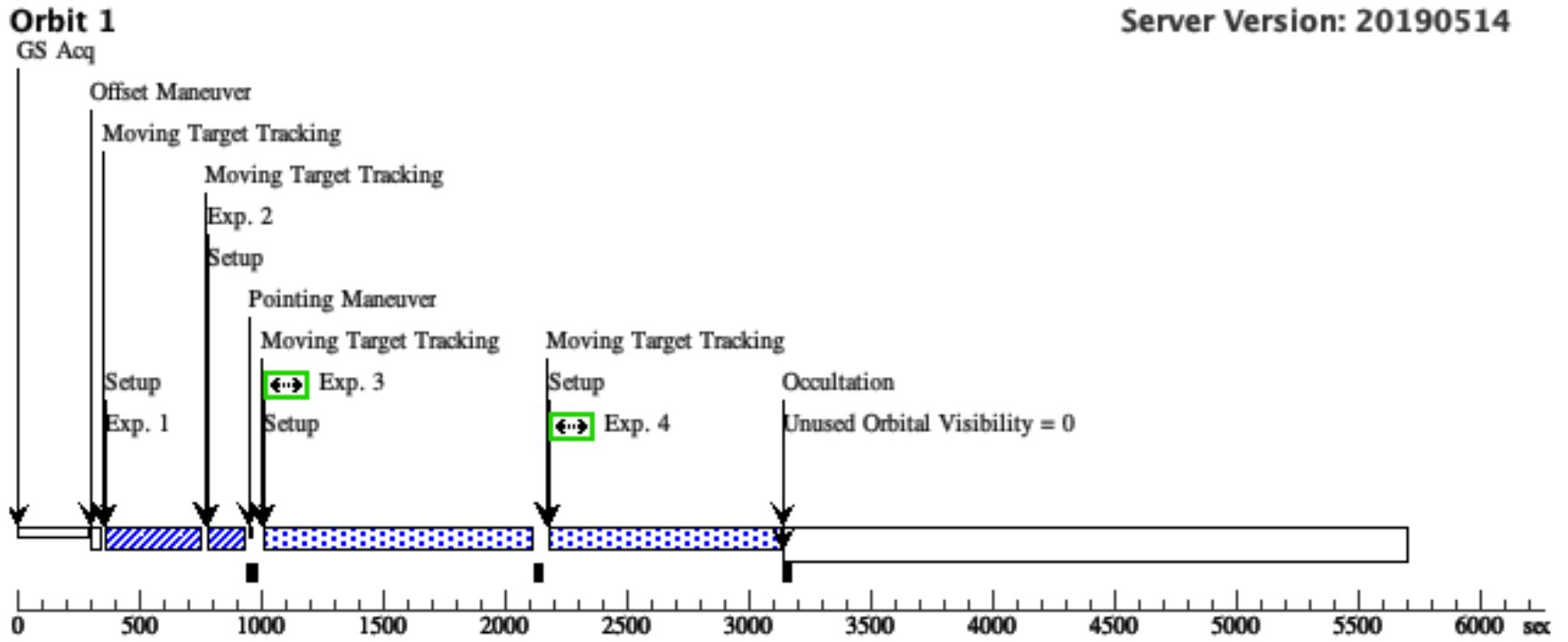
Proposal 16049 - G140L FP3+4, 3 (06) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

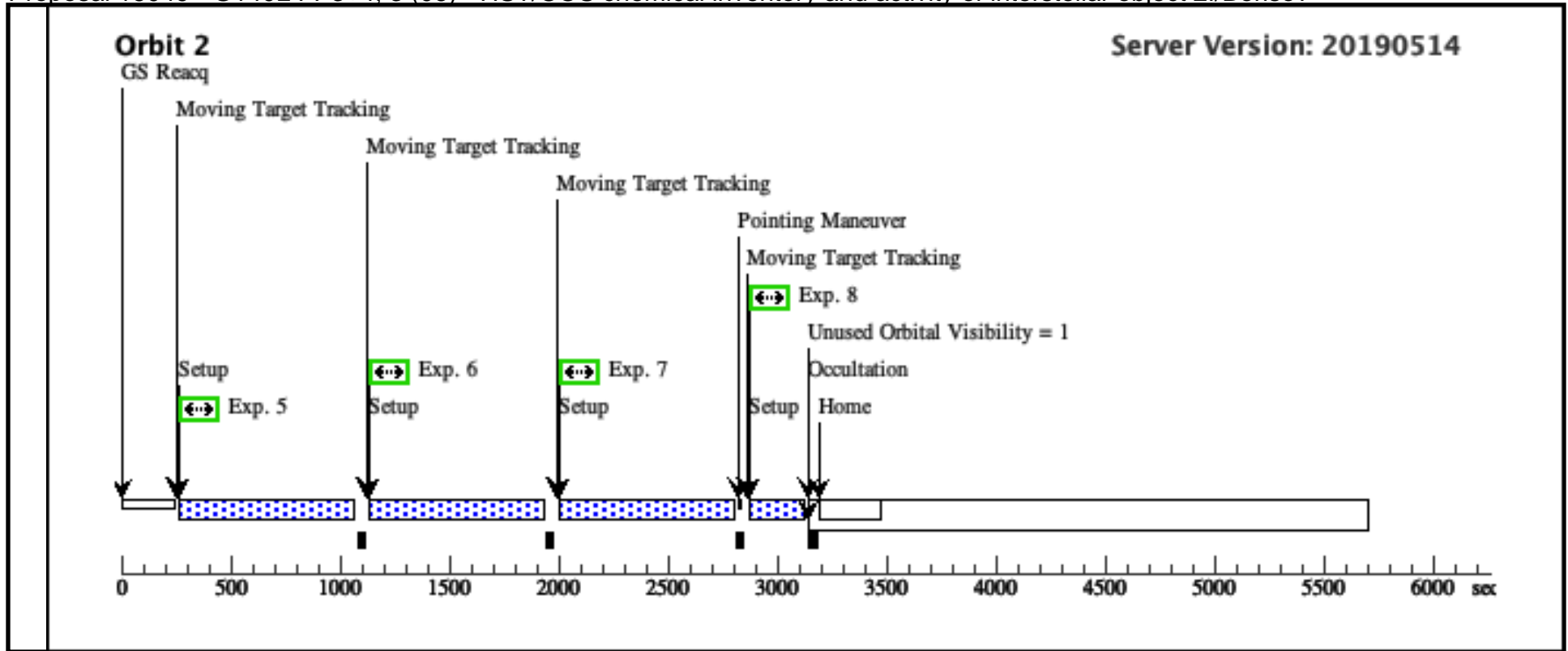
Thu Jan 02 18:00:34 GMT 2020

Visit	Proposal 16049, G140L FP3+4, 3 (06), completed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 29-DEC-2019:00:00:00																																																																																																			
	Diagnostics	(G140L (06.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (06.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (06.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (06.006)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (06.007)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.																																																																																																		
Solar System Targets		<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Level 1</th> <th>Level 2</th> <th>Level 3</th> <th>Window</th> <th>Ephem Center</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>BORISOV</td> <td>TYPE=COMET,Q=2.006657665923882,E=3.357489728570803,I=44.05175011952899,O=308.1488660165818,W=209.1176753018978,T=08-DEC-2019:13:03:07,TimeScale=TDB,EQUINOX=J2000,EPOCH=20-DEC-2019:00:00:00,EpochTimeScale=TDB,A1=3.370896981802429E-7,A2=2.36036798661903E-7,A3=0</td> <td></td> <td></td> <td></td> <td>EARTH</td> </tr> <tr> <td colspan="7"> <i>Comments: Description=Interstella object I2/Borisov Extended=YES Ephemeris Uncertainty: 5 Secs</i> </td> </tr> </tbody> </table>										#	Name	Level 1	Level 2	Level 3	Window	Ephem Center	(1)	BORISOV	TYPE=COMET,Q=2.006657665923882,E=3.357489728570803,I=44.05175011952899,O=308.1488660165818,W=209.1176753018978,T=08-DEC-2019:13:03:07,TimeScale=TDB,EQUINOX=J2000,EPOCH=20-DEC-2019:00:00:00,EpochTimeScale=TDB,A1=3.370896981802429E-7,A2=2.36036798661903E-7,A3=0				EARTH	<i>Comments: Description=Interstella object I2/Borisov Extended=YES Ephemeris Uncertainty: 5 Secs</i>																																																																										
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	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit																																																																																										
	1	ACQ SEAR TH (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=2	REQ EPHEM CORR VISIT6; GS ACQ SCENARIO ONEB1BE	Sequence 1-4 Non-Int in G140L FP3+4, 3 (06)	30 Secs (30 Secs) [==>]	[1]																																																																																										
	2	ACQ IMAGE (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR VISIT6	Sequence 1-4 Non-Int in G140L FP3+4, 3 (06)	30 Secs (30 Secs) [==>]	[1]																																																																																										
	3	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=6000	REQ EPHEM CORR VISIT6	Sequence 1-4 Non-Int in G140L FP3+4, 3 (06)	897 Secs (897 Secs) [==>]	[1]																																																																																										
	4	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=6000	REQ EPHEM CORR VISIT6	Sequence 1-4 Non-Int in G140L FP3+4, 3 (06)	897 Secs (897 Secs) [==>]	[1]																																																																																										
	5	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=6000	REQ EPHEM CORR VISIT6	Sequence 5-8 Non-Int in G140L FP3+4, 3 (06)	748 Secs (748 Secs) [==>]	[2]																																																																																										
	6	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=6000	REQ EPHEM CORR VISIT6	Sequence 5-8 Non-Int in G140L FP3+4, 3 (06)	748 Secs (748 Secs) [==>]	[2]																																																																																										
	7	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=6000	REQ EPHEM CORR VISIT6	Sequence 5-8 Non-Int in G140L FP3+4, 3 (06)	748 Secs (748 Secs) [==>]	[2]																																																																																										
8	NUV IMAGE (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACCUM, PSA	MIRRORA		REQ EPHEM CORR VISIT6	Sequence 5-8 Non-Int in G140L FP3+4, 3 (06)	30 Secs (30 Secs) [==>]	[2]																																																																																											

Server Version: 20190514

Orbit Structure



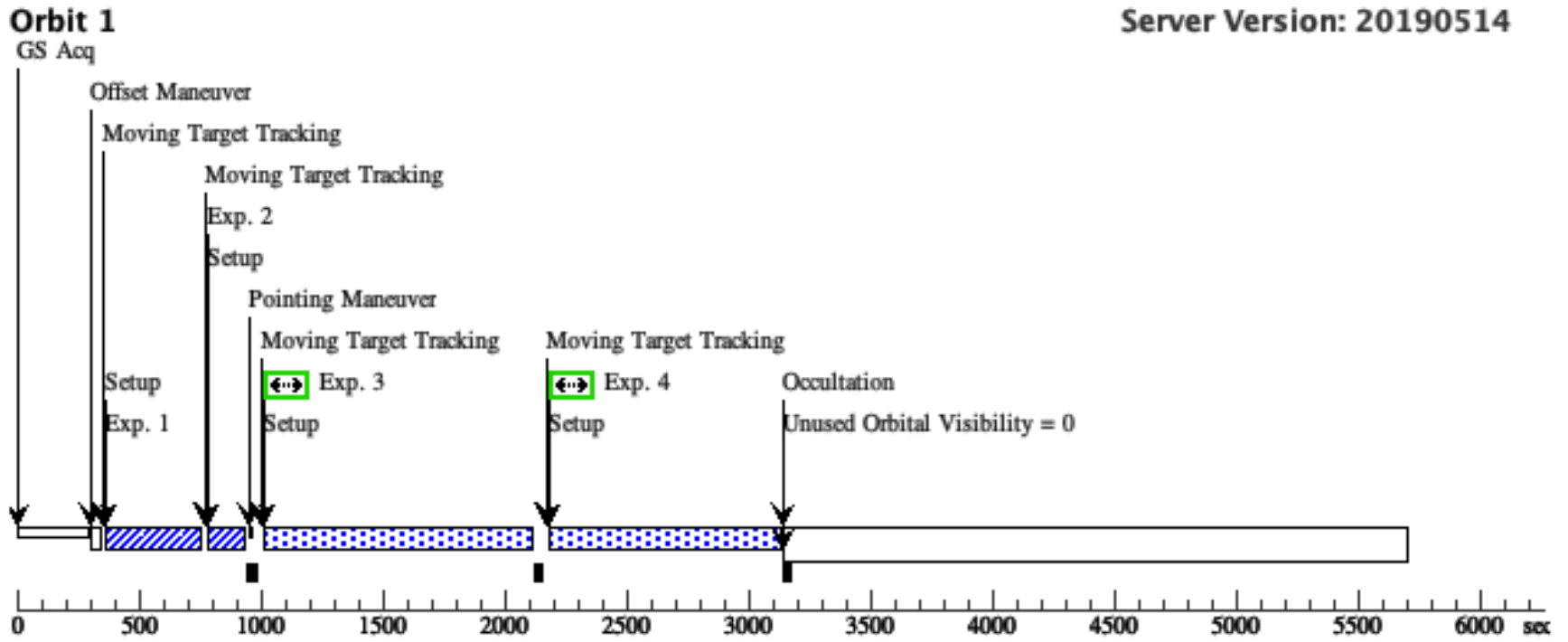


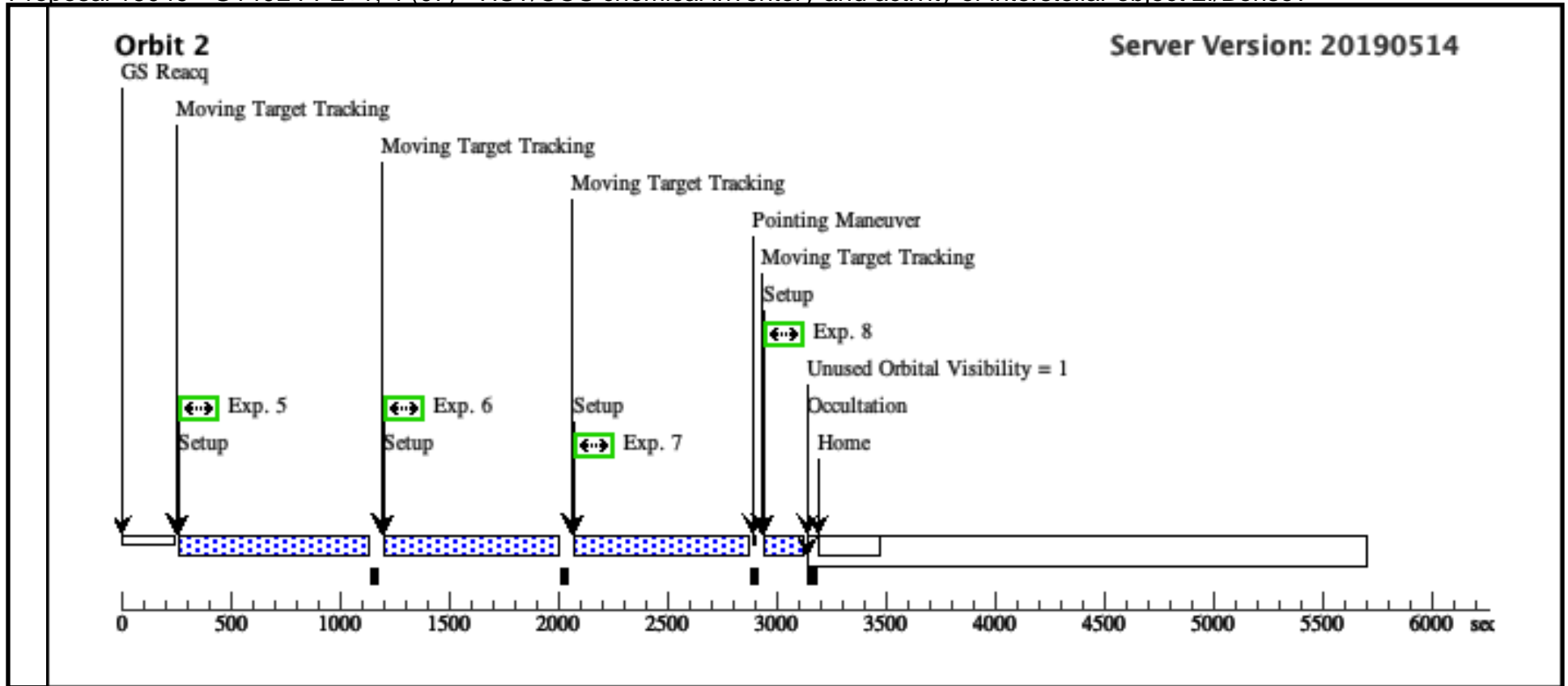
Proposal 16049 - G140L FP2+1, 4 (07) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:34 GMT 2020

Visit	Proposal 16049, G140L FP2+1, 4 (07), completed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 29-DEC-2019:00:00:00									
	Diagnostics	(G140L FP2+1, 4 (07)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (G140L (07.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (07.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (07.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (07.006)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (07.007)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.								
Solar System Targets		#	Name	Level 1	Level 2	Level 3	Window	Ephem Center		
	(1)	BORISOV	TYPE=COMET,Q=2.0066576659238 82,E=3.357489728570803,I=44.05175 011952899,O=308.1488660165818,W =209.1176753018978,T=08-DEC- 2019:13:03:07,TimeScale=TDB,EQ UINOX=J2000,EPOCH=20-DEC- 2019:00:00:00,EpochTimeScale=TDB, A1=3.370896981802429E- 7,A2=2.36036798661903E-7,A3=0					EARTH		
	<i>Comments: Description=Interstella object I2/Borisov Extended=YES Ephemeris Uncertainty: 5 Secs</i>									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ SEAR TH (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=2	REQ EPHEM CORR VISIT7; GS ACQ SCENARI O ONEB1BE	Sequence 1-4 Non-Int in G140L FP2+1, 4 (07)	30 Secs (30 Secs) [==>]	[1]
	2	ACQ IMAG E (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR VISIT7	Sequence 1-4 Non-Int in G140L FP2+1, 4 (07)	30 Secs (30 Secs) [==>]	[1]
	3	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=2; BUFFER-TIME=60 00	REQ EPHEM CORR VISIT7	Sequence 1-4 Non-Int in G140L FP2+1, 4 (07)	897 Secs (897 Secs) [==>]	[1]
	4	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=2; BUFFER-TIME=60 00	REQ EPHEM CORR VISIT7	Sequence 1-4 Non-Int in G140L FP2+1, 4 (07)	897 Secs (897 Secs) [==>]	[1]
	5	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=1; BUFFER-TIME=60 00	REQ EPHEM CORR VISIT7	Sequence 5-8 Non-Int in G140L FP2+1, 4 (07)	748 Secs (748 Secs) [==>]	[2]
	6	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=1; BUFFER-TIME=60 00	REQ EPHEM CORR VISIT7	Sequence 5-8 Non-Int in G140L FP2+1, 4 (07)	748 Secs (748 Secs) [==>]	[2]
	7	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=1; BUFFER-TIME=60 00	REQ EPHEM CORR VISIT7	Sequence 5-8 Non-Int in G140L FP2+1, 4 (07)	748 Secs (748 Secs) [==>]	[2]
	8	NUV IMAG E (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACCUM, PSA	MIRRORA		REQ EPHEM CORR VISIT7	Sequence 5-8 Non-Int in G140L FP2+1, 4 (07)	30 Secs (30 Secs) [==>]	[2]

Orbit Structure

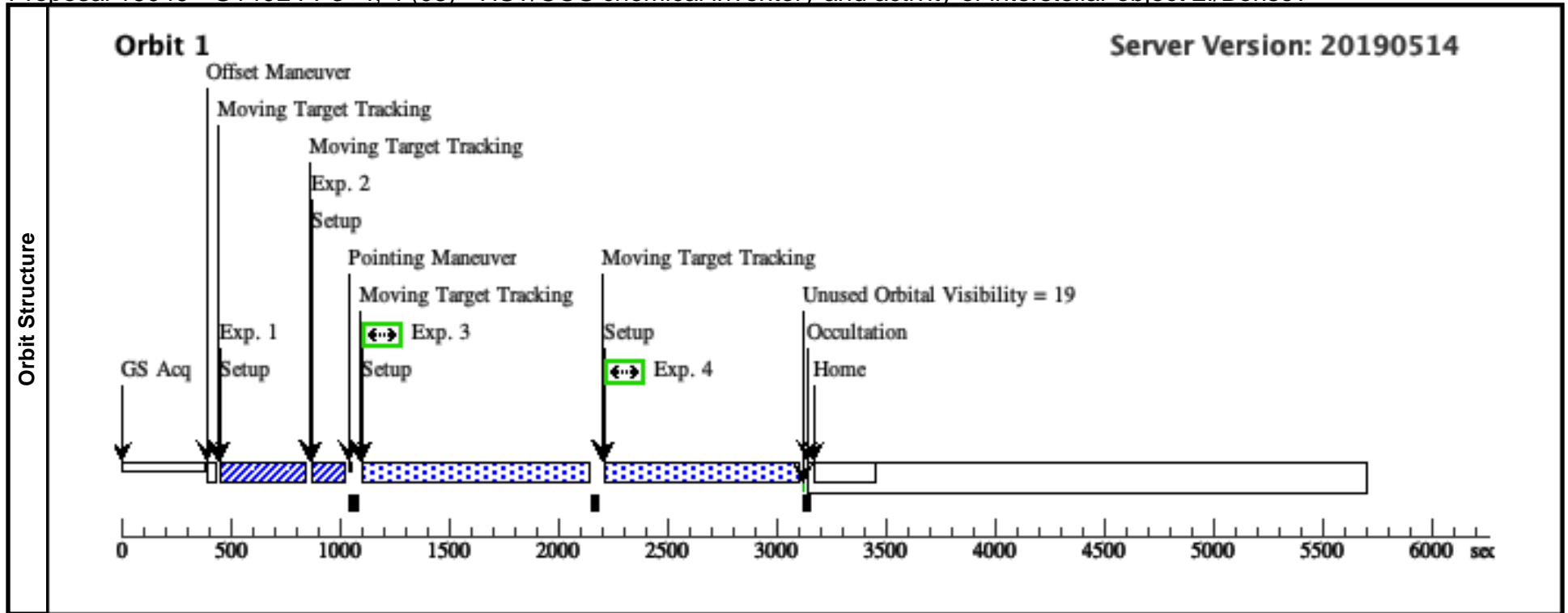




Proposal 16049 - G140L FP3+4, 4 (08) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:34 GMT 2020

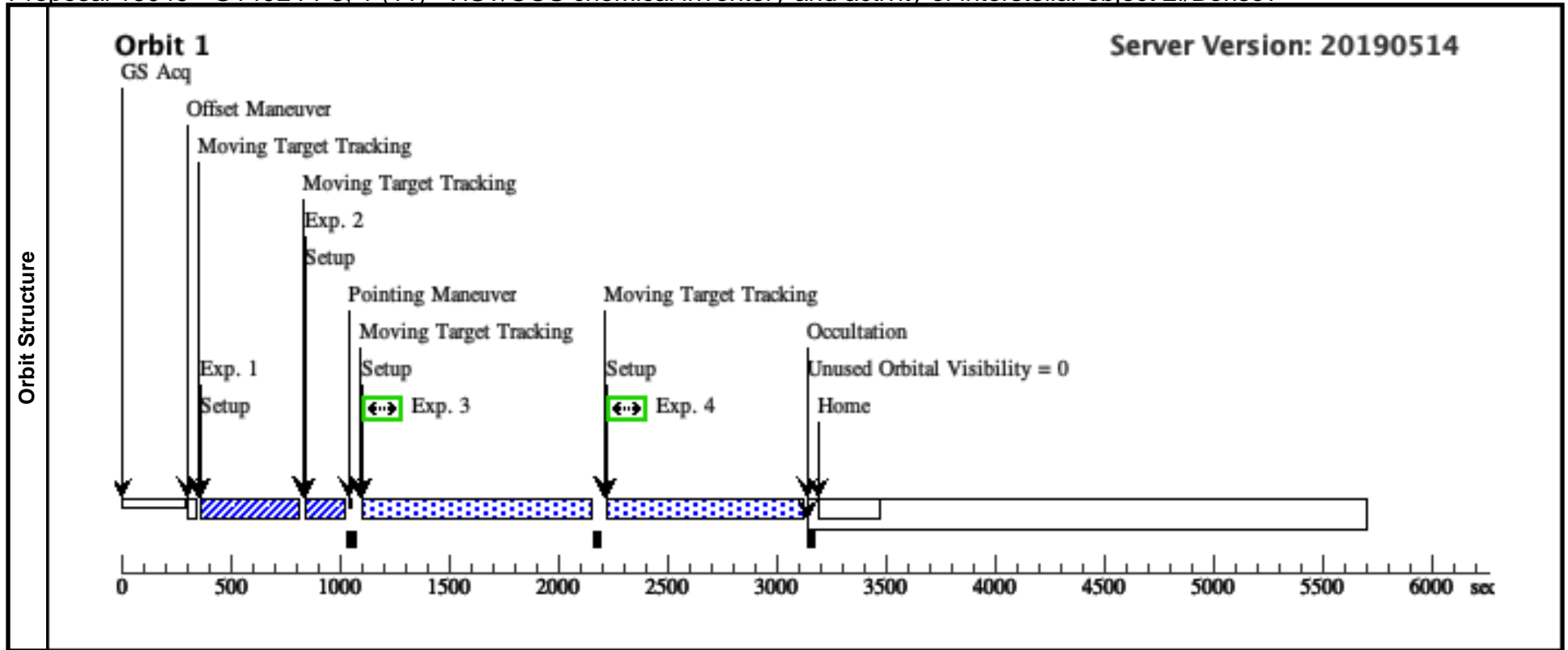
Visit	Proposal 16049, G140L FP3+4, 4 (08), completed Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 29-DEC-2019:00:00:00									
	Diagnostics	(G140L (08.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (08.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.								
Solar System Targets		#	Name	Level 1	Level 2	Level 3	Window	Ephem Center		
		(1)	BORISOV	TYPE=COMET,Q=2.0066576659238 82,E=3.357489728570803,I=44.05175 011952899,O=308.1488660165818,W =209.1176753018978,T=08-DEC- 2019:13:03:07,TimeScale=TDB,EQ UINOX=J2000,EPOCH=20-DEC- 2019:00:00:00,EpochTimeScale=TDB, A1=3.370896981802429E- 7,A2=2.36036798661903E-7,A3=0				EARTH		
	<i>Comments: Description=Interstella object I2/Borisov</i> <i>Extended=YES</i> <i>Ephemeris Uncertainty: 5 Secs</i>									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ SEAR TH (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=2	REQ EPHEM CORR VISIT8	Sequence 1-4 Non-In t in G140L FP3+4, 4 (08)	30 Secs (30 Secs) [==>]	[1]
	2	ACQ IMAG E (COS.ta.139 0955)	(1) BORISOV	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR VISIT8	Sequence 1-4 Non-In t in G140L FP3+4, 4 (08)	30 Secs (30 Secs) [==>]	[1]
	3	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=60 00	REQ EPHEM CORR VISIT8	Sequence 1-4 Non-In t in G140L FP3+4, 4 (08)	840 Secs (840 Secs) [==>]	[1]
	4	G140L (COS.sp.139 0967)	(1) BORISOV	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=60 00	REQ EPHEM CORR VISIT8	Sequence 1-4 Non-In t in G140L FP3+4, 4 (08)	840 Secs (840 Secs) [==>]	[1]



Proposal 16049 - G140L FP3, 1 (11) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:34 GMT 2020

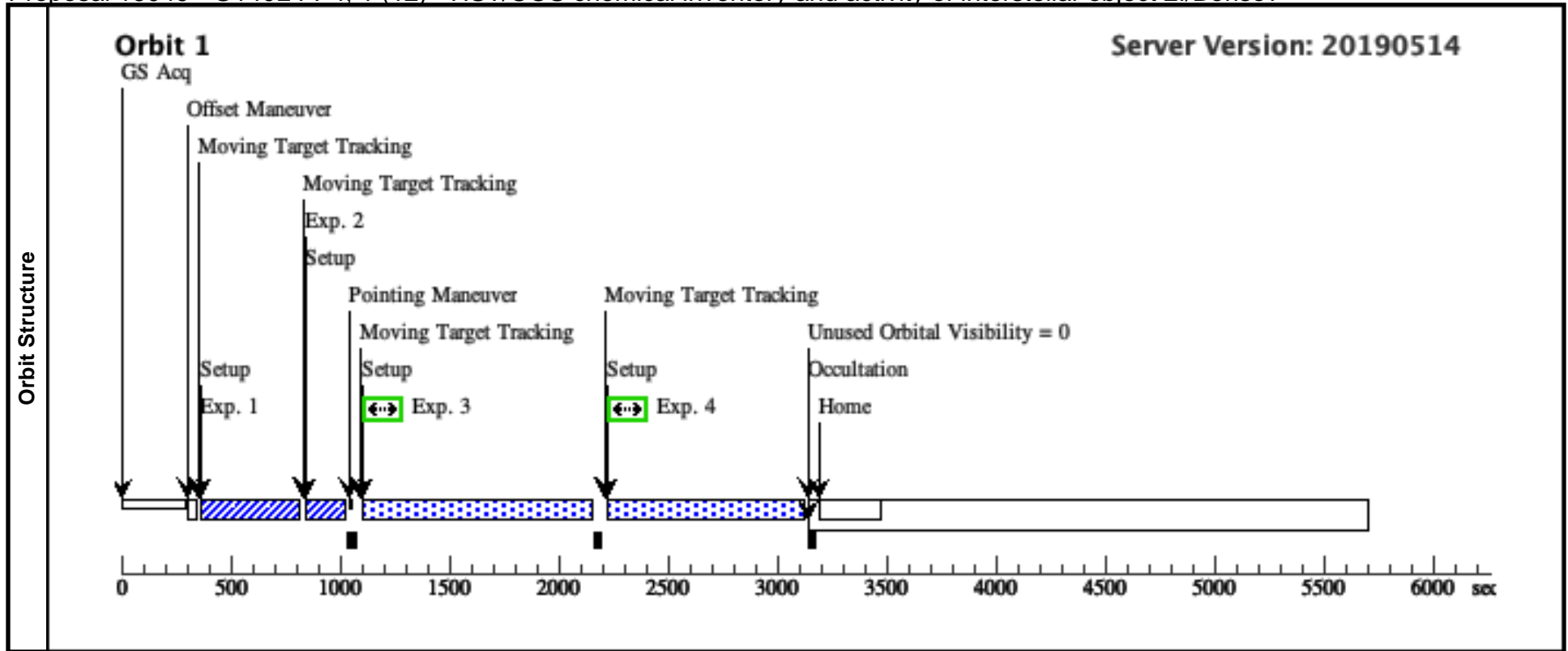
Visit	<p>Proposal 16049, G140L FP3, 1 (11), withdrawn</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: COS/FUV, COS/NUV</p> <p>Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 06-JAN-2020:00:00:00</p> <p><i>Comments: Replacement of failed Visit02, orbit 1</i></p>									
	<p>(G140L (11.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.</p> <p>(G140L (11.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.</p>									
Diagnostics										
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center			
	(2)	BORISOV-JPL49	TYPE=COMET,Q=2.0066469198896 02,E=3.357489316443313,I=44.05247 152804048,O=308.1494484383344,W =209.1223857291233,T=08-DEC- 2019:13:12:55,TTimeScale=TDB,EQ UINOX=J2000,EPOCH=20-DEC- 2019:00:00:00,EpochTimeScale=TDB, A1=2.001994872043314E- 8,A2=1.551358136462329E-7,A3=- 7.238847192588078E-8					EARTH		
<p><i>Comments: Description=Interstella object I2/Borisov</i></p> <p><i>Extended=YES</i></p> <p><i>Ephemeris Uncertainty: 4 Secs</i></p>										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ SEAR TH (COS.ta.139 0955)	(2) BORISOV-JPL4 9	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=2	REQ EPHEM CORR VISI11; GS ACQ SCENARI O ONEB1BE	Sequence 1-4 Non-In t in G140L FP3, 1 (1 1)	45 Secs (45 Secs) [==>]	[1]
	2	ACQ IMAG E (COS.ta.139 0955)	(2) BORISOV-JPL4 9	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR VISI11	Sequence 1-4 Non-In t in G140L FP3, 1 (1 1)	45 Secs (45 Secs) [==>]	[1]
	3	G140L (COS.sp.139 0967)	(2) BORISOV-JPL4 9	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=60 00	REQ EPHEM CORR VISI11	Sequence 1-4 Non-In t in G140L FP3, 1 (1 1)	852 Secs (852 Secs) [==>]	[1]
	4	G140L (COS.sp.139 0967)	(2) BORISOV-JPL4 9	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=60 00	REQ EPHEM CORR VISI11	Sequence 1-4 Non-In t in G140L FP3, 1 (1 1)	852 Secs (852 Secs) [==>]	[1]



Proposal 16049 - G140L FP4, 1 (12) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:34 GMT 2020

Visit	<p>Proposal 16049, G140L FP4, 1 (12), completed</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: COS/FUV, COS/NUV</p> <p>Special Requirements: BETWEEN 10-DEC-2019:00:00:00 AND 06-JAN-2020:00:00:00</p> <p><i>Comments: Replacement of failed Visit02, orbit 2</i></p>									
	<p>(G140L (12.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.</p> <p>(G140L (12.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.</p>									
Diagnostics										
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center			
	(2)	BORISOV-JPL49	TYPE=COMET,Q=2.0066469198896 02,E=3.357489316443313,I=44.05247 152804048,O=308.1494484383344,W =209.1223857291233,T=08-DEC- 2019:13:12:55,TimeScale=TDB,EQ UINOX=J2000,EPOCH=20-DEC- 2019:00:00:00,EpochTimeScale=TDB, A1=2.001994872043314E- 8,A2=1.551358136462329E-7,A3=- 7.238847192588078E-8					EARTH		
<p><i>Comments: Description=Interstella object I2/Borisov</i></p> <p><i>Extended=YES</i></p> <p><i>Ephemeris Uncertainty: 4 Secs</i></p>										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ SEAR TH (COS.ta.139 0955)	(2) BORISOV-JPL4 9	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=2	REQ EPHEM CORR VISI12; GS ACQ SCENARI O ONEB1BE	Sequence 1-4 Non-In t in G140L FP4, 1 (1 2)	45 Secs (45 Secs) [==>]	[1]
	2	ACQ IMAG E (COS.ta.139 0955)	(2) BORISOV-JPL4 9	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR VISI12	Sequence 1-4 Non-In t in G140L FP4, 1 (1 2)	45 Secs (45 Secs) [==>]	[1]
	3	G140L (COS.sp.139 0967)	(2) BORISOV-JPL4 9	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=60 00	REQ EPHEM CORR VISI12	Sequence 1-4 Non-In t in G140L FP4, 1 (1 2)	852 Secs (852 Secs) [==>]	[1]
	4	G140L (COS.sp.139 0967)	(2) BORISOV-JPL4 9	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=60 00	REQ EPHEM CORR VISI12	Sequence 1-4 Non-In t in G140L FP4, 1 (1 2)	852 Secs (852 Secs) [==>]	[1]

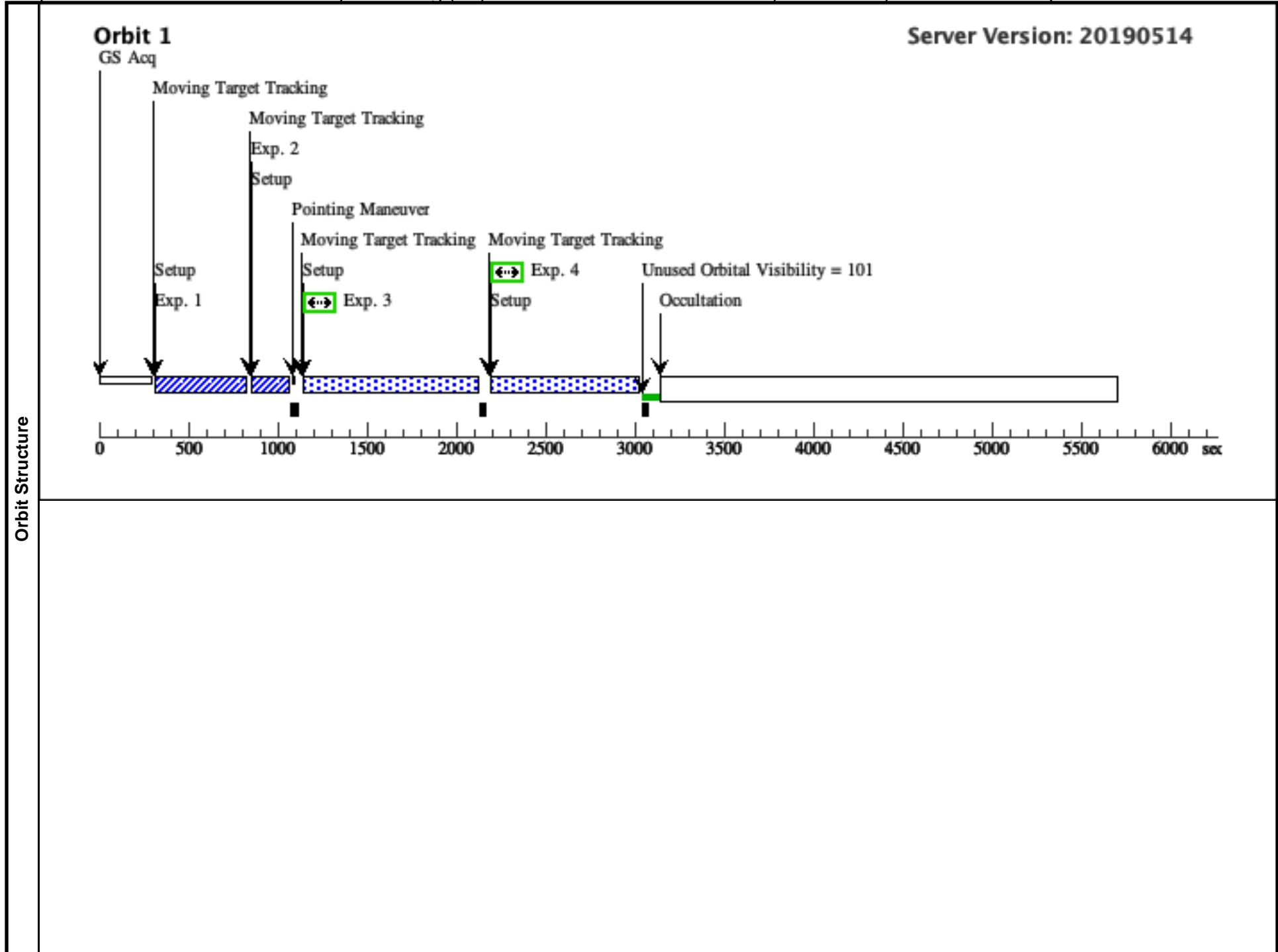


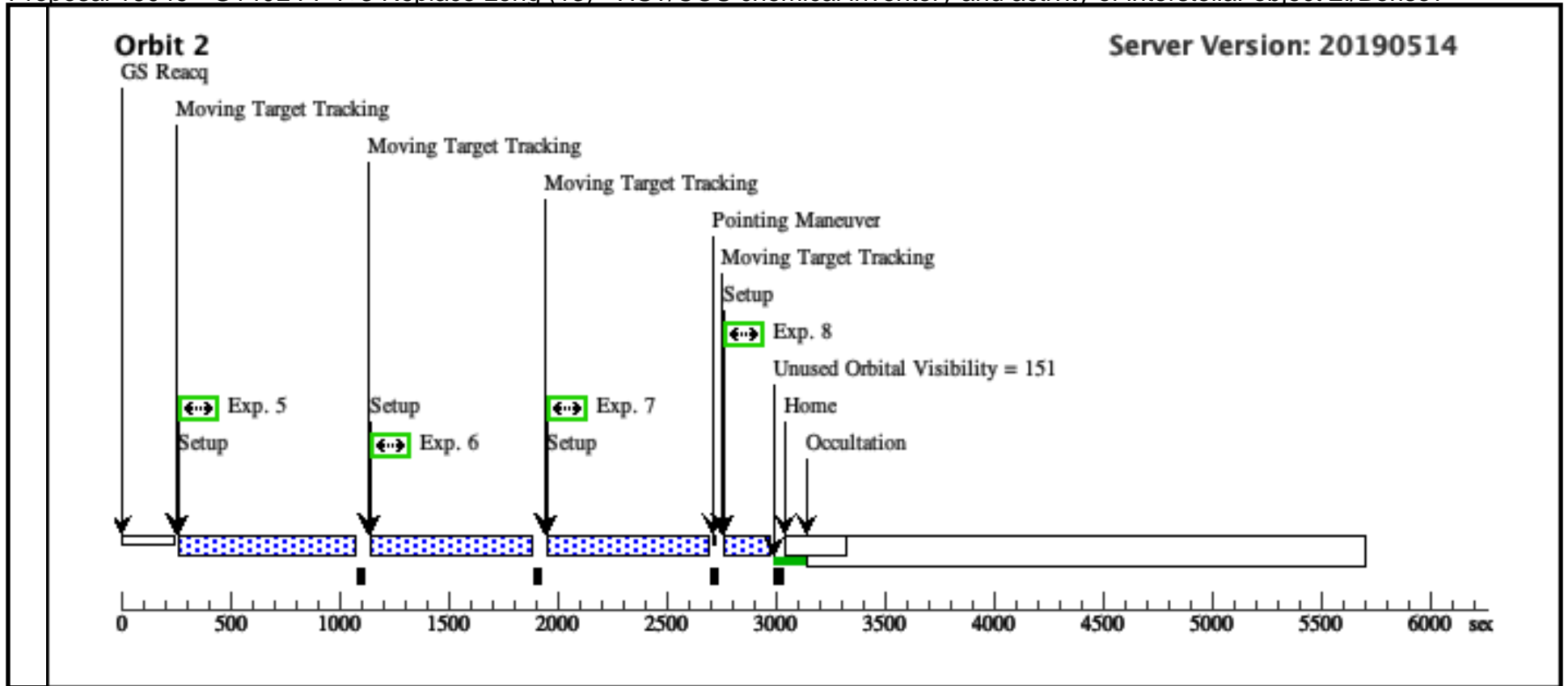
Proposal 16049 - G140L FP4+3 Replace Long (13) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Visit	Proposal 16049, G140L FP4+3 Replace Long (13), implementation Thu Jan 02 18:00:34 GMT 2020																				
	Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 13-JAN-2020:00:00:00 AND 20-JAN-2020:00:00:00 <i>Comments: Replacement for Visit 4 that was lost due to HST safing event</i>																				
Diagnostics	(G140L FP4+3 Replace Long (13)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS																				
	(G140L (13.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.																				
	(G140L (13.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.																				
	(G140L (13.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.																				
	(G140L (13.006)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.																				
	(G140L (13.007)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.																				
Solar System Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Level 1</th> <th>Level 2</th> <th>Level 3</th> <th>Window</th> <th>Ephem Center</th> </tr> </thead> <tbody> <tr> <td>(3)</td> <td>BORISOV-JPL50</td> <td colspan="3"> TYPE=COMET,Q=2.0066160399249 64,E=3.35705587897315,I=44.053519 23993201,O=308.1499849748581,W= 209.1244471001688,T=08-DEC- 2019:13:18:20,TimeScale=TDB,EQ UINOX=J2000,EPOCH=05-JAN- 2020:00:00:00,EpochTimeScale=TDB, A1=-4.515200363206737E-8,A2=- 3.231415845906202E-8,A3=- 1.177106089098949E-7 </td> <td></td> <td></td> <td>EARTH</td> </tr> </tbody> </table>	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center	(3)	BORISOV-JPL50	TYPE=COMET,Q=2.0066160399249 64,E=3.35705587897315,I=44.053519 23993201,O=308.1499849748581,W= 209.1244471001688,T=08-DEC- 2019:13:18:20,TimeScale=TDB,EQ UINOX=J2000,EPOCH=05-JAN- 2020:00:00:00,EpochTimeScale=TDB, A1=-4.515200363206737E-8,A2=- 3.231415845906202E-8,A3=- 1.177106089098949E-7					EARTH	<i>Comments: Description=Interstella object I2/Borisov</i> <i>Extended=YES</i> <i>Ephemeris Uncertainty: 2 Secs</i>				
	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center														
(3)	BORISOV-JPL50	TYPE=COMET,Q=2.0066160399249 64,E=3.35705587897315,I=44.053519 23993201,O=308.1499849748581,W= 209.1244471001688,T=08-DEC- 2019:13:18:20,TimeScale=TDB,EQ UINOX=J2000,EPOCH=05-JAN- 2020:00:00:00,EpochTimeScale=TDB, A1=-4.515200363206737E-8,A2=- 3.231415845906202E-8,A3=- 1.177106089098949E-7					EARTH														

Proposal 16049 - G140L FP4+3 Replace Long (13) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ SEAR TH (COS.ta.139 0955)	(3) BORISOV-JPL5 0	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=2	GS ACQ SCENARI O ONEB1BE	Sequence 1-4 Non-Int in G140L FP4+3 R eplace Long (13)	60 Secs (60 Secs) [==>]	[1]
	2	ACQ IMAG E (COS.ta.139 0955)	(3) BORISOV-JPL5 0	COS/NUV, ACQ/IMAGE, PSA	MIRRORA			Sequence 1-4 Non-Int in G140L FP4+3 R eplace Long (13)	60 Secs (60 Secs) [==>]	[1]
	3	G140L (COS.sp.139 0967)	(3) BORISOV-JPL5 0	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=60 00		Sequence 1-4 Non-Int in G140L FP4+3 R eplace Long (13)	782 Secs (782 Secs) [==>]	[1]
	4	G140L (COS.sp.139 0967)	(3) BORISOV-JPL5 0	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=4; BUFFER-TIME=60 00		Sequence 1-4 Non-Int in G140L FP4+3 R eplace Long (13)	782 Secs (782 Secs) [==>]	[1]
	5	G140L (COS.sp.139 0967)	(3) BORISOV-JPL5 0	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=60 00		Sequence 5-8 Non-Int in G140L FP4+3 R eplace Long (13)	689 Secs (689 Secs) [==>]	[2]
	6	G140L (COS.sp.139 0967)	(3) BORISOV-JPL5 0	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=60 00		Sequence 5-8 Non-Int in G140L FP4+3 R eplace Long (13)	689 Secs (689 Secs) [==>]	[2]
	7	G140L (COS.sp.139 0967)	(3) BORISOV-JPL5 0	COS/FUV, TIME-TAG, PSA	G140L 800 A	FP-POS=3; BUFFER-TIME=60 00		Sequence 5-8 Non-Int in G140L FP4+3 R eplace Long (13)	689 Secs (689 Secs) [==>]	[2]
	8	NUV IMAG E (COS.ta.139 0955)	(3) BORISOV-JPL5 0	COS/NUV, ACCUM, PSA	MIRRORA			Sequence 5-8 Non-Int in G140L FP4+3 R eplace Long (13)	60 Secs (60 Secs) [==>]	[2]





Proposal 16049 - G140L FP4+3 Replace Short (14) - HST/COS chemical inventory and activity of interstellar object 2I/Borisov

Thu Jan 02 18:00:34 GMT 2020

Visit	Proposal 16049, G140L FP4+3 Replace Short (14), implementation Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: BETWEEN 13-JAN-2020:00:00:00 AND 20-JAN-2020:00:00:00 <i>Comments: Replacement for Visit 4 that was lost due to HST safing event</i>																																																										
	Diagnosics (G140L FP4+3 Replace Short (14)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (G140L (14.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (G140L (14.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.																																																										
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#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit																																																		
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