



# 11650 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Binaries

Cycle: 17, Proposal Category: GO

(Availability Mode: SUPPORTED)

## INVESTIGATORS

| <i>Name</i>                       | <i>Institution</i>                | <i>E-Mail</i> |
|-----------------------------------|-----------------------------------|---------------|
| <b>Dr. William M. Grundy (PI)</b> | <b>Lowell Observatory</b>         |               |
| Dr. John A. Stansberry (CoI)      | University of Arizona             |               |
| Dr. Keith S. Noll (CoI)           | Space Telescope Science Institute |               |
| Dr. Marc W. Buie (CoI)            | Lowell Observatory                |               |
| Dr. Susan D. Kern (CoI)           | Space Telescope Science Institute |               |

## 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) 2003-QA91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:10.0        | yes                           |
| 02           | (1) 2003-QA91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:18.0        | yes                           |
| 03           | (1) 2003-QA91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:26.0        | yes                           |
| 04           | (1) 2003-QA91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:31.0        | yes                           |
| 05           | (1) 2003-QA91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:36.0        | yes                           |
| 06           | (2) 2003-QR91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:41.0        | yes                           |
| 07           | (2) 2003-QR91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:46.0        | yes                           |
| 08           | (2) 2003-QR91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:51.0        | 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> |
|--------------|------------------------------|-------------------------------------|--------------------|-------------------------------|-------------------------------|
| 09           | (2) 2003-QR91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:01:56.0        | yes                           |
| 10           | (2) 2003-QR91                | WFC3/UVIS                           | 1                  | 10-May-2010 21:02:01.0        | yes                           |
| 11           | (3) 79360                    | WFC3/UVIS                           | 1                  | 10-May-2010 21:02:06.0        | yes                           |
| 12           | (3) 79360                    | WFC3/UVIS                           | 1                  | 10-May-2010 21:02:11.0        | yes                           |
| 13           | (3) 79360                    | WFC3/UVIS                           | 1                  | 10-May-2010 21:02:16.0        | yes                           |
| 14           | (3) 79360                    | WFC3/UVIS                           | 1                  | 10-May-2010 21:02:20.0        | yes                           |
| 15           | (3) 79360                    | WFC3/UVIS                           | 1                  | 10-May-2010 21:02:25.0        | yes                           |

15 Total Orbits Used

### **ABSTRACT**

Many transneptunian objects (TNOs) have been found to be binary or multiple systems. As in other astrophysical settings, trans-neptunian binaries (TNBs) offer uniquely valuable information. Their mutual orbits allow the direct determination of their system masses, perhaps the most fundamental physical quantity of any astronomical object. Their frequency of occurrence and dynamical characteristics provide clues to formation conditions and evolution scenarios affecting both the binaries and their single neighbors. Combining masses with sizes, bulk densities can be measured. Densities constrain bulk composition and internal structure, key clues to TNO origins and evolution over time. Several TNB bulk densities have been determined, hinting at interesting trends. But none of them belongs to the Cold Classical sub-population, the one group of TNOs with demonstrably distinct physical characteristics. Two top-priority Spitzer programs will soon observe and measure the sizes of 3 Cold Classical TNBs. This proposal seeks to determine the mutual orbits and thus masses of these systems, enabling computation of their densities.

### **OBSERVING DESCRIPTION**

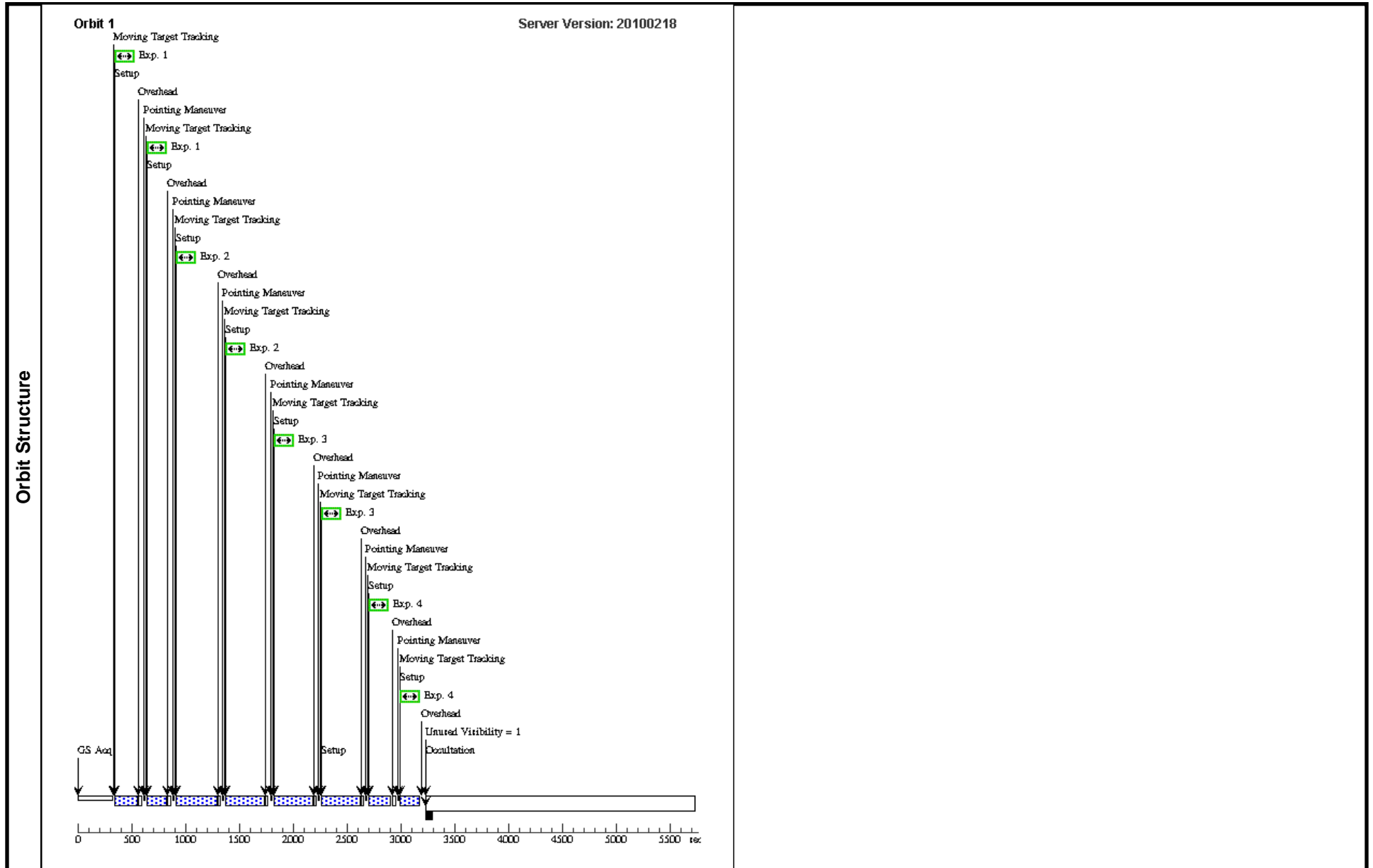
Strategically timed HST observations of binary Classical KBOs which are also being observed by Spitzer. The job of HST is to obtain relative astrometry, from which we determine the mutual orbits of the binary bodies, giving us their masses. Meanwhile, Spitzer determines their surface areas. When we put these pieces of information together, we get the bulk densities.

Since we don't know the orbital periods a priori, we start with an initial set of observations, then use Monte Carlo routines to work out optimal times for follow up observations. The visits to be scheduled this way start off being on hold until we give the go-ahead, in consultation with Tony Roman to ensure that they have a low impact on the scheduling team. Three TOO visits will be scheduled the same way, but leaving the target unspecified for now.

Proposal 11650 - Visit 01 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

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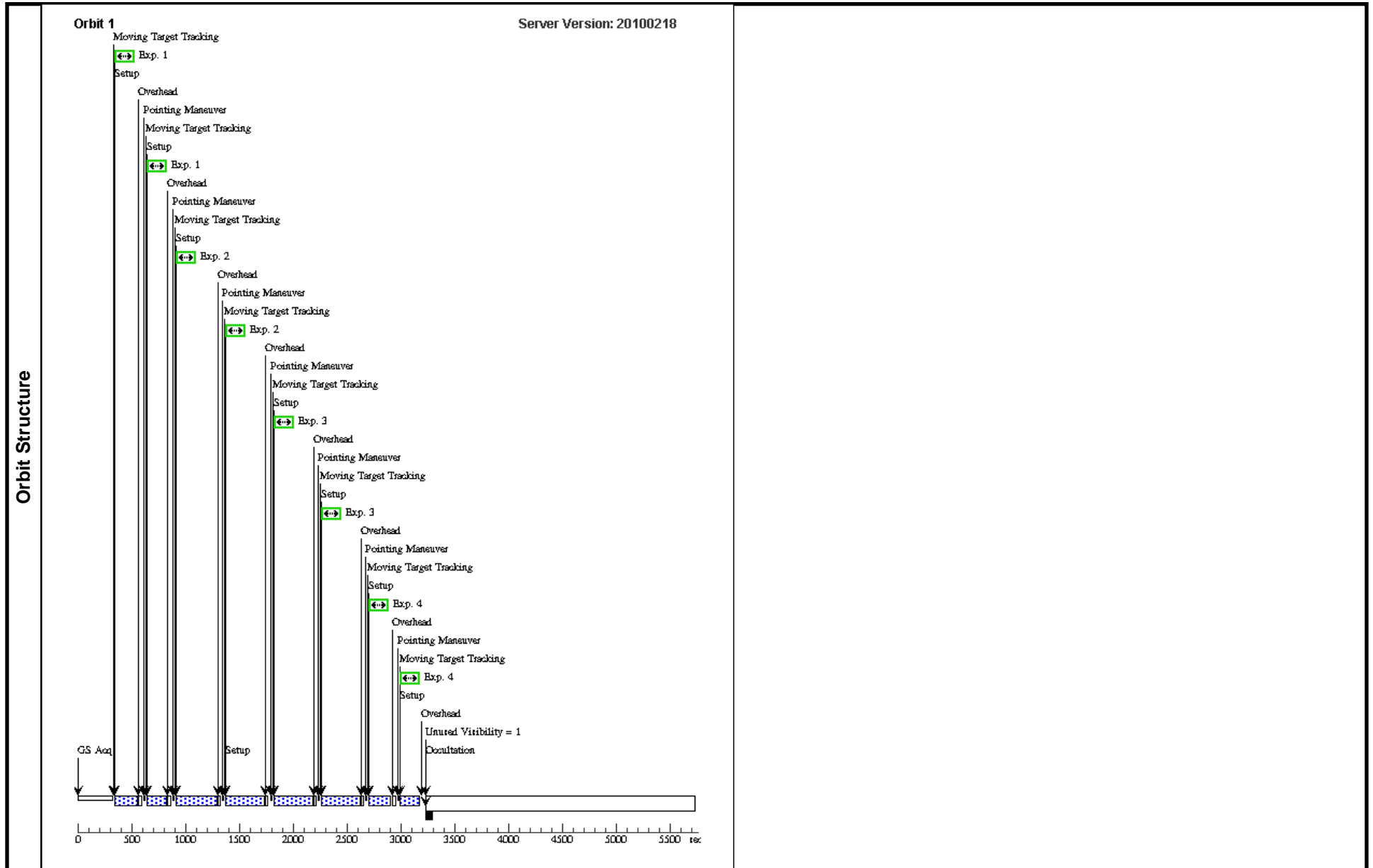
| Visit                | <b>Proposal 11650, Visit 01, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: BETWEEN 07-SEP-2009:00:00:00 AND 20-SEP-2009:00:00:00 |               |  |  |               |                   |                               |                         |  |       |
|----------------------|--|---------------|--|--|---------------|-------------------|-------------------------------|-------------------------|--|-------|
|                      | Patterns   | #             | Primary Pattern  |  |               | Secondary Pattern |                               |                         | Exposures  |       |
|                      |  | (2)           | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=   | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                   |                               |                         | (1), (2), (3), (4)                                 |       |
| Solar System Targets | #  | Name          | Level 1  | Level 2  | Level 3       | Window            | Ephem Center                  |                         |  |       |
|                      | (1)  | 2003-QA91     | TYPE=ASTEROID,A=44.6525830070<br>00,E=0.067365847149,I=2.412573735<br>20,O=104.628203180000,W=326.0687<br>67050000,M=269.523907390000,EQU<br>INOX=J2000,EPOCH=18-JUN-2009:00:00:00 |  |               |                   | EARTH                         |                         |  |       |
| Exposures            | #  | Label         | Target   | Config,Mode,Aperture   | Spectral Els. | Opt. Params.      | Special Reqs.                 | Groups                  | Exp. Time/[Actual Dur.]                            | Orbit |
|                      | 1  | (1) 2003-QA91 | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 2  | (1) 2003-QA91 | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG -0.1532 56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 3  | (1) 2003-QA91 | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 4  | (1) 2003-QA91 | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |



Proposal 11650 - Visit 01 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

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| Visit                | Proposal 11650, Visit 02, completed<br>Diagnostic Status: No Diagnostics<br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: AFTER 01 BY 0.3 D TO 0.5 D |               |  |  |               |                   |                               |                         |  |       |
|----------------------|---|---------------|--|--|---------------|-------------------|-------------------------------|-------------------------|--|-------|
|                      | Patterns  | #             | Primary Pattern  |  |               | Secondary Pattern |                               |                         | Exposures  |       |
|                      |   | (2)           | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=   | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                   |                               |                         | (1), (2), (3), (4)                                 |       |
| Solar System Targets | #   | Name          | Level 1  | Level 2  | Level 3       | Window            | Ephem Center                  |                         |  |       |
|                      | (1)   | 2003-QA91     | TYPE=ASTEROID,A=44.6525830070<br>00,E=0.067365847149,I=2.412573735<br>20,O=104.628203180000,W=326.0687<br>67050000,M=269.523907390000,EQU<br>INOX=J2000,EPOCH=18-JUN-<br>2009:00:00:00 |  |               |                   | EARTH                         |                         |  |       |
| Exposures            | #   | Label         | Target   | Config,Mode,Aperture   | Spectral Els. | Opt. Params.      | Special Reqs.                 | Groups                  | Exp. Time/[Actual Dur.]                            | Orbit |
|                      | 1   | (1) 2003-QA91 | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 2   | (1) 2003-QA91 | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG -0.1532 56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 3   | (1) 2003-QA91 | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 4   | (1) 2003-QA91 | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |



Proposal 11650 - Visit 02 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

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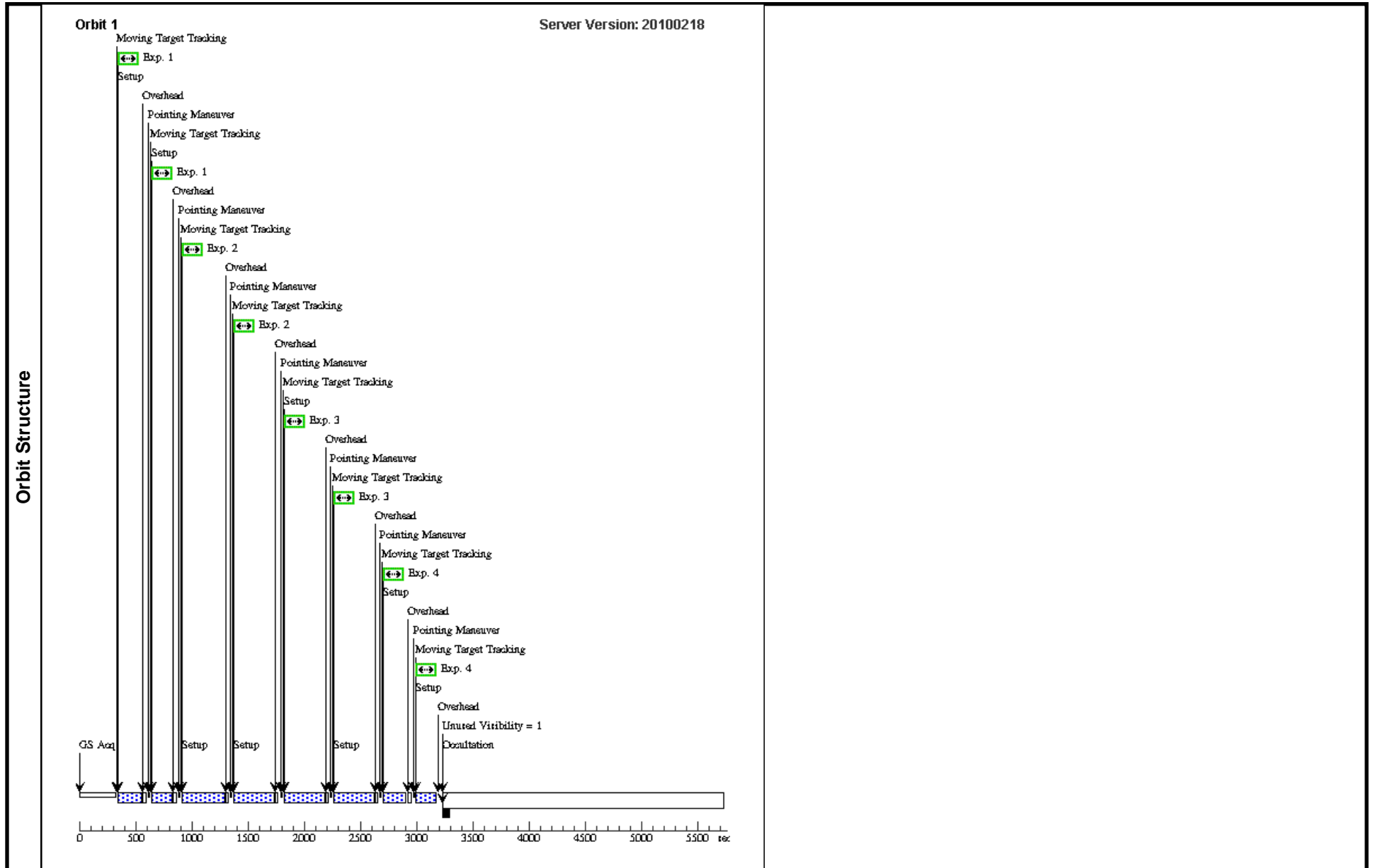
| Visit                | Proposal 11650, Visit 03, completed<br>Diagnostic Status: No Diagnostics<br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: AFTER 01 BY 1.3 D TO 1.6 D |               |  |  |               |                   |                               |                         |  |       |
|----------------------|---|---------------|--|--|---------------|-------------------|-------------------------------|-------------------------|--|-------|
|                      | Patterns  | #             | Primary Pattern  |  |               | Secondary Pattern |                               |                         | Exposures  |       |
|                      |   | (2)           | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=   | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                   |                               |                         | (1), (2), (3), (4)                                 |       |
| Solar System Targets | #   | Name          | Level 1  | Level 2  | Level 3       | Window            | Ephem Center                  |                         |  |       |
|                      | (1)   | 2003-QA91     | TYPE=ASTEROID,A=44.6525830070<br>00,E=0.067365847149,I=2.412573735<br>20,O=104.628203180000,W=326.0687<br>67050000,M=269.523907390000,EQU<br>INOX=J2000,EPOCH=18-JUN-<br>2009:00:00:00 |  |               |                   | EARTH                         |                         |  |       |
| Exposures            | #   | Label         | Target   | Config,Mode,Aperture   | Spectral Els. | Opt. Params.      | Special Reqs.                 | Groups                  | Exp. Time/[Actual Dur.]                            | Orbit |
|                      | 1   | (1) 2003-QA91 |  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 2   | (1) 2003-QA91 |  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG -0.1532 56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 3   | (1) 2003-QA91 |  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 4   | (1) 2003-QA91 |  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |



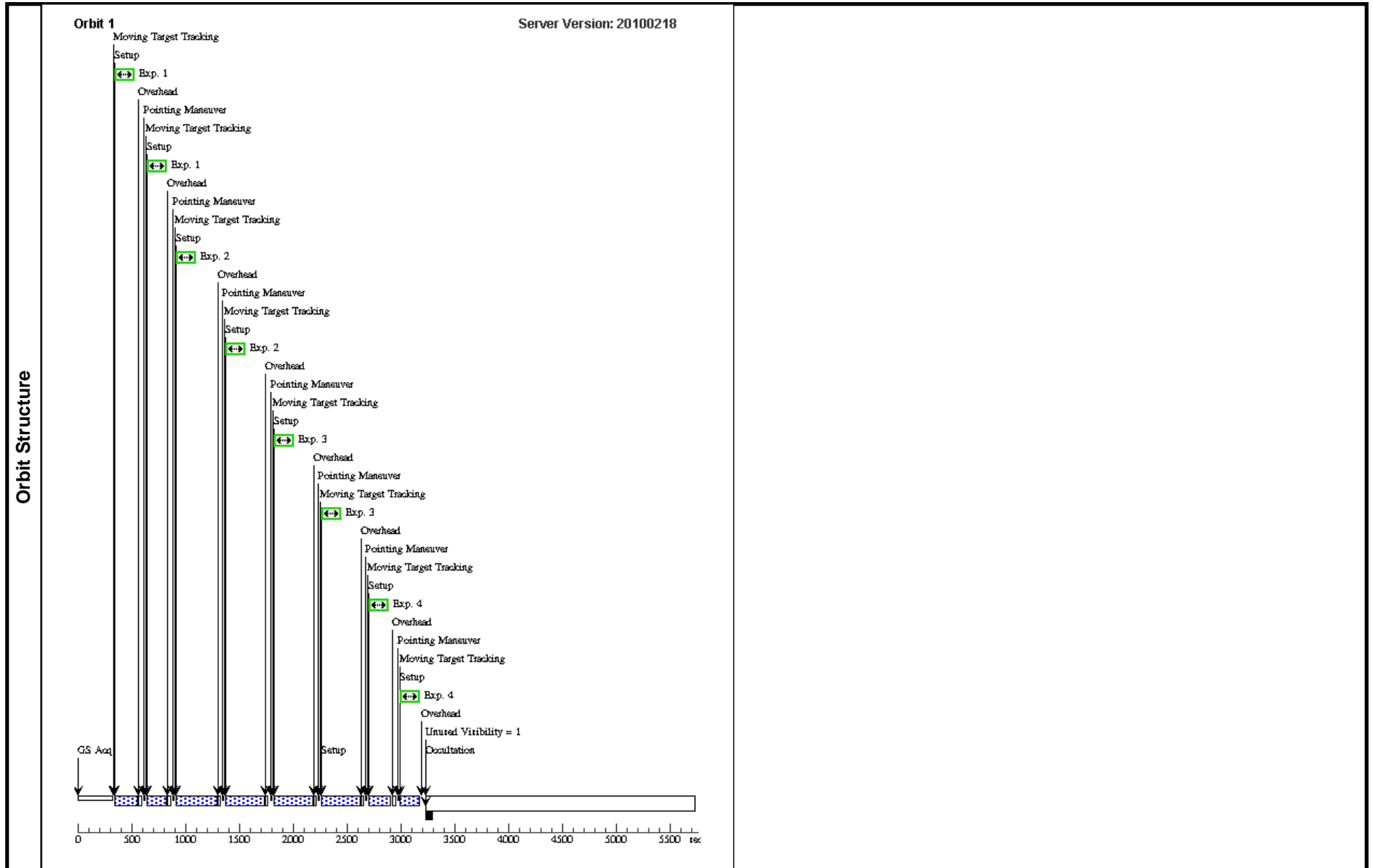
Proposal 11650 - Visit 03 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

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|                             |  |  |  |                                   |                      |  |                              |                         |                                |                                      |                  |
|-----------------------------|--|--|--|-----------------------------------|----------------------|--|------------------------------|-------------------------|--------------------------------|--------------------------------------|------------------|
| <b>Visit</b>                | <b>Proposal 11650, Visit 04, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: ON HOLD FOR 01<br><i>On Hold Comments: Pending observer input</i> |  |  |                                   |                      |  |                              |                         |                                |                                      |                  |
|                             | <b>Patterns</b>  | <b>#</b>   | <b>Primary Pattern</b>   |                                   |                      |  | <b>Secondary Pattern</b>     |                         |                                |                                      | <b>Exposures</b> |
| (2)                         |  | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing= |  |                                   |                      | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |                              |                         |                                | (1), (2), (3), (4)                   |                  |
| <b>Solar System Targets</b> | <b>#</b>   | <b>Name</b>  | <b>Level 1</b>   | <b>Level 2</b>                    | <b>Level 3</b>       | <b>Window</b>  | <b>Ephem Center</b>          |                         |                                |                                      |                  |
|                             | (1)  | 2003-QA91  | TYPE=ASTEROID,A=44.652583007000,E=0.067365847149,I=2.41257373520,O=104.628203180000,W=326.068767050000,M=269.523907390000,EQUINOX=J2000,EPOCH=18-JUN-2009:00:00:00 |                                   |                      |  | EARTH                        |                         |                                |                                      |                  |
| <b>Exposures</b>            | <b>#</b>   | <b>Label</b>   | <b>Target</b>  | <b>Config,Mode,Aperture</b>       | <b>Spectral Els.</b> | <b>Opt. Params.</b>  | <b>Special Reqs.</b>         | <b>Groups</b>           | <b>Exp. Time/[Actual Dur.]</b> |                                      | <b>Orbit</b>     |
|                             | 1  | (1) 2003-QA91  | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB | F606W                | CR-SPLIT=NO  | POS TARG -0.158200,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs                     | [==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]              |
|                             | 2  | (1) 2003-QA91  | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB | F814W                | CR-SPLIT=NO  | POS TARG -0.153256,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs                     | [==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]              |
|                             | 3  | (1) 2003-QA91  | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB | F814W                | CR-SPLIT=NO  | POS TARG 0.0541835,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs                     | [==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]              |
|                             | 4  | (1) 2003-QA91  | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB | F606W                | CR-SPLIT=NO  | POS TARG 0.0494375,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs                     | [==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]              |



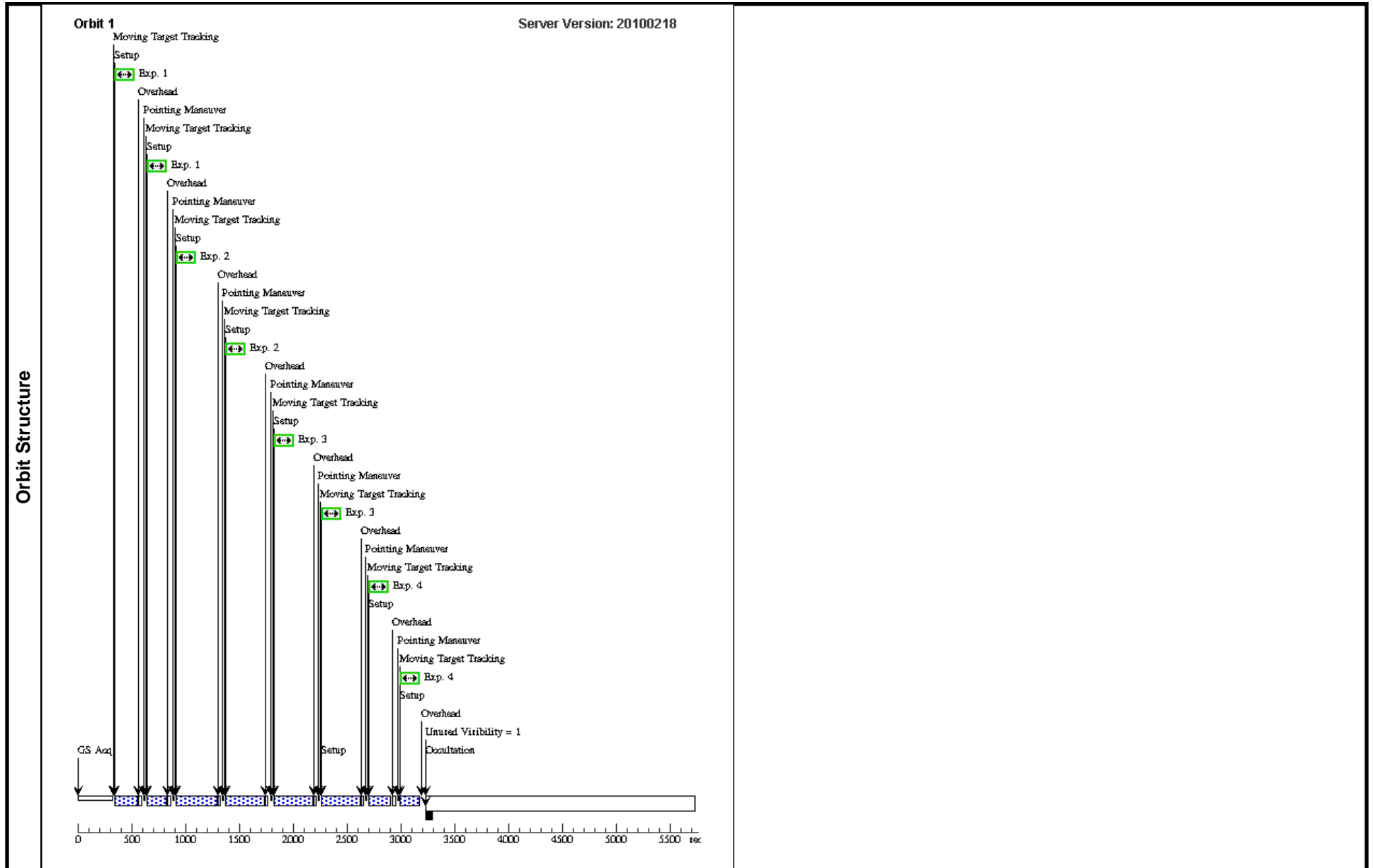
|                             |  |  |  |                                   |                      |  |                              |                         |                                |                                      |              |
|-----------------------------|--|--|--|-----------------------------------|----------------------|--|------------------------------|-------------------------|--------------------------------|--------------------------------------|--------------|
| <b>Visit</b>                | <b>Proposal 11650, Visit 05, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: AFTER 04 BY 4 D TO 4.8 D; ON HOLD FOR 01<br><i>On Hold Comments: Pending observer input</i> |  |  |                                   |                      |  |                              |                         |                                |                                      |              |
|                             | <b>Patterns</b>  | <b>#</b>   | <b>Primary Pattern</b>   |                                   |                      |  | <b>Secondary Pattern</b>     |                         |                                | <b>Exposures</b>                     |              |
| (2)                         |  | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing= |  |                                   |                      | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |                              |                         | (1), (2), (3), (4)             |                                      |              |
| <b>Solar System Targets</b> | <b>#</b>   | <b>Name</b>  | <b>Level 1</b>   | <b>Level 2</b>                    | <b>Level 3</b>       | <b>Window</b>  | <b>Ephem Center</b>          |                         |                                |                                      |              |
|                             | (1)  | 2003-QA91  | TYPE=ASTEROID,A=44.652583007000,E=0.067365847149,I=2.41257373520,O=104.628203180000,W=326.068767050000,M=269.523907390000,EQUINOX=J2000,EPOCH=18-JUN-2009:00:00:00 |                                   |                      |  | EARTH                        |                         |                                |                                      |              |
| <b>Exposures</b>            | <b>#</b>   | <b>Label</b>   | <b>Target</b>  | <b>Config,Mode,Aperture</b>       | <b>Spectral Els.</b> | <b>Opt. Params.</b>  | <b>Special Reqs.</b>         | <b>Groups</b>           | <b>Exp. Time/[Actual Dur.]</b> |                                      | <b>Orbit</b> |
|                             | 1  | (1) 2003-QA91  | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB | F606W                | CR-SPLIT=NO  | POS TARG -0.158200,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs                     | [==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]          |
|                             | 2  | (1) 2003-QA91  | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB | F814W                | CR-SPLIT=NO  | POS TARG -0.153256,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs                     | [==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]          |
|                             | 3  | (1) 2003-QA91  | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB | F814W                | CR-SPLIT=NO  | POS TARG 0.0541835,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs                     | [==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]          |
|                             | 4  | (1) 2003-QA91  | (1) 2003-QA91  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB | F606W                | CR-SPLIT=NO  | POS TARG 0.0494375,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs                     | [==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]          |
|                             |  |  |  |                                   |                      |  |                              |                         |                                |                                      |              |
|                             |  |  |  |                                   |                      |  |                              |                         |                                |                                      |              |
|                             |  |  |  |                                   |                      |  |                              |                         |                                |                                      |              |



Proposal 11650 - Visit 05 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

Tue May 11 01:02:34 GMT 2010

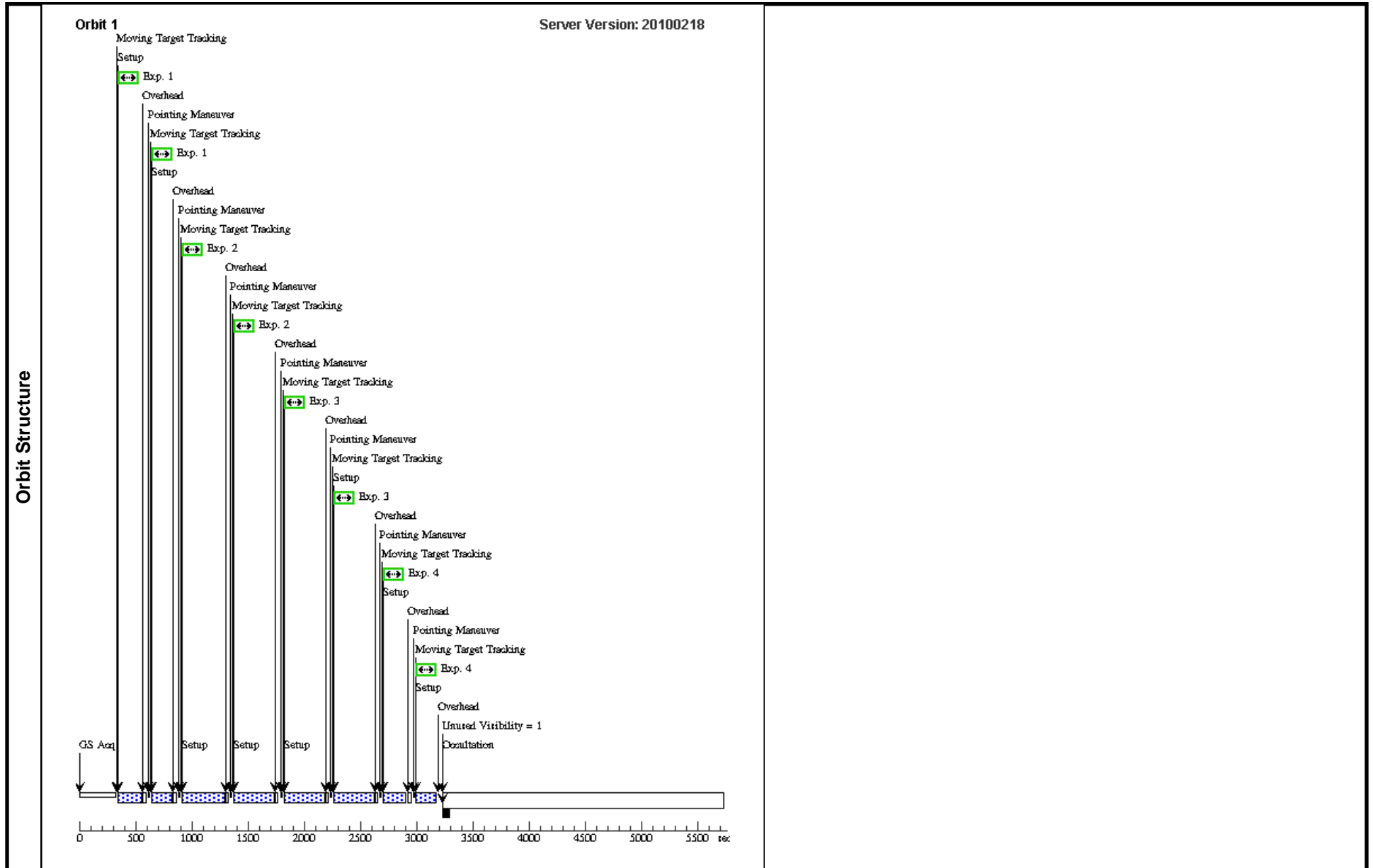
| Visit                | <b>Proposal 11650, Visit 06, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: BETWEEN 01-SEP-2009:00:00:00 AND 14-SEP-2009:00:00:00 |           |   |  |               |                   |                               |                         |  |       |
|----------------------|--|-----------|---|--|---------------|-------------------|-------------------------------|-------------------------|--|-------|
|                      | Patterns   | #         | Primary Pattern   |  |               | Secondary Pattern |                               |                         | Exposures  |       |
|                      |  | (2)       | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=  | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                   |                               |                         | (1), (2), (3), (4)                                 |       |
| Solar System Targets | #  | Name      | Level 1   | Level 2  | Level 3       | Window            | Ephem Center                  |                         |  |       |
|                      | (2)  | 2003-QR91 | TYPE=ASTEROID,A=46.931737455,<br>E=0.188478319810,I=3.4887927398,O<br>=273.10713387,W=14.295672558,M=<br>23.533022699,EQUINOX=J2000,EPO<br>CH=18-JUN-2009:00:00:00<br><br><i>Comments: Previous warning about ephemeris uncertainty was removed 2008-10-10 because the updated ephemeris is now secure.</i> |  |               |                   | EARTH                         |                         |  |       |
| Exposures            | #  | Label     | Target  | Config,Mode,Aperture   | Spectral Els. | Opt. Params.      | Special Reqs.                 | Groups                  | Exp. Time/[Actual Dur.]                            | Orbit |
|                      | 1  |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 2  |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG -0.1532 56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 3  |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 4  |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |



Proposal 11650 - Visit 06 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

Tue May 11 01:02:35 GMT 2010

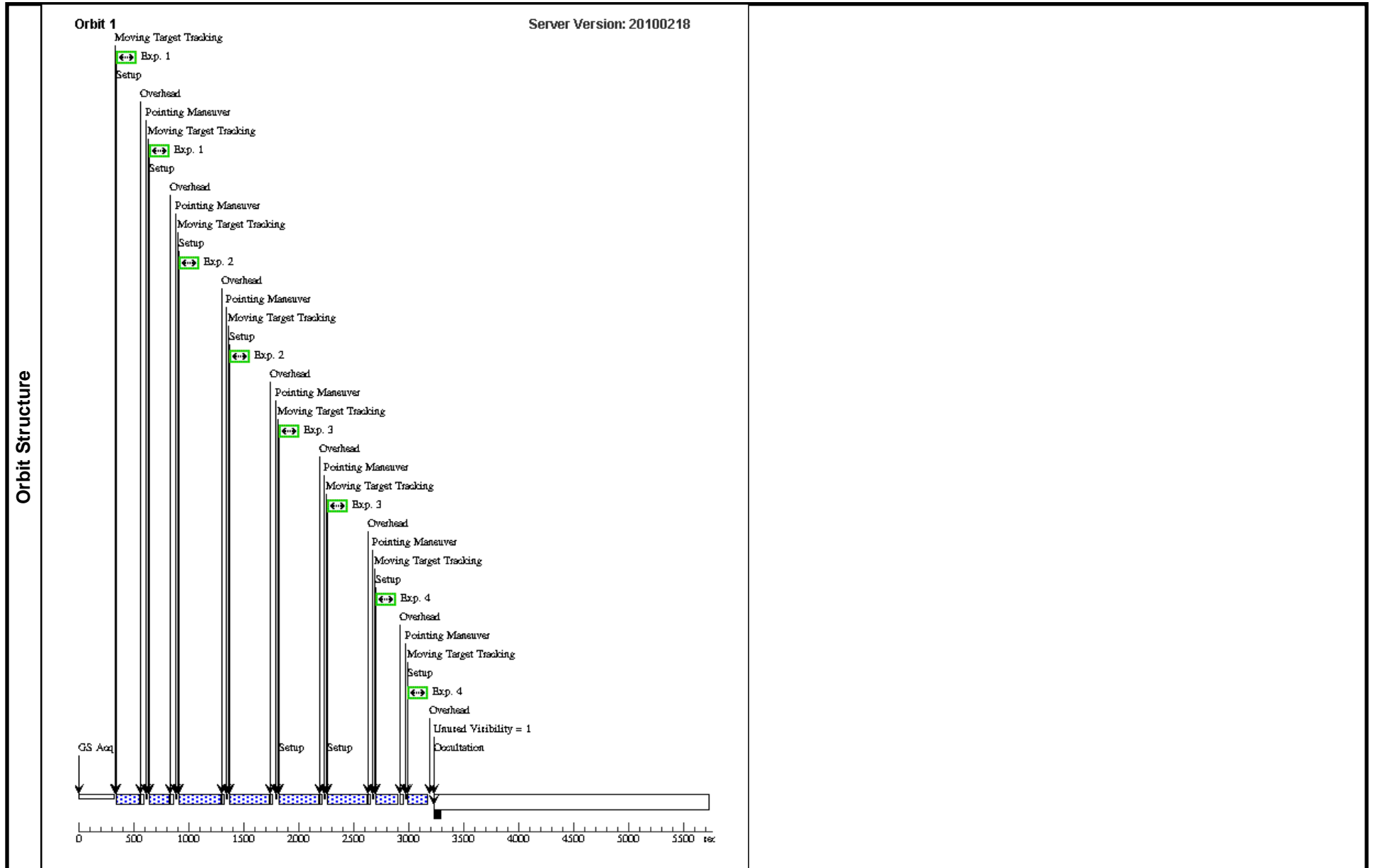
| Visit                | <b>Proposal 11650, Visit 07, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: AFTER 06 BY 0.4 D TO 0.6 D |           |   |  |               |                   |                               |                         |  |       |
|----------------------|---|-----------|---|--|---------------|-------------------|-------------------------------|-------------------------|--|-------|
|                      | Patterns  | #         | Primary Pattern   |  |               | Secondary Pattern |                               |                         | Exposures  |       |
|                      |   | (2)       | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=  | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                   |                               |                         | (1), (2), (3), (4)                                 |       |
| Solar System Targets | #   | Name      | Level 1   | Level 2  | Level 3       | Window            | Ephem Center                  |                         |  |       |
|                      | (2)   | 2003-QR91 | TYPE=ASTEROID,A=46.931737455,<br>E=0.188478319810,I=3.4887927398,O<br>=273.10713387,W=14.295672558,M=<br>23.533022699,EQUINOX=J2000,EPO<br>CH=18-JUN-2009:00:00:00<br><br><i>Comments: Previous warning about ephemeris uncertainty was removed 2008-10-10 because the updated ephemeris is now secure.</i> |  |               |                   | EARTH                         |                         |  |       |
| Exposures            | #   | Label     | Target  | Config,Mode,Aperture   | Spectral Els. | Opt. Params.      | Special Reqs.                 | Groups                  | Exp. Time/[Actual Dur.]                            | Orbit |
|                      | 1   |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 2   |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG -0.1532 56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 3   |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 4   |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |



Proposal 11650 - Visit 07 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

Tue May 11 01:02:35 GMT 2010

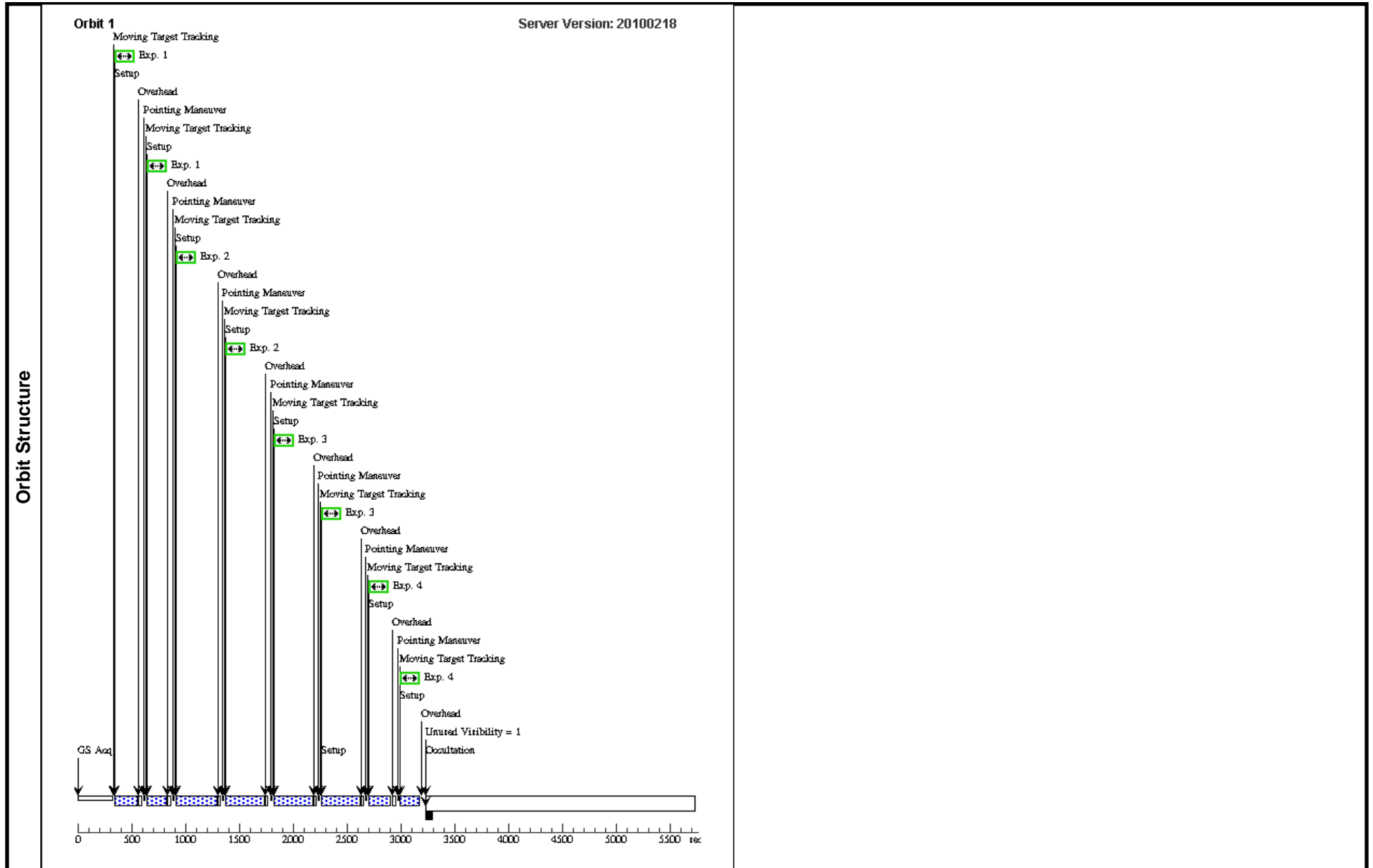
| Visit                | <b>Proposal 11650, Visit 08, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: AFTER_06 BY 2.1 D TO 2.5 D |           |   |  |               |                   |                               |                         |  |       |
|----------------------|---|-----------|---|--|---------------|-------------------|-------------------------------|-------------------------|--|-------|
|                      | Patterns  | #         | Primary Pattern   |  |               | Secondary Pattern |                               |                         | Exposures  |       |
|                      |   | (2)       | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=  | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                   |                               |                         | (1), (2), (3), (4)                                 |       |
| Solar System Targets | #   | Name      | Level 1   | Level 2  | Level 3       | Window            | Ephem Center                  |                         |  |       |
|                      | (2)   | 2003-QR91 | TYPE=ASTEROID,A=46.931737455,<br>E=0.188478319810,I=3.4887927398,O<br>=273.10713387,W=14.295672558,M=<br>23.533022699,EQUINOX=J2000,EPO<br>CH=18-JUN-2009:00:00:00<br><br><i>Comments: Previous warning about ephemeris uncertainty was removed 2008-10-10 because the updated ephemeris is now secure.</i> |  |               |                   | EARTH                         |                         |  |       |
| Exposures            | #   | Label     | Target  | Config,Mode,Aperture   | Spectral Els. | Opt. Params.      | Special Reqs.                 | Groups                  | Exp. Time/[Actual Dur.]                            | Orbit |
|                      | 1   |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 2   |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG -0.1532 56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 3   |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO       | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |
|                      | 4   |           | (2) 2003-QR91   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO       | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[==>(Pattern 1)]<br>[==>(Pattern 2)] | [1]   |



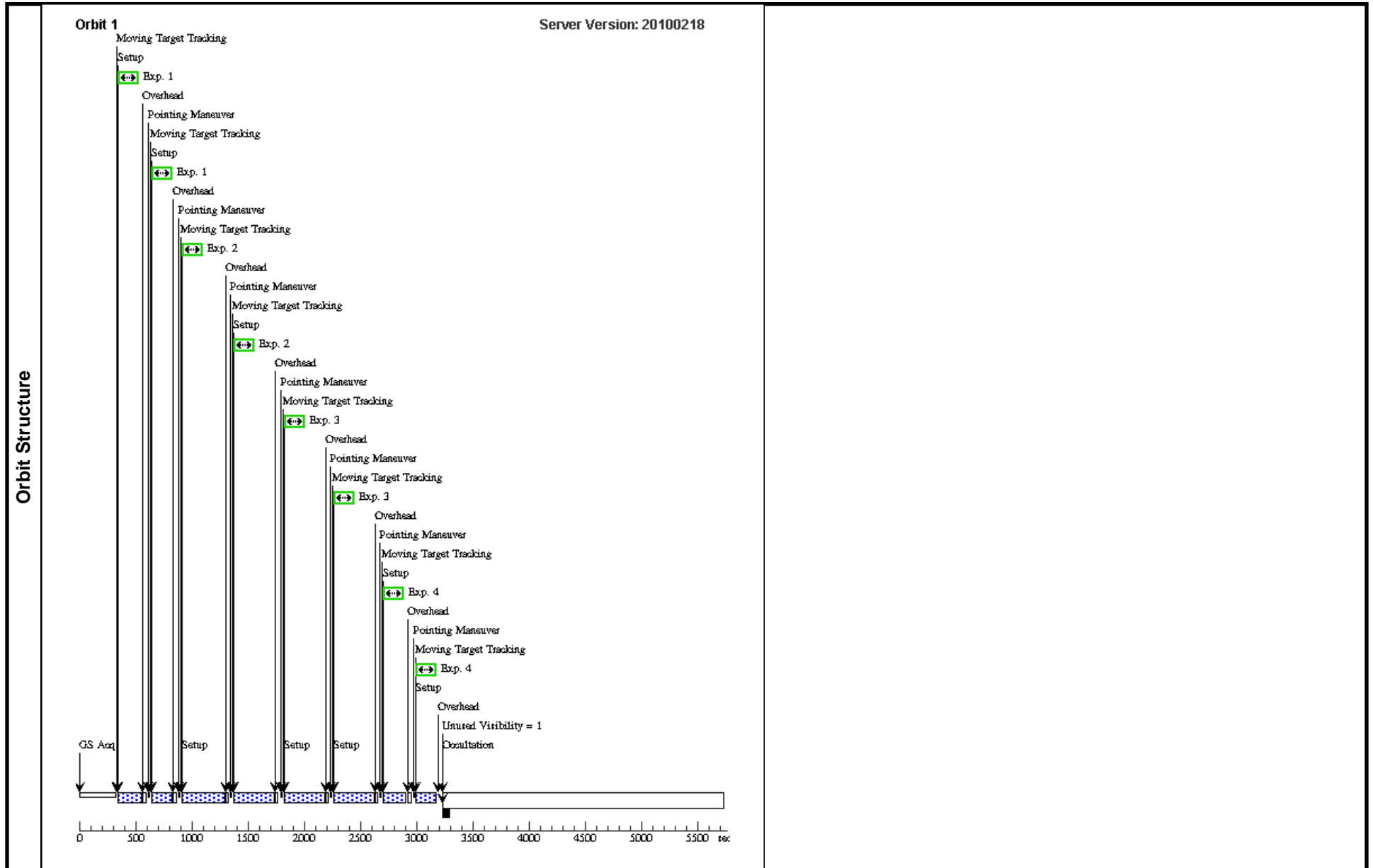
Proposal 11650 - Visit 08 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

Tue May 11 01:02:36 GMT 2010

|   |  |  |  |                                      |                      |  |                                  |                             |                                |                  |              |
|---|--|--|--|--------------------------------------|----------------------|--|----------------------------------|-----------------------------|--------------------------------|------------------|--------------|
| <b>Visit</b>  | <b>Proposal 11650, Visit 09, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: ON HOLD FOR 06<br><i>On Hold Comments: Pending observer input</i> |  |  |                                      |                      |  |                                  |                             |                                |                  |              |
|   | <b>Patterns</b>  | <b>#</b>   | <b>Primary Pattern</b>   |                                      |                      |  | <b>Secondary Pattern</b>         |                             |                                | <b>Exposures</b> |              |
| (2)   |  | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing= |  |                                      |                      | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |                                  |                             | (1), (2), (3), (4)             |                  |              |
| <b>Solar System Targets</b>   | <b>#</b>   | <b>Name</b>  | <b>Level 1</b>   | <b>Level 2</b>                       | <b>Level 3</b>       | <b>Window</b>  | <b>Ephem Center</b>              |                             |                                |                  |              |
|   | (2)  | 2003-QR91  | TYPE=ASTEROID,A=46.931737455,<br>E=0.188478319810,I=3.4887927398,O<br>=273.10713387,W=14.295672558,M=<br>23.533022699,EQUINOX=J2000,EPO<br>CH=18-JUN-2009:00:00:00 |                                      |                      |  |                                  | EARTH                       |                                |                  |              |
| <i>Comments: Previous warning about ephemeris uncertainty was removed 2008-10-10 because the updated ephemeris is now secure.</i> |  |  |  |                                      |                      |  |                                  |                             |                                |                  |              |
| <b>Exposures</b>  | <b>#</b>   | <b>Label</b>   | <b>Target</b>  | <b>Config,Mode,Aperture</b>          | <b>Spectral Els.</b> | <b>Opt. Params.</b>  | <b>Special Reqs.</b>             | <b>Groups</b>               | <b>Exp. Time/[Actual Dur.]</b> |                  | <b>Orbit</b> |
|   | 1  |  | (2) 2003-QR91  | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB | F606W                | CR-SPLIT=NO  | POS TARG -0.1582<br>00,0.0289867 | Pattern 2, Exps 1-1 (<br>2) | 180.0 Secs                     |                  |              |
|   |  |  |  |                                      |                      |  |                                  |                             | [==>(Pattern 1)]               |                  | [1]          |
|   |  |  |  |                                      |                      |  |                                  |                             | [==>(Pattern 2)]               |                  |              |
|   | 2  |  | (2) 2003-QR91  | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB | F814W                | CR-SPLIT=NO  | POS TARG -0.1532<br>56,-0.144537 | Pattern 2, Exps 2-2 (<br>2) | 358.0 Secs                     |                  |              |
|   |  |  |  |                                      |                      |  |                                  | [==>(Pattern 1)]            |                                | [1]              |              |
|   |  |  |  |                                      |                      |  |                                  | [==>(Pattern 2)]            |                                |                  |              |
| 3   |  | (2) 2003-QR91  | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB   | F814W                                | CR-SPLIT=NO          | POS TARG 0.05418<br>35,0.0385166   | Pattern 2, Exps 3-3 (<br>2)      | 358.0 Secs                  |                                |                  |              |
|   |  |  |  |                                      |                      |  |                                  | [==>(Pattern 1)]            |                                | [1]              |              |
|   |  |  |  |                                      |                      |  |                                  | [==>(Pattern 2)]            |                                |                  |              |
| 4   |  | (2) 2003-QR91  | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB   | F606W                                | CR-SPLIT=NO          | POS TARG 0.04943<br>75,-0.145331   | Pattern 2, Exps 4-4 (<br>2)      | 180.0 Secs                  |                                |                  |              |
|   |  |  |  |                                      |                      |  |                                  | [==>(Pattern 1)]            |                                | [1]              |              |
|   |  |  |  |                                      |                      |  |                                  | [==>(Pattern 2)]            |                                |                  |              |



|  |  |  |  |                                      |                      |  |                                  |                             |                                |                  |              |
|--|--|--|--|--------------------------------------|----------------------|--|----------------------------------|-----------------------------|--------------------------------|------------------|--------------|
| <b>Visit</b>   | <b>Proposal 11650, Visit 10, scheduling</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: AFTER 09 BY 6.1 D TO 6.9 D; ON HOLD FOR 06<br>On Hold Comments: Pending observer input |  |  |                                      |                      |  |                                  |                             |                                |                  |              |
|  | <b>Patterns</b>  | <b>#</b>   | <b>Primary Pattern</b>   |                                      |                      |  | <b>Secondary Pattern</b>         |                             |                                | <b>Exposures</b> |              |
| (2)  |  | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing= |  |                                      |                      | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |                                  |                             | (1), (2), (3), (4)             |                  |              |
| <b>Solar System Targets</b>  | <b>#</b>   | <b>Name</b>  | <b>Level 1</b>   | <b>Level 2</b>                       | <b>Level 3</b>       | <b>Window</b>  | <b>Ephem Center</b>              |                             |                                |                  |              |
|  | (2)  | 2003-QR91  | TYPE=ASTEROID,A=46.931737455,<br>E=0.188478319810,I=3.4887927398,O<br>=273.10713387,W=14.295672558,M=<br>23.533022699,EQUINOX=J2000,EPO<br>CH=18-JUN-2009:00:00:00 |                                      |                      |  |                                  | EARTH                       |                                |                  |              |
| Comments: Previous warning about ephemeris uncertainty was removed 2008-10-10 because the updated ephemeris is now secure. |  |  |  |                                      |                      |  |                                  |                             |                                |                  |              |
| <b>Exposures</b>   | <b>#</b>   | <b>Label</b>   | <b>Target</b>  | <b>Config,Mode,Aperture</b>          | <b>Spectral Els.</b> | <b>Opt. Params.</b>  | <b>Special Reqs.</b>             | <b>Groups</b>               | <b>Exp. Time/[Actual Dur.]</b> |                  | <b>Orbit</b> |
|  | 1  | (2) 2003-QR91  |  | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB | F606W                | CR-SPLIT=NO  | POS TARG -0.1582<br>00,0.0289867 | Pattern 2, Exps 1-1 (<br>2) | 180.0 Secs                     |                  |              |
|  |  |  |  |                                      |                      |  |                                  |                             | [==>(Pattern 1)]               |                  | [1]          |
|  |  |  |  |                                      |                      |  |                                  |                             | [==>(Pattern 2)]               |                  |              |
|  | 2  | (2) 2003-QR91  |  | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB | F814W                | CR-SPLIT=NO  | POS TARG -0.1532<br>56,-0.144537 | Pattern 2, Exps 2-2 (<br>2) | 358.0 Secs                     |                  |              |
|  |  |  |  |                                      |                      |  |                                  | [==>(Pattern 1)]            |                                | [1]              |              |
|  |  |  |  |                                      |                      |  |                                  | [==>(Pattern 2)]            |                                |                  |              |
| 3  | (2) 2003-QR91  |  | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB   | F814W                                | CR-SPLIT=NO          | POS TARG 0.05418<br>35,0.0385166   | Pattern 2, Exps 3-3 (<br>2)      | 358.0 Secs                  |                                |                  |              |
|  |  |  |  |                                      |                      |  |                                  | [==>(Pattern 1)]            |                                | [1]              |              |
|  |  |  |  |                                      |                      |  |                                  | [==>(Pattern 2)]            |                                |                  |              |
| 4  | (2) 2003-QR91  |  | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB   | F606W                                | CR-SPLIT=NO          | POS TARG 0.04943<br>75,-0.145331   | Pattern 2, Exps 4-4 (<br>2)      | 180.0 Secs                  |                                |                  |              |
|  |  |  |  |                                      |                      |  |                                  | [==>(Pattern 1)]            |                                | [1]              |              |
|  |  |  |  |                                      |                      |  |                                  | [==>(Pattern 2)]            |                                |                  |              |



Proposal 11650 - Visit 10 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

Tue May 11 01:02:37 GMT 2010

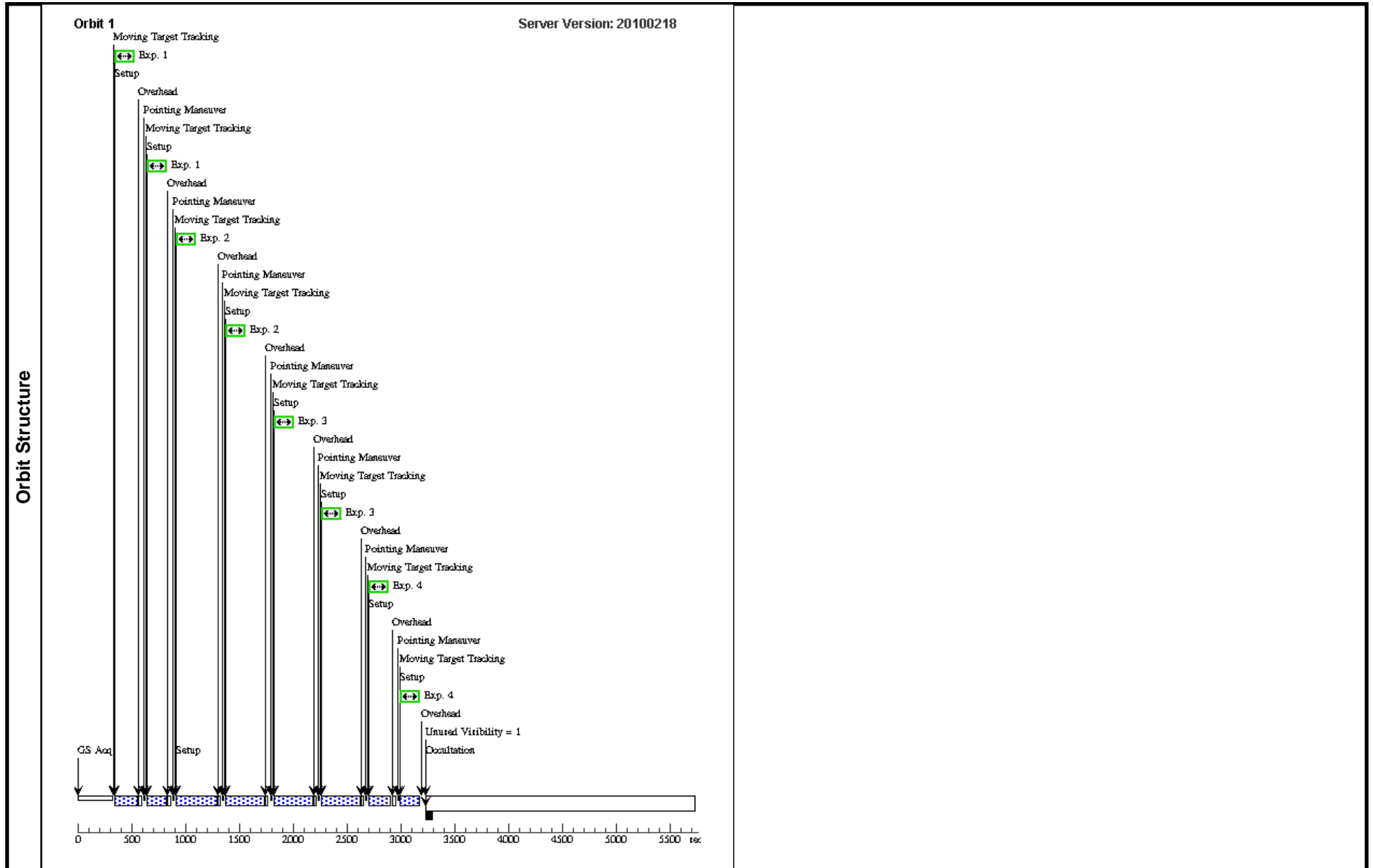
| Visit                | <b>Proposal 11650, Visit 11, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: BETWEEN 01-FEB-2010:00:00:00 AND 24-FEB-2010:00:00:00; BETWEEN 25-FEB-2010:00:00:00 AND 01-MAR-2010:12:00:00; BETWEEN 02-MAR-2010:00:00:00 AND 15-MAR-2010:00:00:00; ON HOLD<br>On Hold Comments: Pending observer input (main observability window is in 2010) |           |   |  |               |                               |                         |  |                         |           |
|----------------------|--|-----------|---|--|---------------|-------------------------------|-------------------------|--|-------------------------|-----------|
|                      | Patterns   | #         | Primary Pattern   |  |               |                               | Secondary Pattern       |  |                         | Exposures |
|                      |  | (2)       | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=  | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                               |                         | (1), (2), (3), (4)                               |                         |           |
| Solar System Targets | #  | Name      | Level 1   | Level 2  | Level 3       | Window                        | Ephem Center            |  |                         |           |
|                      | (3)  | 79360     | TYPE=ASTEROID,A=43.6895358320<br>,E=0.00843554596,I=2.2530293654,O=304.376345610,W=247.0822536400,M=299.0138305900,EQUINOX=J2000,EPOCH=18-JUN-2009:00:00:00 |  |               |                               |                         | EARTH  |                         |           |
| Exposures            | #  | Label     | Target  | Config,Mode,Aperture   | Spectral Els. | Opt. Params.                  | Special Reqs.           | Groups   | Exp. Time/[Actual Dur.] | Orbit     |
|                      | 1  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F606W  | CR-SPLIT=NO   | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]                     |           |
|                      | 2  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F814W  | CR-SPLIT=NO   | POS TARG -0.1532 56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]                     |           |
|                      | 3  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F814W  | CR-SPLIT=NO   | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]                     |           |
|                      | 4  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F606W  | CR-SPLIT=NO   | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]                     |           |



Proposal 11650 - Visit 11 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

Tue May 11 01:02:37 GMT 2010

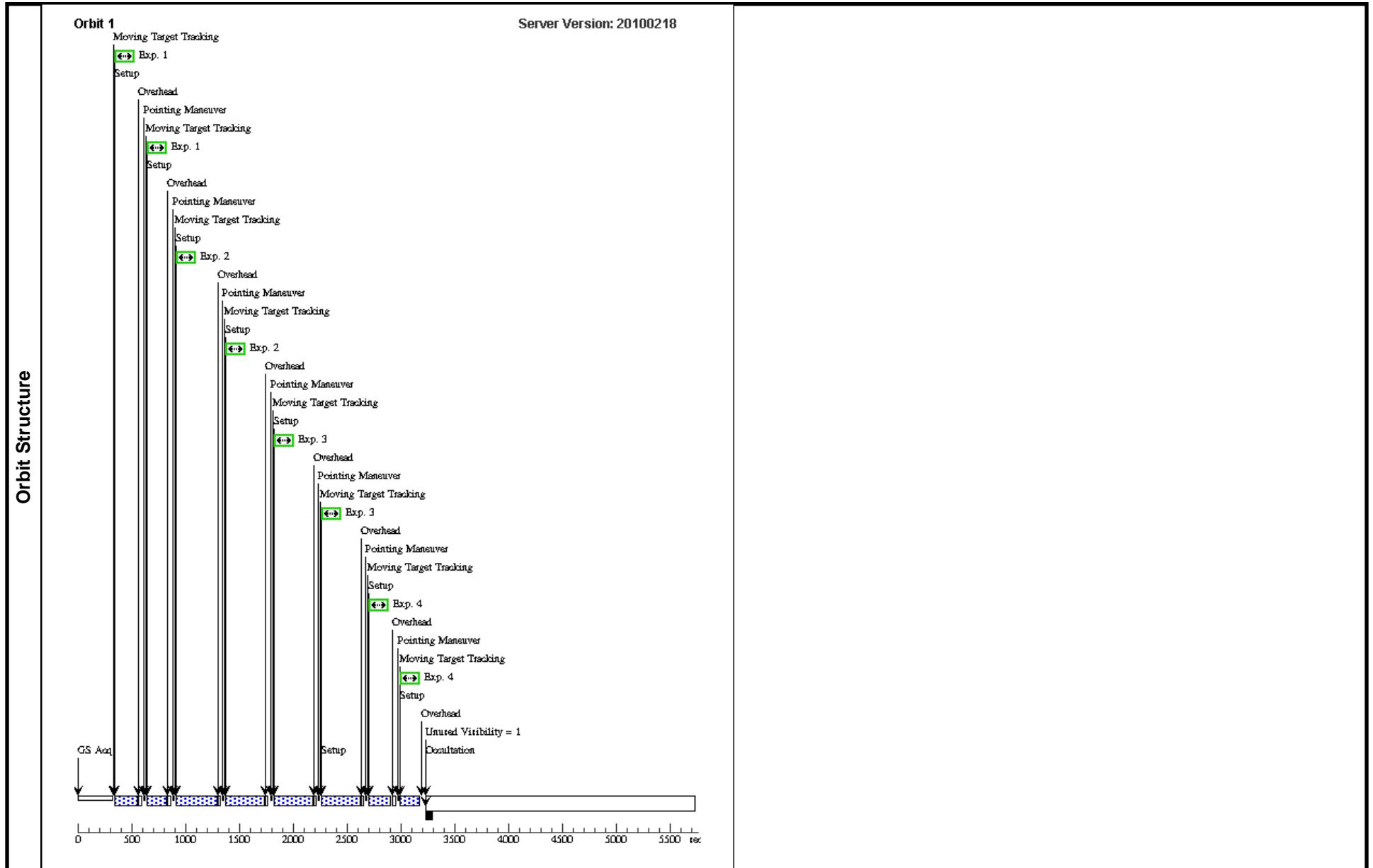
| Visit                | <b>Proposal 11650, Visit 12, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: AFTER 11 BY 23 H TO 29 H; BETWEEN 01-FEB-2010:00:00:00 AND 24-FEB-2010:00:00:00; BETWEEN 25-FEB-2010:00:00:00 AND 01-MAR-2010:12:00:00; BETWEEN 02-MAR-2010:00:00:00 AND 15-MAR-2010:00:00:00; ON HOLD<br>On Hold Comments: Pending observer input (main observability window is in 2010) |           |   |  |               |              |                               |                         |  |           |
|----------------------|--|-----------|---|--|---------------|--------------|-------------------------------|-------------------------|--|-----------|
|                      | Patterns   | #         | Primary Pattern   |  |               |              | Secondary Pattern             |                         |  | Exposures |
|                      |  | (2)       | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=                                      | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |              |                               | (1), (2), (3), (4)      |  |           |
| Solar System Targets | #  | Name      | Level 1   | Level 2  | Level 3       | Window       | Ephem Center                  |                         |  |           |
|                      | (3)  | 79360     | TYPE=ASTEROID,A=43.6895358320,E=0.00843554596,I=2.2530293654,O=304.376345610,W=247.0822536400,M=299.0138305900,EQUINOX=J2000,EPOCH=18-JUN-2009:00:00:00 |  |               |              |                               |                         |  | EARTH     |
| Exposures            | #  | Label     | Target  | Config,Mode,Aperture   | Spectral Els. | Opt. Params. | Special Reqs.                 | Groups                  | Exp. Time/[Actual Dur.]                          | Orbit     |
|                      | 1  | (3) 79360 |   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO  | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]       |
|                      | 2  | (3) 79360 |   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO  | POS TARG -0.1532 56,-0.104829 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]       |
|                      | 3  | (3) 79360 |   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W         | CR-SPLIT=NO  | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]       |
|                      | 4  | (3) 79360 |   | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W         | CR-SPLIT=NO  | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]       |



Proposal 11650 - Visit 12 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

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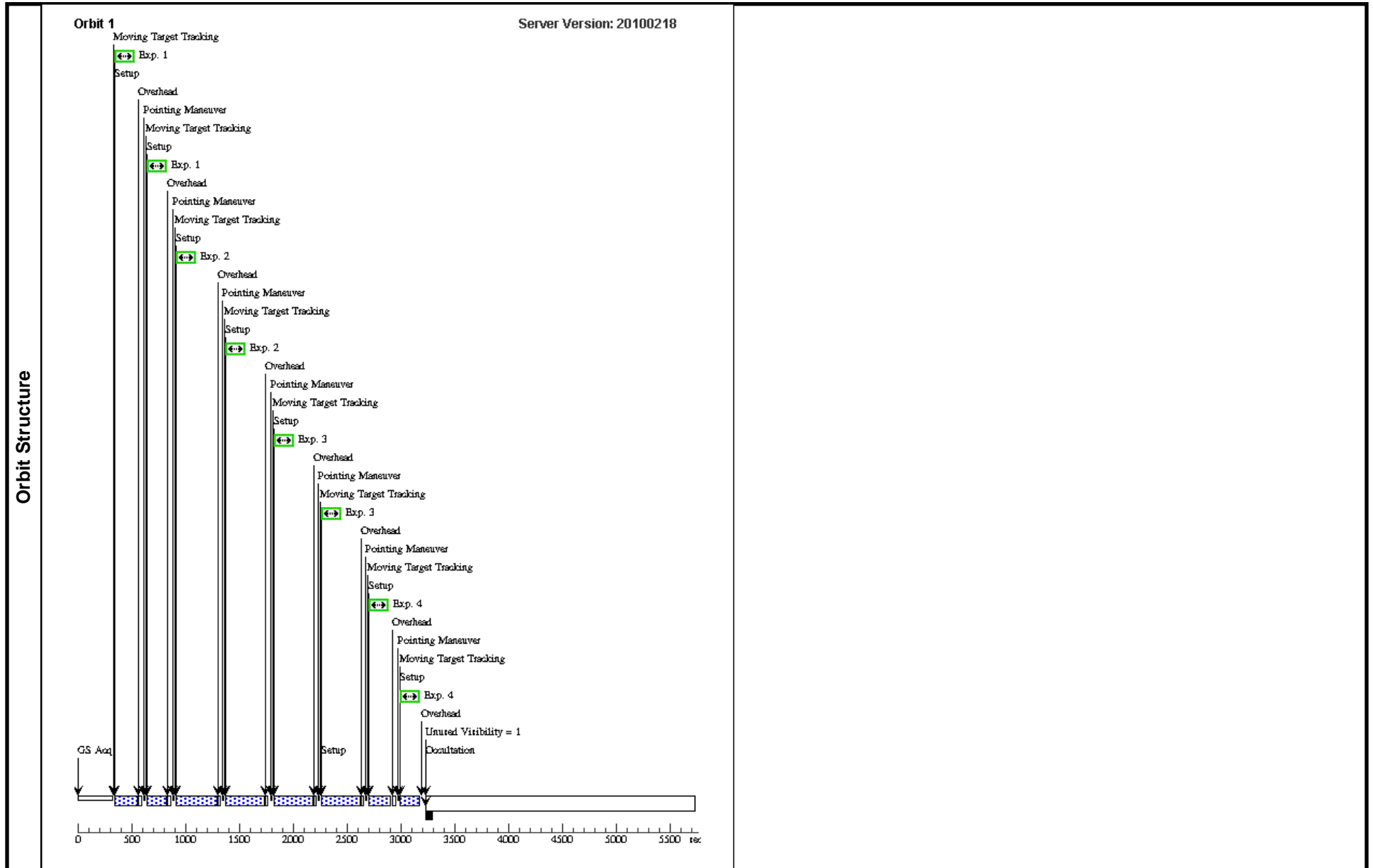
| Visit                | <b>Proposal 11650, Visit 13, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: BETWEEN 14-MAR-2010:12:00:00 AND 15-MAR-2010:00:00:00; BETWEEN 25-MAR-2010:10:00:00 AND 25-MAR-2010:18:00:00; BETWEEN 03-APR-2010:12:00:00 AND 04-APR-2010:12:00:00; ON HOLD<br>On Hold Comments: Pending observer activation |           |  |   |               |                               |  |                         |                         |                    |       |
|----------------------|--|-----------|--|---|---------------|-------------------------------|--|-------------------------|-------------------------|--------------------|-------|
|                      | Patterns   | #         | Primary Pattern  |   |               |                               | Secondary Pattern  |                         |                         | Exposures          |       |
|                      |  | (2)       | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing= |   |               |                               | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |                         |                         | (1), (2), (3), (4) |       |
| Solar System Targets | #  | Name      | Level 1  | Level 2   | Level 3       | Window                        | Ephem Center   |                         |                         |                    |       |
|                      | (3)  | 79360     |  | TYPE=ASTEROID,A=43.6895358320,E=0.00843554596,I=2.2530293654,O=304.376345610,W=247.0822536400,M=299.0138305900,EQUINOX=J2000,EPOCH=18-JUN-2009:00:00:00 |               |                               |  | EARTH                   |                         |                    |       |
| Exposures            | #  | Label     | Target   | Config,Mode,Aperture  | Spectral Els. | Opt. Params.                  | Special Reqs.  | Groups                  | Exp. Time/[Actual Dur.] |                    | Orbit |
|                      | 1  |           | (3) 79360  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F606W         | CR-SPLIT=NO                   | POS TARG -0.1582 00,0.0289867  | Pattern 2, Exps 1-1 (2) | 180.0 Secs              |                    |       |
|                      |  |           |  |   |               |                               |  |                         | [=>(Pattern 1)]         |                    | [1]   |
|                      |  |           |  |   |               |                               |  |                         | [=>(Pattern 2)]         |                    |       |
|                      | 2  |           | (3) 79360  | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F814W         | CR-SPLIT=NO                   | POS TARG -0.1532 56,-0.144537  | Pattern 2, Exps 2-2 (2) | 358.0 Secs              |                    |       |
|                      |  |           |  |   |               |                               |  | [=>(Pattern 1)]         |                         | [1]                |       |
|                      |  |           |  |   |               |                               |  | [=>(Pattern 2)]         |                         |                    |       |
| 3                    |  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F814W   | CR-SPLIT=NO   | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2)  | 358.0 Secs              |                         |                    |       |
|                      |  |           |  |   |               |                               |  | [=>(Pattern 1)]         |                         | [1]                |       |
|                      |  |           |  |   |               |                               |  | [=>(Pattern 2)]         |                         |                    |       |
| 4                    |  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB  | F606W   | CR-SPLIT=NO   | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2)  | 180.0 Secs              |                         |                    |       |
|                      |  |           |  |   |               |                               |  | [=>(Pattern 1)]         |                         | [1]                |       |
|                      |  |           |  |   |               |                               |  | [=>(Pattern 2)]         |                         |                    |       |



Proposal 11650 - Visit 13 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

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| Visit                | <b>Proposal 11650, Visit 14, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: BETWEEN 26-APR-2010:15:00:00 AND 26-APR-2010:20:00:00; BETWEEN 27-APR-2010:19:00:00 AND 28-APR-2010:00:00:00; BETWEEN 01-MAY-2010:18:00:00 AND 01-MAY-2010:23:00:00; ON HOLD<br>On Hold Comments: Pending observer activation |           |   |  |               |                               |                         |  |                         |           |
|----------------------|--|-----------|---|--|---------------|-------------------------------|-------------------------|--|-------------------------|-----------|
|                      | Patterns   | #         | Primary Pattern   |  |               |                               | Secondary Pattern       |  |                         | Exposures |
|                      |  | (2)       | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=  | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                               |                         | (1), (2), (3), (4)                               |                         |           |
| Solar System Targets | #  | Name      | Level 1   | Level 2  | Level 3       | Window                        | Ephem Center            |  |                         |           |
|                      | (3)  | 79360     | TYPE=ASTEROID,A=43.6895358320<br>,E=0.00843554596,I=2.2530293654,O=304.376345610,W=247.0822536400,M=299.0138305900,EQUINOX=J2000,EPOCH=18-JUN-2009:00:00:00 |  |               |                               |                         |  |                         | EARTH     |
| Exposures            | #  | Label     | Target  | Config,Mode,Aperture   | Spectral Els. | Opt. Params.                  | Special Reqs.           | Groups   | Exp. Time/[Actual Dur.] | Orbit     |
|                      | 1  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F606W  | CR-SPLIT=NO   | POS TARG -0.1582 00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]                     |           |
|                      | 2  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F814W  | CR-SPLIT=NO   | POS TARG -0.1532 56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]                     |           |
|                      | 3  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F814W  | CR-SPLIT=NO   | POS TARG 0.05418 35,0.0385166 | Pattern 2, Exps 3-3 (2) | 358.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]                     |           |
|                      | 4  | (3) 79360 | WFC3/UVIS, ACCUM, UVIS1-C512B-SUB   | F606W  | CR-SPLIT=NO   | POS TARG 0.04943 75,-0.145331 | Pattern 2, Exps 4-4 (2) | 180.0 Secs<br>[=>(Pattern 1)]<br>[=>(Pattern 2)] | [1]                     |           |



Proposal 11650 - Visit 14 - Mutual Orbits, Colors, Masses, and Bulk Densities of 3 Cold Classical Transneptunian Bina...

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| Visit                | <b>Proposal 11650, Visit 15, implementation</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/UVIS<br>Special Requirements: BETWEEN 25-MAY-2010:07:00:00 AND 25-MAY-2010:15:00:00; BETWEEN 28-MAY-2010:14:00:00 AND 29-MAY-2010:00:00:00; BETWEEN 06-JUN-2010:19:00:00 AND 07-JUN-2010:03:00:00; ON HOLD<br>On Hold Comments: Pending observer activation |           |   |  |               |                                  |                                  |                         |                         |                    |       |
|----------------------|---|-----------|---|--|---------------|----------------------------------|----------------------------------|-------------------------|-------------------------|--------------------|-------|
|                      | Patterns  | #         | Primary Pattern   |  |               |                                  | Secondary Pattern                |                         |                         | Exposures          |       |
|                      |   | (2)       | Pattern Type=WFC3-UVIS-DITHER-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.145<br>Line Spacing=  | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false |               |                                  |                                  |                         |                         | (1), (2), (3), (4) |       |
| Solar System Targets | #   | Name      | Level 1   | Level 2  | Level 3       | Window                           | Ephem Center                     |                         |                         |                    |       |
|                      | (3)   | 79360     | TYPE=ASTEROID,A=43.6895358320<br>,E=0.00843554596,I=2.2530293654,O<br>=304.376345610,W=247.0822536400,<br>M=299.0138305900,EQUINOX=J200<br>0,EPOCH=18-JUN-2009:00:00:00 |  |               |                                  | EARTH                            |                         |                         |                    |       |
| Exposures            | #   | Label     | Target  | Config,Mode,Aperture   | Spectral Els. | Opt. Params.                     | Special Reqs.                    | Groups                  | Exp. Time/[Actual Dur.] |                    | Orbit |
|                      | 1   |           | (3) 79360   | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB   | F606W         | CR-SPLIT=NO                      | POS TARG -0.1582<br>00,0.0289867 | Pattern 2, Exps 1-1 (2) | 180.0 Secs              |                    |       |
|                      |   |           |   |  |               |                                  |                                  |                         | [=>(Pattern 1)]         |                    | [1]   |
|                      |   |           |   |  |               |                                  |                                  |                         | [=>(Pattern 2)]         |                    |       |
|                      | 2   |           | (3) 79360   | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB   | F814W         | CR-SPLIT=NO                      | POS TARG -0.1532<br>56,-0.144537 | Pattern 2, Exps 2-2 (2) | 358.0 Secs              |                    |       |
|                      |   |           |   |  |               |                                  |                                  | [=>(Pattern 1)]         |                         | [1]                |       |
|                      |   |           |   |  |               |                                  |                                  | [=>(Pattern 2)]         |                         |                    |       |
| 3                    |   | (3) 79360 | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB  | F814W  | CR-SPLIT=NO   | POS TARG 0.05418<br>35,0.0385166 | Pattern 2, Exps 3-3 (2)          | 358.0 Secs              |                         |                    |       |
|                      |   |           |   |  |               |                                  |                                  | [=>(Pattern 1)]         |                         | [1]                |       |
|                      |   |           |   |  |               |                                  |                                  | [=>(Pattern 2)]         |                         |                    |       |
| 4                    |   | (3) 79360 | WFC3/UVIS, ACCUM,<br>UVIS1-C512B-SUB  | F606W  | CR-SPLIT=NO   | POS TARG 0.04943<br>75,-0.145331 | Pattern 2, Exps 4-4 (2)          | 180.0 Secs              |                         |                    |       |
|                      |   |           |   |  |               |                                  |                                  | [=>(Pattern 1)]         |                         | [1]                |       |
|                      |   |           |   |  |               |                                  |                                  | [=>(Pattern 2)]         |                         |                    |       |

