| **Page** | **Section** | **Line** | **Type** | **Comment/ Rationale** | **Source of Comment (Name/Agency)** | **Suggested Disposition** | **Disposition**  **(Completed by Principal Editor)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2-1 | 2.2 | 6-7 | te | We will need to spend some time discussing changes to the reference frame set. The issue of the relevant reference frames for this application dominated the discussions on CDM V.1. The agreements from version 1 cannot be changed without knowledge of the history. Interesting that you cite a reference with co-author "M. Moury" (informative reference [G18])... she was one of the participants in developing the initial version of CDM and very much advocated having only a SINGLE reference frame for all CDMs. | David S. Berry / NASA | Discuss at Spring Meetings 2021. |  |
| 3-1 | 3.1.3 | 1 | ed | Contains a "shall" that cannot be enforced by CCSDS | David S. Berry / NASA | Change the "shall" to "should" |  |
| 3-4 | Table 3-3 |  | te | It's not clear how PC or PC\_MAX represent a SCREEN\_VOLUME\_SHAPE. There are already a few keywords later in the table relating to PC and PC\_MAX, Aside from being geometrically ambiguous, it seems redundant to have PC and PC\_MAX here. | David S. Berry / NASA | Probably shouid disambiguate this keyword by deferring PC and PC\_MAX to "COLLISION\_PROBABILITY\_METHOD" keyword. |  |
| 3-4 | Table 3-3 |  | ed/te | Units abbreviation for SCREEN\_VOLUME\_RADIUS is incorrect | David S. Berry / NASA | From: "M"  To: "m" |  |
| 3-4 | Table 3-3 |  | ed/te | MOC for SCREEN\_VOLUME\_RADIUS, SCREEN\_VOLUME\_X, SCREEN\_VOLUME\_Y, SCREEN\_VOLUME\_Z, SCREEN\_ENTRY\_TIME, SCREEN\_EXIT\_TIME should reflect the specified conditions | David S. Berry / NASA | From: MOC = "O"  To: MOC = "OC" |  |
| 3-4 | Table 3-3 |  | ed/te | SCREEN\_PC\_THRESHOLD... perhaps should be relocated | David S. Berry / NASA | It seems to me that this keyword should come after all of the SCREEN\_VOLUME\_\* keywords, perhaps just prior to COLLISION\_PERCENTILE |  |
| 3-4 | Table 3-3 |  | ed/t-4e | Regarding SCREEN\_VOLUME\_X, SCREEN\_VOLUME\_Y, SCREEN\_VOLUME\_Z. If PC and PC\_MAX are removed from SCREEN\_VOLUME\_SHAPE, SCREEN\_ENTRY\_TIME, SCREEN\_EXIT\_TIME, as suggested above, then the shape qualification for these keywords becomes unnecessary. The MOC then can be simply "O". | David S. Berry / NASA | Consider. It will make the text simpler and more straightforward |  |
| 3-5 | Table 3-3 |  | te | COLLISION\_PERCENTILE: I think some more instruction on how to fill assign the value is desirable. | David S. Berry / NASA | Clarify usage. Provide at least one example, and perhaps a plot in Annex F |  |
| 3-5 | Table 3-3 |  | te | COLLISION\_PROBABILITY: I think some more instruction on how to assign the value if COLLISION\_PERCENTILE is desirable. | David S. Berry / NASA | Clarify usage. Provide at least one example, and perhaps a plot in Annex F |  |
| 3-6 | Table 3-3 |  | te | SEFI\_COLLISION\_PROBABILITY: given the algorithm in Annex F for calculating this, it is not clear why an array of 1 to n elements is needed for this keyword. | David S. Berry / NASA | Consider making the value here always a single double-precision number. |  |
| 3-8 | Table 3-4 |  | te | ODM\_MSG\_LINK: I can see why this might be relevant, however, it's redundant with the mandatory EPHEMERIS\_NAME keyword later in the Table. | David S. Berry / NASA | Consider removing this keyword. Alternatively, move the ODM\_MSG\_LINK contiguous with the EPHEMERIS\_NAME keyword and allow the user to select one or the other, but not both. Ultimately (in a later version of CDM) EPHEMERIS\_NAME could conceivably be phased out. |  |
| 3-8 | Table 3-4 |  | ed/te | ADM\_MSG\_LINK: I can see how ADM information could be relevant, in particular for orienting an OEB, but given that EPHEMERIS\_NAME reflects an orbit, should the attitude keyword be named similarly? | David S. Berry / NASA | Change ADM\_MSG\_LINK to "ATTITUDE\_INFO\_FILE" or something like that, and situate it after "EPHEMERIS\_NAME". |  |
| 3-9 | Table 3-4 |  | te | TDM\_MSG\_LINK: It's difficult for me to envision how a TDM could be relevant to a CDM. | David S. Berry / NASA | Suggest removing this keyword. |  |
| 3-10 | Table 3-4 |  | te | We will need to spend some time discussing changes to the reference frame set. The issue of the relevant reference frames for this application dominated the discussions on CDM V.1. The agreements from version 1 cannot be changed without knowledge of the history. Interesting that you cite a reference with co-author "M. Moury" (informative reference [G18])... she was one of the participants in developing the initial version of CDM and very much advocated having only a SINGLE reference frame for all CDMs. | David S. Berry / NASA | Discuss at Spring Meetings 2021. |  |
| 3-10 | Table 3-4 |  | ed/te | Requirements language | David S. Berry / NASA | From: The selected reference frame **is** the same for both Object1 and Object2.  To: The selected reference frame  **must be** the same for both Object1 and Object2. |  |
| 3-10 | Table 3-4 |  | ed | If the REF\_FRAME is to be selected from the SANA Registry (which is still up for discussion), then the "N/E" value for REF\_FRAME is not correct. In CDM V.1, the set of frames was very restricted, and the list of "Normative Values/Examples" was normative (N/E = N). Note that I still consider the set of values to be under discussion, so the N/E value could change back to "N", depending on the result of the discussion. | David S. Berry / NASA | From: N/E = "N".  To: N/E = "E" |  |
| 3-10 | Table 3-4 |  | ed/te | The location of the registry to be used for COV\_REF\_FRAME is not provided. | David S. Berry / NASA | Add "located at:  https://sanaregistry.org/r/celestial\_body\_reference\_frames" |  |
| 3-10 | Table 3-4 |  | ed/te | Given the definition of COV\_REF\_FRAME, the "N/E" column is incorrect | David S. Berry / NASA | From: N/E = "N".  To: N/E = "E" |  |
| 3-11 | 3.5.2 | NOTE |  | The "NOTE" at the end of this section uses normative requirements language, which cannot be used in a NOTE. | David S. Berry / NASA | Number the NOTE as 3.5.3 |  |
| 3-13 | Table 3-5 |  | ed/te | OEB\_PARENT\_FRAME description refers to OEB\_ROLL and OEB\_YAW which are not defined. | David S. Berry / NASA | Rather than add 2 keywords that may not be necessary given the OEB\_Q\* keywords, remove OEB\_ROLL and OEB\_YAW from the OEB\_PARENT\_FRAME description. |  |
| 3-14 | Table 3-5 |  | ed | OEM\_MAX is a typo | David S. Berry / NASA | From: OEM\_MAX  To: OEB\_MAX |  |
| 3-15 | Table 3-5 |  | te | The value of the VM\_\* visual magnitude keywords is not clear for the CDM. | David S. Berry / NASA | Consider whether these really add value. |  |
| 3-15 | Table 3-5 |  | ed | HBR: The parenthetical "(Object 1 or Object 2)" is superfluous. It could apply to every keyword in this section. | David S. Berry / NASA | Remove parenthetical comment. |  |
| 3-15  3-16 | Table 3-5 |  | ed/te | APOAPSIS\_HEIGHT, PERIAPSIS\_HEIGHT... were these keywords specifically requested? | David S. Berry / NASA | I think "ALTITUDE" is more frequently used than "HEIGHT". |  |
| 3-15  3-16 | Table 3-5 |  | ed | APOAPSIS\_HEIGHT, PERIAPSIS\_HEIGHT have a minor grammatical error | David S. Berry / NASA | From: objects orbit  To: object's orbit (added possessive apostrophe) |  |
| 3-18 | Table 3-5 |  | ed | Typo "meta data" | David S. Berry / NASA | From: meta data  To: metadata |  |
| 3-18 to 3-20 | Table 3-5 |  | te | The section titled "Additional covariance meta data" seems to me to be a variety of "fudge factors" with tenuous relation to reality. Since they relate to numbers already in the covariance matrix (that supposedly already represent the uncertainty), it's not clear what value this section has. | David S. Berry / NASA | Clarify value of these factors, what constitutes "covariance realism", and why the 3 covariance matrix formulations don't achieve the desired realism (probably these things should be in Annex F, but the questions arise here. |  |
| 4-2 | 4.3.1 | 3 | ed | Section reference typo | David S. Berry / NASA | From: "C1.2 through 3.6C1.4"  To: "C1.2 through C1.4" |  |
| 4-2 | 4.3.3.3 | 4 | ed/te | Link needs an update. It may also change again depending on how the ODM and ADM progress, | David S. Berry / NASA | From: "http://sanaregistry.org/r/ndmxml/ndmxml-1.0-master.xsd"  To:  "http://sanaregistry.org/r/ndmxml\_unqualified/ndmxml-2.0.0-master-2.0.xsd" |  |
| 4-3 | 4.3.3.8 |  | ed/te | Link needs an update. It may also change again depending on how the ODM and ADM progress, | David S. Berry / NASA | From: "http://sanaregistry.org/r/ndmxml/ndmxml-1.0-master.xsd"  To:  "http://sanaregistry.org/r/ndmxml\_unqualified/ndmxml-2.0.0-master-2.0.xsd" |  |
| 5-1 | 5.2.7 |  | ed/te | Requirements language... the phrase "will be mandatory" doesn't have a formal meaning in CCSDS documents. | David S. Berry / NASA | From: "will be mandatory"  To: "shall"  Note that some other text changes may be needed to smooth it out and make it "good English". |  |
| 5-1 | 5.2.7 |  | ed/te | Format of covariance matrix is not clear for "COV\_TYPE=XYZ". | David S. Berry / NASA | Specify if the lower triangular notation should be used for COV\_TYPE=XYZ as well as COV\_TYPE=RTN. |  |
| 5-1 | 5.2.8 |  | ed/te | I'm not sure this section is necessary since this statement is provided on each element of the quaternion in Section 3 | David S. Berry / NASA | Consider removing 5.2.8 |  |
| 5-1 | 5.2.9 |  | ed/te | Logically, it seems that this paragraph should precede the section currently numbered 5.2.7 | David S. Berry / NASA | Move current 5.2.9 before current 5.2.7 |  |
| 5-1 | 5.2.9 |  | ed/te | Requirements language | David S. Berry / NASA |  |  |
| A-2 | A1.2 |  | ed/te | Regarding the addition of codes "MC" and "OC", the official CCSDS ICS book says that additional designations may be defined if necessary, though it's not encouraged. Additionally, if "MC" and "OC" are added, it seems there is no need for plain "C". | David S. Berry / NASA | Consider whether the new codes are really necessary. |  |
| A-3 | A2.1.4 |  | ed | Document number | David S. Berry / NASA | Should use 508.0 Version 2 |  |
| A-4 | A2.1.5 | Item 9 | ed | Misspelled keyword | David S. Berry / NASA | From:CONJUCNTION\_ID  To: CONJUNCTION\_ID |  |
| A-5 | A2.1.5 | Items40, 41 | ed | The order of EPHEMERIS\_NAME and OBS\_BEFORE\_NEXT\_MESSAGE is reversed relative to Table 3-4 | David S. Berry / NASA | Reverse order in Sec A2.1.5 |  |
| A-5 | A2.1.5 | Item 44 | ed | Keyword is shown as "ORBIT\_CENTERCENTER\_NAME" | David S. Berry / NASA | From: ORBIT\_CENTERCENTER\_NAME  To: ORBIT\_CENTER, consistent w/Table 3-4 |  |
| A-6 | A2.1.5 | Item 77 | ed | Typo in Keyword "OEM\_MAX" | David S. Berry / NASA | From: OEM\_MAX  To: OEB\_MAX |  |
| A-7 | A2.1.5 | Item 105 | ed/te | The status is "M", but a condition is expressed in the "Feature" column and all of the keywords have a conditional status. | David S. Berry / NASA | Change status to "MC" |  |
| A-8 | A2.1.5 | Item 111 | ed/te | The status is "M", but a condition is expressed in the "Feature" column and all of the keywords have a conditional status. | David S. Berry / NASA | Change status to "MC" |  |
| A-8 | A2.1.5 | Item 117 | ed/te | The status is "M", but a condition is expressed in the "Feature" column and all of the keywords have a conditional status. | David S. Berry / NASA | Change status to "MC" |  |
| A-8 | A2.1.5 | Item 117, 118, 119 | ed/te | The "COV\_TYPE=EIG" looks like a leftover from an earlier version | David S. Berry / NASA | From: COV\_TYPE=EIG  To: COV\_TYPE=CSIG3EIGVEC3 |  |
| F-1 |  |  |  |  |  |  |  |
| F-6 | F4 |  | ed | APOAPSIS\_HEIGHT, PERIAPSIS\_HEIGHT... description has a couple of minor grammatical errors | David S. Berry / NASA | From: objects orbit  To: object's orbit  From: they are  To: it is |  |
| F-1 | F1 |  |  | Typo in definition of COLLISION\_PROBABILITY, line 2 | David S. Berry / NASA | From: PROBABILILY  To: PROBABILITY |  |
| F-6 | F4 |  | ed | INCLINATION description has a typo | David S. Berry / NASA | From: which is measures  To: which is measured |  |
| G-1 | Ref [G1] |  | ed | References older version | David S. Berry / NASA | Change to Issue 4, doc # 500.0-G-4, November 2019 |  |
| G-1 | Ref [G2] |  | ed | I believe there's a new version about to be released. | David S. Berry / NASA | Check with Dan since it's coming out of one of his SC14 WGs. |  |