US Certification May 2002
Media Group's informal minutes.

These informal minutes were written to reflect the discussions and decisions made by the media group. They must not be considered as official minutes but providing an insight into the way the Certification was carried out and as an aid to future certifications.

Day 1: May 8th, 2002.

After forming the media group four members went over to the MPF (Media Processing Facility) to witness the process of preparing 21-step calibration wedges for processing of in-flight examination media. A signature box containing the signatures of the four participants present was exposed next to every wedge.

Day 2: May 9th, 2002.

After required briefings by the certifying team the elected media group leader (David Cooper UK) outlined the following topics to be tackled:

- Data review in accordance with Annex D requirements
- Sample checks re-read L2 and K2, recalculate Hmin
- Confirm Hmin expected (US is aware that they fly at risk if they fly before Hmin expected is confirmed by this group)
- Witness film processing
- Carry out L2 readings
- Selection of negatives
- Ensure correct information is recorded during in-flight examination
- Witness K2 readings
- Witness Data input into Hmin calc
- Review in-flight examination results and recommend Hmin-cert values to main group
- Check CD ROM contents

The media group was divided into five subgroups, to deal with the data review.
Group 1 looked at Annex D requirements concerning information provided.
Group 2 carried out spot checks on data base imagery and carried out Hmin calculation checks.
Groups 3 through 5 carried out a review on configurations' Hmin-expected.

Annex D working group (Group 1)

- No info on sensor covers. (pictures not required but for ground examination this would be handy)
- Some pictures are overexposed by the flash (completely whited-out)
- More time needed to check calibration procedures required according to the SGD

Sensor covers reference (Ann D SII 4 B) "the observation aircraft, as well as its sensors, associated equipment and covers for sensor apertures or other devices that inhibit the operation of sensors, indicating their location on the observation aircraft with the help of diagrams, photographs, slides and other visual materials

Spot Checking working Group (Group 2):
Data flight number OS6003 (configuration US_OP_3001) was reviewed: L2 and K2 were re-evaluated and Hmin was recalculated. A 7% difference was found. The cause might be that the US used two different calibration wedges. One was used for process control and another for calibration of the microdensitometer. This difference was determined because the Americans measure the 21-step sensitometric wedge on the Microdensitometer and the review group used the DLogE curve from the macro-densitometer (X-rite). When the review group used the Microdensitometer values, a much smaller difference in Hmin was calculated. Furthermore, it was determined that the Americans now use the same calibration wedge for both the densitometer and Microdensitometer.

3404 review (Group 3):
3004: some small anomalies will need more attention however this does not indicate to change Hmin-exp significantly.

3412 review (Group 4):
3013: Some issues need explanation by the US team. In one case data was found to be missing: it was not on the CD containing all Hmin calculations provided by the certifying team. Also it was not available or in hard-copy. More time needed for evaluation.

SO-050 review (Group 5):
Hmin expected seems to be OK. See comment below reference to L2.

Groups 3, 4 and 5 commented on the wide range of L2 reading of the same negative for several data lines. This will be investigated further to find the impact on Hmin-expected. Re-reading is not possible due to the immense size of the package. If necessary a question will be formulated later.

In-flight monitoring: The joint certification in Nordholz exposed the problem of handing over off the correct on-flight data to the media group. Proposal to have a representative from the media group to fly on the in-flight inspection to ensure all relevant information is passed to the media group as soon as possible.

The certifying team was debriefed on the observations that arose from initial review of the data provided.
Sensor cover pictures/diagrams might be an enhancement to the CD ROM.
Media group's review needs more work
Data review came up with a remark for the L2 readings, more attention by the data group is needed.
The missing data on 3013 will be specified tomorrow.

Day 3: May 10th, 2002.

A question was raised about the resolution increase towards the edges of the lens seen in the KA91C MTF curves provided in the data package.
The group of participants asked the media group to investigate this question and provide a recommendation. Review of the MTF's provided on the US certification CD proves the point of best resolution at the 10% cut-off frequency to 99 lp/mm in the centre while there are 140 lp/mm at the edge of the frame. The discussion resulted in a recommendation to the main group for some additional flight test data. The recommendation is at the end of these informal minutes as Attachment 1. This was presented to the Certifying team.

Annex D group (Group 1)

- Information on all the targets used for data gathering, has not been included on the CD.
- The following discrepancies were found in the OSF3:

  §5 A 1 H (ii) : 66.8 should be 133.4
  §5 A 2 C (ii) : 2.40 should be 4.0
  §5 A 2 E (ii) : 5.99 should be 4.5
  §5 B 1 : 427.2 should be 457.2

3412 review (Group 4):

- Big differences between readers, 7 is not exceptional. It was accepted that those readings are real and inclusion in the data package are a risk the certifying team takes.

3404 review (Group 3):

- Checking the data spreadsheet provided on the US certification CD with the hard copies of the data package, most of the lines deviate a little from the spreadsheet. The soft copies of the calculations generally agreed with the spreadsheet.
  After consulting the certifying team the problem was identified as a rounding problem. Two different spreadsheets had been used, one used two digits and the other used three digits in the K2 values to calculate Hmin. The hard-copy data package will be updated with the correct printed spreadsheets, this will take a lot of time and may not be finished before signing the OSF25. It is important to know is that values in the spreadsheet on the US certification CD are the correct ones. This should been checked prior to completion of the format 25.
- Several configurations contain data collected over other targets. One target used for these DGF's has different sized bargroups. For the calculation the sizes of the WPAFB target were used resulting into wrong Hmin results. The certifying team has been made aware and will recalculate the Hmins with correct L2 values. This will lead to a change in some Hmins-expected. Polish and Norwegian targets were also used, it was confirmed correct bargroup sizes were used.

US_OP-3003.

- Two different camera settings were used: 100Y and 150R. 150R could overexpose by 1.5 stops. No deviation in the Hmins-calculated was found, proving the exposure was still suitable good resolution. Please verify and provide explanation.

US_OP-3004.

- Frames taken on the 19th of September 1998 are 600 to 1200 meters higher than the next point, the US is aware of this but had no reason to exclude this data.

US_OP-3009.

- Three different camera film sensitivity settings were used: 6, 8 and 10. This is compared to the setting of 10 which is the setting to used according to the provided information, settings 6 and 8 are overexposing the imagery. The Dmin is out of the area of best resolution as described in manufacturer specifications provided on the US certification CD. The average Hmin of the 15 data-lines with the wrong setting is 2316m while Hmin-expected for this configuration is 3004m. Deletion of the lines results in a 71m higher Hmin-expected. Please verify and comment.

SO-050 review (Group 5):

- Big differences between readers, Hmins appear to be ok.

In-flight monitoring.
Media Group participants monitoring the co-ordination of configurations proved the changing of magazines to be well organised.

Film from the first in-flight inspection arrived at the MPF at about 16.00h, processing was observed and completed by 21.00h. All the imagery was selected and cut the same evening to enable L2 reading to begin tomorrow. All aspects of these activities was monitored by an inspector. The Certifying team provided a CD containing most of the requested corrections.

Day 4: May 11th, 2002.

Groups 3, 4 and 5 have finished their work. Two observations have been passed to the certifying team. (See attachment 2). Third observation was on US_OP-3017: The data point with lowest Hmin calculated is 150 meters lower than nearest Hmin value, only difference to the rest is the fact that this is the only frame where the target is in position 5. This observation might help to explain a deviation in Hmin in case this zone is used for frames from the in-flight examination. The work of this group and the calculations corrected due to the different target used resulted in the following list of corrected Hmins-expected:

US_OP_-3001: 10814m
US_OP_-3002: 6169m
US_OP_-3003: 6624m
US_OP_-3004: t.b.d.
US_OP_-3005: 4834m
US_OF_-3007: 2099m
US_OF_-3008: 2224m
US_OF_-3009: t.b.d.
US_OF_-3010: 2801m
US_OF_-3011: 1506m
US_OF_-3012: 1440m
US_OF_-3013: 2172m
US_OF_-3014: 1994m
US_OF_-3015: 2099m*)
US_OF_-3016: 2224m*)
US_OF_-3017: t.b.d.*)
US_OF_-3018: 2801m*)

As decided according to the outcome of the participants' discussion on the following proposal presented by the certifying party handed out in the arrival information for this certification:

- ❖ Oblique Camera Question:
- ❖ We wish to pursue the certification time saving measure afforded by the Sensor Guidance Document, para 2.2.2.1
- ❖ We hold that the left and right cameras are "essentially identical" and IAW SGD, we have provided flight test data to support the case
- ❖ During you participants organizational meeting, we will request agreement with this methodology, and ask that you select left or right configuration sets

➢ Consensus: Agree to US proposal, Hmin from the left configuration, being the highest value will be accepted as Hmin expected for both Left and Right configuration provided that configuration US_OF_3017 is flown and the result will support the provided data.

Remarks: If US provides this aircraft for taxi-option they cannot guarantee a 30cm resolution for the right oblique camera configurations, since the provided data proves that this configurations can be flown at lower altitudes. US did not think about this, however they do not think someone will lease there aircraft due to high costs.

In-flight monitoring:
Media Group representation monitored all essential areas during the in-flight examination and kept a sensor log which was presented at the MPF along with the exposed film at 15.^{30}h

One Hmin result available: US_OP_-3001, Hmin calculated 10480m. Hmin review team will cross check and verify the results.
All readings have been done except for the 3004 configuration for which we still await a reaction on the observations we made.

Day 5 & 6: May 12-13th, 2002.

The discrepancies found in the OSF3 have been handed over in paper copy to the certifying team (See attachment 3).

So far the following results are available:

US_OP_-3001:
US: 10480m (-3%)

US_OP_-3005
US: 5051m (4%) X-check: 5197m (7.5%)

US_OF-3007:
US: 1963 (-6%)

US_OF_-3011
US: 1500m (0%)

US_OF_-3013
US: 1702m (-22%) X-check: 1743m (-19.8%)

US_OF_-3014:
US: 1501m (-25%) X-check: 1532m (-23.6%)

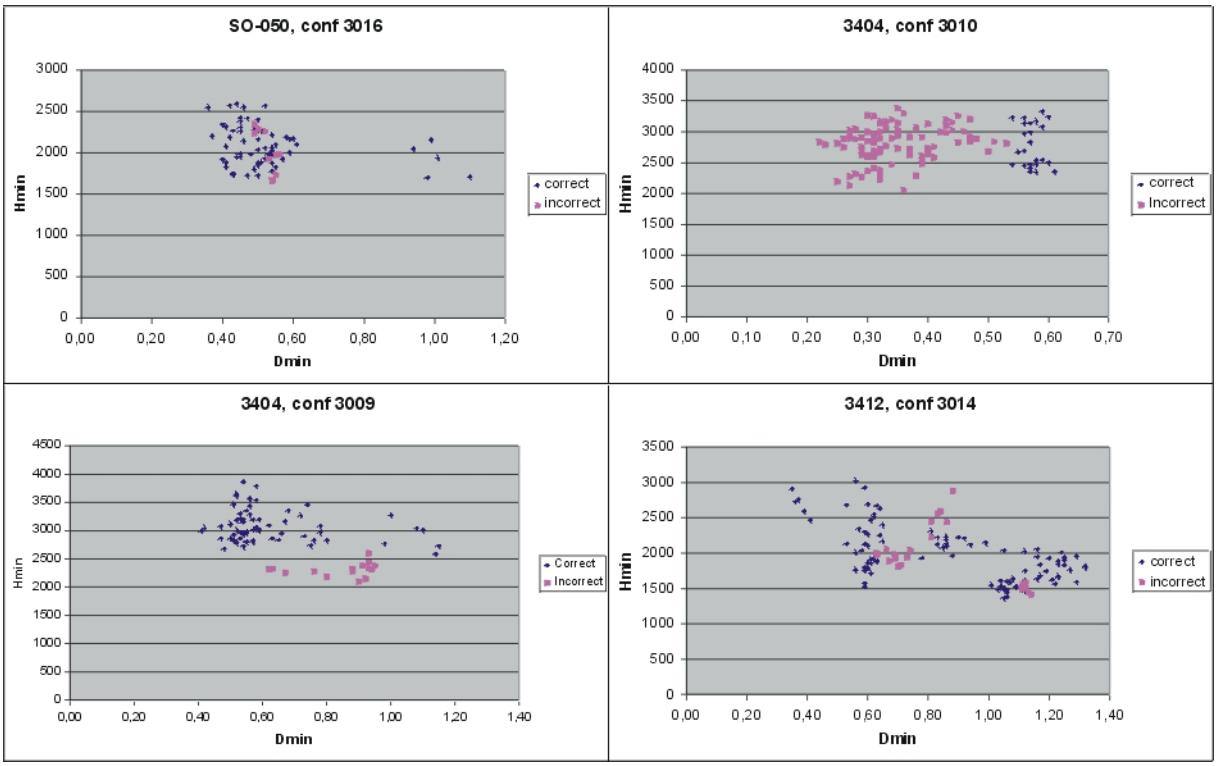
note: X-check carried out by Hmin review group.
The difference of the values found during the X-check is caused by a different way of calculating the L2 value using the best possible resolution for every reading instead of averaging all across and all along and take the best of both averages. One of the readers appeared to have misunderstood the readers briefing because compared to the results of the rest of the readers across and along were always reversed. After discussion there was consensus this might not be the case and the reader did understand the briefing.

A list of pre-mentioned over-exposed pictures on the certification CD (day 2) were handed over to the certifying team (see attachment 4).

A concern was raised on the configurations using Kodak 3412 film at lower altitudes. According to manufacturer specifications the film is made for medium and high level use. The characteristics indicate the film is not suitable for lower altitudes. The group agrees this film is not ideal for use in the vertical camera configurations put up for certification however, the data provided the configuration stable and therefor acceptable.

Remarks to Data Review Group by certifying party.
The certifying team gave a presentation on the observations passed on (attachment 2) and also provided an explanation for the Hmins exceeding 20% of Hmin expected (configurations 3013 and 3014):
US_OP_-3004
US admits some data is more consistent than other. This particular data might be out of the ordinary but US could not find any reference which supports taking this data out and therefore requested the group to accept Hmin expected as originally presented.
US_OF_-3009
The certifying team settled upon a S/C setting (speed over color) after several years of experimenation. Deleting the data in question will lead into a 2.8% difference of Hmin/Hi, 2.3% for Scaled L2/Hi. The data in the package for this configuration was analysed thoroughly and was found to meet the strictest requirements. Therefore the certifying party asks the group to accept the Hmin-expected as reported (3004m).
US_OF_-3013 and US_OF_-3014
During the in-flight examination the weather was exceptionally good. This was not compensated for with the camera settings. This lead into overexposure causing the light bars to bleed on the dark bars resulting in a low L2 value. The K2 measurements proved the information to be high up but still on the straight line portion of the sensitometric curve. The certifying team provided a graph showing datapoints on D-Black over Hmin for this configurations There were two lines showing the 20% areas and a trendline. The trendline for this graph runs through the D-Black points of the in-flight examination's frames. This means if the exposure was correct the D-Blacks will move up the line bringing the Hmin calculated inbetween the 20% lines

Media Group discussion on the above remarks lead into acceptance of the Hmin-expected for the US_OP_-3004 configuration. The group accepted the explanation of exceeding the 20% area for configuration US_OF_-3013 and US_OF_-3014, as long as there will be a remark in the informal minutes (attachment 5). However, Hmin-expected will be recommended to become Hmin-certified. For the US_OF_-3009 the group needed some more investigation. This investigation led into the following graphs:



The graphs proves underexposing does not influence the Hmin for three of the configurations. For the configuration 3009 the underexposed resulted in different Hmins. However, the Hmins are lower than correctly exposed frames. This proves if the cameras are operated at Hmin-expected and the wrong camera setting is used the resolution in the image becomes worse. This also backs up the explanation US provided for configurations 3013 and 3014 as described above.

Main group asked for changed and additional pictures to be taken. A list was provided and is available for the media group. A final review of the CD will be done on Wednesday the media group will assure the changes proposed were taken care of.

US_OP_-3001 No items open therefore Hmin-expected will be recommended to become Hmin-certified.

US_OP_-3003 X-check has been carried out There are no open items on this configuration and therefore Hmin-expected will be recommended to become Hmin-certified.

US_OP_-3004 X-check has been carried out There are no open items on this configuration and therefore Hmin-expected will be recommended to become Hmin-certified.

US_OP_-3005 Hmin-expected will be recommended to become Hmin-certified.

US_OF_-3007 X-check has been carried out There are no open items on this configuration and therefore Hmin-expected will be recommended to become Hmin-certified.

US_OF_-3008 X-check has been carried out There are no open items on this configuration and therefore Hmin-expected will be recommended to become Hmin-certified.

US_OF-3009 Hmin-expected will be recommended to become Hmin-certified.

US_OF_-3010 X-check has been carried out There are no open items on this configuration and therefore Hmin-expected will be recommended to become Hmin-certified.

US_OF_-3011 Hmin-expected will be recommended to become Hmin-certified.

US_OF_-3012 X-check has been carried out There are no open items on this configuration and therefore Hmin-expected will be recommended to become Hmin-certified.

US_OF_-3013 No open items, Hmin-expected will be recommended to become Hmin-certified, there is a remark in the informal minutes of the media group.

US_OF_-3014 No open items, Hmin-expected will be recommended to become Hmin-certified, there is a remark in the informal minutes of the media group.

US_OP_-3015 Hmin-expected will be recommended to become Hmin-certified.

This lead into the following list which will be brought to the big group as a recommended Hmins-certified.

US_OP_-3001: 10814m	US_OF_-3009: 3004m	US_OF_-3015: 2099m
US_OP_-3003: 6169m	US_OF_-3010: 2801m	US_OF_-3016: 2224m
US_OP_-3004: 6624m	US_OF_-3011: 1506m	US_OF_-3017: 3004m
US_OP_-3005: 4834m	US_OF_-3012: 1440m	US_OF_-3018: 2801m
US_OF_-3007: 2009m	US_OF_-3013: 2172m	
US_OF_-3008: 2224m	US_OF_-3014: 1994m	

KA –91C Panoramic camera proposal.

The certifying team provided a briefing on the first recommendation of the media group (attachment 1). In this presentation they provided information on compliance with the Treaty and the SGD. Then they provided information on the increase of resolution according to the MTF and the loss of resolution as an effect of the increased slant range. After the presentation US came with the following two questions:

- *Do you agree that we are in compliance with the Treaty*
- *Do you agree that we are in compliance with the SGD*

Then they came with four proposals:

- *Please consider our obligations under the Treaty*
- *Please consider your rights under the Treaty*
- *Please consider the recommendations of the SGD and the merits of this presentation*
- *Please withdraw the recommendation to fly*

All six bullets were accepted in silence. The recommendation was based on information provided. The additional information provided in the presentation showed a 3.3% gain of resolution in the area specified in our recommendation, a unanimous show of hands led into withdrawal of the recommendation for flight test data.

This leaves only the items on the Format 3, information on the targets and the imagery on the CD as unresolved items. The certifying team is working on the questions asked (attachement 3), photo's have been taken of the sensor covers, the overexposed photos have been re-taken. If the pictures requesred and the target data shows up on the CD the item can be closed.

Day 7: May 14th, 2002.

The certifying team today gives a demonstration on their duplication capabilities. Following this duplication demonstration the certifying party wish to attach a comment to the format 25 to reflect their compliance to Annex K duplication requirements. Some older flight test data will be analysed. A duplicate will be made and the imagery will be analysed.

Attachment 1: Data review Group Recommendation 1.

Media Group Recommendation. KA 91C Panoramic Camera Resolution Check 10th May 2002

It is quite normal for the point of best resolution of an optical system to be close to the centre of the frame, resolution decreasing towards the edges. Therefore, AC passes are carried out directly over the target bringing the target into the centre of the frame. However, according to the information provided on the KA-91C panoramic camera, the ground resolution increases towards the edge of the image.

The explanation provided by the certifying team did not completely satisfy some concerns within the group. There is some data in areas 7 and 8 of the template, as specified on the US certification CD, however, these areas are too large to remove all the doubts.

To completely satisfy the needs of the media group some additional flight test data is required. The group is aware of the Treaty reference, (Annex D Appendix 1 Section II Paragraph 1) which states that during an in-flight examination the line of flight should be directly over and parallel to the calibration target. However, the group recommends flying five additional passes on the US_OP_3004 configuration at an off-set track between 12 and 18 degrees using the maximum scan-angle.

Attachment 2: Observations Data Review, handed over at 13.^{00}h, May 11th, 2002.

Observations passed to the Certifying Team as a result of the Data Review

Configuration US_OP_-3004.

H_{min} calculations done on frames taken on the 19th of September 1998 are very high (9094, 9348, 9480 and 9687m) compared to the rest of the data in this configuration: $H_{min-expected}$ is 6624m the nearest H_{min} value (8492m). The cause for this is the very low K2 values. SGD 5.1.4.1 says K2 should be above 0.30, desirable above 0.35. K2 values are just above 0.35 however, compared to the rest of the data they are low. Weather reports for that day give no indication of high humidity, rain or fog. No anomaly described in SGD 5.4.1 is found however, according to the data review group these frames are considered abnormal within this data package. Deletion of the lines result in a substantial decrease of $H_{min-expected}$ and reflect a more accurate $H_{min-expected}$ for this configuration. Please provide comments on this observation.

Configuration US_OP_-3009.

Three different camera film sensitivity settings were used: 6, 8 and 10. This is compared to the setting of 10 which is the setting to used according to the provided information, settings 6 and 8 are overexposing the imagery. The D_{min} is out of the area of best resolution as described in manufacturer specifications provided on the US certification CD. The average H_{min} of the 15 data-lines with the wrong setting is 2316m while $H_{min-expected}$ for this configuration is 3004m. Deletion of the lines results in a 71m higher $H_{min-expected}$ which may more accurately reflect the $H_{min-expected}$ for this configuration. Please verify and comment.

Attachment 3: Observations Review Format 3 and Annex D information, handed over at 13.^{00}h, May 12th, 2002.

Media Group Recommendation, different targets used for test data collection and observations after review of the OS Format 3.

Format 3:
The following discrepancies were found in the OSF3:

§5 A 1 H (ii) : 66.8 should be 133.4
§5 A 2 C (ii) : 2.40 should be 4.0
§5 A 2 E (ii) : 5.99 should be 4.5
§5 B 1 : 427.2 should be 457.2

Please verify and correct if needed.

Targets:
Not all information on targets used for data collection is available on the CD. Please verify and provide information.

Attachment 4: Observations Review Annex D information, handed over at 15.^{00}h, May 12th, 2002.

Review of the US data package for Annex D requirements

During the review of the data package provided on CD by the certifying state party, it was noticed that a few images of the "Interior Center" location of the aircraft were overexposed. The reflection from the flash cause significant "white-out" in the image. Especially for the following images:

672_2023.tif
672_2013.tif
672_2025.tif

The Media Group recommends that these pictures be retaken and included in the final the data package.

It was also observed that there were no images of the sensor covers included in the data package. The Media Group realizes that there is no requirement to include these images in the data package, however, the Media Group recommends that the sensors cover pictures be included for enhancement of the data package.

Attachment 5: Remark for configurations US_OP_-3013 and US_OP_-3014.

While examining the frames from the in-flight examination for these two configurations Hmin-calculated was outside the 20% window. This window has been decided on in the OSCC's Informal Working Group on Certification as the way to come to an Hmin certified for a configuration:

Hmin-expected becomes Hmin-certified if within 20% however, bigger deviations are to be expected and will be discussed.

The certifying team provided an explanation for the deviation and the discussion led to approval of the configuration by consensus.