



RTCA Paper No. 029-25/SC159-1122

Washington, 6 March 2025

EUR 091-25 / WG62-157

Saint-Denis, 6 March 2025

Summary of the One Hundred and Eighteenth Meeting

Special Committee 159 (SC-159)

Navigation Equipment Using the Global Navigation Satellite System (GNSS)

And

Seventy Fourth Meeting

EUROCAE Working Group 62 (WG-62)

GNSS

The one hundred and eighteenth meeting of SC-159 was held on February 10, 2025, in person and virtually, from 9:00 a.m. to 1:00 p.m., Eastern Daylight Time. The meeting was held jointly with the seventy fourth meeting of EUROCAE WG-62 (GNSS). The attendees were the following:

NAME	COMPANY
Christopher Hegarty (Co-Chairman)	The MITRE Corporation
George Ligler (Co-Chairman)	Texas A&M University
Wes Googe (Secretary)	American Airlines
Mikael Mabilieu (WG-62 Secretary)	EUROCONTROL
Hamza Abduselam (GAR)	Federal Aviation Administration (FAA)
Rebecca Morrison (Program Director)	RTCA
Mark Watson (Technical Programme Manager)	EUROCAE

NAME	COMPANY
Alessandro Adinolfi	ANAC-Brazil
Ken Alexander	Federal Aviation Administration (FAA)
Capucine Amielh	Airbus
John Ashley	The MITRE Corporation
Laurent Azoulai	Airbus
John Barry	Federal Aviation Administration (FAA)
Dmitri Baraban	The MITRE Corporation
Jeremy Bennington	Spirent
Dennis Bouvet	Thales
Craig Boxrucker	ALPA
Natali Caccioppoli	EUROCONTROL
Jed Dennis	FAA/NAVTAC
George Dimos	US Department of Transportation (DOT)

Andrew Elliot
Philippe Estival
Davide Ferraro
John Foley
Boyuan Gong
Matt Harris
Sai Kalyanaraman
Jeff Kerr
Karl Keyzer
Vignesh Krishnan
Andreas Lipp
Fan Liu
Tin Needham
Christophe Ouzeau
John Owen
Kristi Peterson
Doug Phifer
Lauren Porr
Dave Redman
John Studenny
Mohamed Tamazin
Shizhen Tian
Li Tieshuai
Dan Tillet
Francois Tranchet
Hans Trautenberg
Daniel Viotti
Brian Wadzink
Joel Wichgers
Hu Yaying
Mike Zaiko
Zhang Ziwu
Danyang Zhang

US Air Force/ US Space Force
DSNA
Leonardo
Garmin Ltd.
COMAC
The Boeing Company
Collins Aerospace
Federal Aviation Administration (FAA)
Honeywell International
Honeywell International
EUROCONTROL
Federal Aviation Administration (FAA)
NGC
Collins Aerospace
Defence Science Technology Laboratory (DSTL)
Federal Aviation Administration (FAA)
Federal Aviation Administration (FAA)
Zeta Associates
AVSI (Texas A&M University)
CMC Electronics
Safran Group
COMAC
COMAC
Spirent
Airbus
EASA
Embraer
Honeywell International
Collins Aerospace
COMAC
Zeta Associates
COMAC
COMAC

AGENDA

1. Introductory Remarks: RTCA, EUROCAE, GAR and Co-Chairs
2. Approval of Summaries of Previous Meetings
 - a. One Hundred Seventeenth Meeting for SC-159 and Seventy Second Meeting for WG-62 held October 25, 2024 (RTCA Paper No 002-25/SC159-1121 / EUROCAE Reference Number 003-25/WG 62-154)
 - b. Seventy Third Meeting for WG-62 (jointly working session with SC-159 WG-2) held January 13- 17, 2025
3. GPS/WAAS (WG-2 and EUROCAE WG-62) Update
 - a. Discussion of Work Plan
4. BeiDou Internal Report Status
 - a. IR (WG-62 SG-1) RAC/Peer Review Resolution Update
 - b. Consider BeiDou IR for approval to forward to TAC and PMC
5. Discussion of Terms of Reference Updates
6. Action Item Review
7. Assignment/Review of Future Work
8. Other Business
9. Date and Place of Next Meeting
10. Adjourn

* Hamza Abduselam, Federal Aviation Administration (FAA), was the Government Authorized Representative for this meeting.

Agenda Item 1. Introductory Remarks: RTCA, GAR and Co-Chairs

- **SC-159 Co-Chairman Dr. Chris Hegarty called the Plenary to order at 9 am and welcomed everyone to the meeting.** This Plenary meeting was convened as an off scheduled meeting to address issues brought up at the fall biannual plenary. Dr. Hegarty then went back to Ms. Morrison and Mr. Watson, Technical Programme Manager of EUROCAE, to review the guiding policies for this joint RTCA/EUROCAE Plenary.
- Rebecca Morrison, SC-159 Program Director at RTCA, stated that that meetings are conducted in strict accordance with U.S. anti- trust laws. She discussed RTCA’s export compliance policy, proprietary references policy and committee participation membership policy. Ms. Morrison noted that this Plenary meeting is open to the public, and that notice of the meeting was published online and that members of the public may present written or oral statements with the permission of the committee chairpersons and program director.
- Mark Watson, Technical Programme Manager of EUROCAE, discussed EUROCAE’s Intellectual Property Rights and Membership policies as well as General Data Protection and Privacy regulations. He also reminded all that Russia was still excluded from participating in EUROCAE activities. He commented that if any participants online were from Russia, they would be asked to leave the meeting.
- Then Dr. Hegarty then introduced the SC-159 leadership team. Dr. Hegarty then asked those on the web to introduce themselves and their company affiliation.

Agenda Item 2. Approval of Summaries of Previous Meetings

- a) The summary for the 117th meeting of SC-159 and Seventy-second Meeting for WG-62 held on October 25, 2024 (RTCA Paper No. 002-25/SC159-1116 / EUROCAE Reference Number 003-25/WG62-154), was presented to the meeting. Meeting attendees were asked to review the summary and provide any comments to RTCA. **Dr. Hegarty asked the group if there were any changes needed for the minutes beyond what had already been submitted. There were no comments from the group, so Dr. Hegarty dispositioned that the minutes were approved.**
- b) The summary for the 73rd meeting of WG-62 (and SC-159 WG-2) held on January 13 – 17, 2025, was determined to be unfinished at the present time. **Mikael Mabillean (WG-62 secretary) commented that this last meeting had multiple topics presented. Yet at this time the summary was not ready to be submitted for approval. Mr. Mabillean indicated that the summary should be available the following week.**

Then Dr. Hegarty asked for any other comments. None were heard so he moved to Agenda item 3.

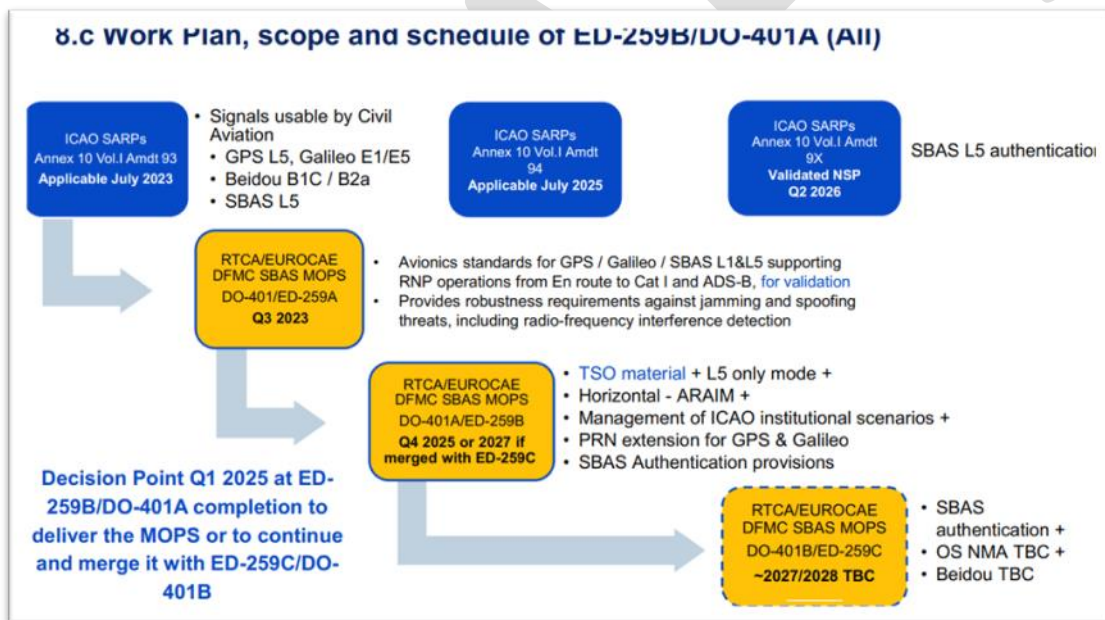
Agenda Item 3. GPS/WAAS (WG-2 and EUROCAE WG-62) Update

Item 3a Discussion of Work Plan

Dr. Hegarty asked Mr. Mabillean to begin his presentation.

Background

- The scope and development schedule of ED-259B/DO-401A was agreed in WG2/62#68 meeting (October 2023) which included the following features:
 - Rev A MOPS validation
 - H-ARAIM (see other presentation)
 - Additional robustness to RFI
 - Institutional scenarios
 - Extended GPS PRN and GAL SVID ranges
 - SBAS authentication initial provisions



- The workplan included a decision point in Q1 2025 to validate ED-259B/DO-401A scope and schedule.
 - WG2/62 leadership organised the discussion associated to that decision point within the WG2/62#73 meeting held in January 2025.


FAA inputs to workplan discussion

- FAA advocated for inclusion of V-ARAIM in the MOPS by the 2027 timeframe.

Summary

- **FAA continues to develop ARAIM concept and standards, targeting V-ARAIM SARPS and MOPS completion by end of 2027**
- **Moving forward with pre-development activities**
 - Can align development with broader industry commitment
- **Need RTCA/EUROCAE effort for vertical ARAIM to match other activities (MOPS by end 2027)**

WAAS Program Overview
January 16, 2025



Federal Aviation
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- GPS PICWG meeting should be called by the coming months to finalise ISD and ARAIM related information within GPS ICDs.
- ARAIM pre-development activities include ISMG implementation and flight test demonstration expected in 2025.

EUSPA inputs to workplan discussion

- An initial WAAS DFMC service supporting aviation operations will be available in 2027. EGNOS DFMC service is expected to be available around 2029.
 - OSNMA Initial Service declaration expected in Q1-2025.
 - OSNMA SARPs planned to be approved by NSP/8 (Q1 2026).
 - Galileo OSNA is ready and operational and has been demonstrated to be an asset for spoofing detection.

- Receiver prototype projects to be launched to support MOPS Rev. B validation, validation of SBAS authentication and OSNMA in aviation.
 - One procurement with dual source (8M€ total) to be launched in 2025.
- RFI threat today is already affecting GNSS navigation safety: **DFMC capabilities embedded in this MOPS plus the additional RFI robustness requirements provide enhanced resilience of the GNSS equipment against RFI.**
- The implementation of GNSS is required by the European PBN IR: **airlines could equip with DFMC product targeting more resilient navigation capability if available.**
- **EUSPA proposed to amend the ToR for ED-259B with a 1-year shift of MOPS completion adding OSNMA in the scope.**

Dr. Hegarty remarked that the next GPS Public Interface Control Working Group (PICWG) will meet on 05-13-2025. He asked Ms. Morrison to distribute the date to all SC-159 members for interest and comment.

WG2/62#73 work plan discussion highlights

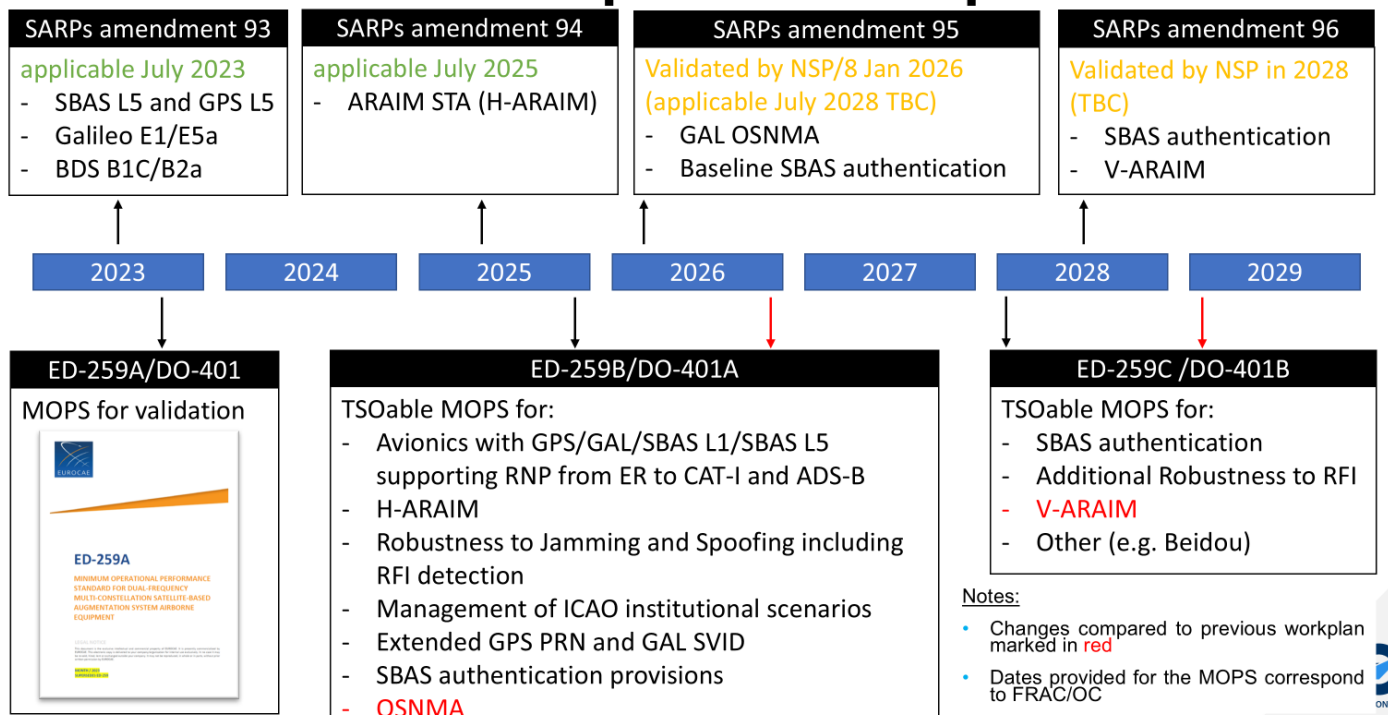
- Related to ED-259B/DO-401A
 - WG2/62 reached a consensus on the workplan inserted in **next slide**.
 - ED-259B is proposed to be delayed by one additional year compared to current plan to complete its development
 - Getting more time to finalise robustness toward RFI and spoofing in particular
 - Adding Galileo OSNMA processing capability into the MOPS baseline
 - ED-259C will include SBAS authentication, V-ARAIM and possibly BeiDou.
- Other possible RTCA/EUROCAE products
 - Airbus raised an interest to enhance RFI robustness by being capable to use a CRPA antenna without need for change of existing aircraft architecture.
 - CRPA antenna standard to be discussed.
 - Airbus raised an interest to to benefit from RFI

robustness requirements developed in ED-259B but adapted to an equipment matching with existing Airbus architecture (no change of existing aircraft architecture considering FMS or GNSS/INS hybridization).

- DO-229 evolution to be discussed.

ED-259B/DO-401A updated workplan

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At this point Mr. Mabillean offered that there was a need for a shift in time for ED259 document to deal with Jamming/Spoofing. This result would require the next subsequent revision to shift as well. Dr. Hegarty added that on Rev C, this deliverable has not been put in the ToR yet. He asked if it was in the WG62 work plan. Mr. Watson responded that in EUROCAE, it was not in the ToR. Dr. Hegarty asked Mr. Mabillean if he had a date in mind. He responded that he did not have a specific date, just providing some information as to the need for the document to shift to the right. Either they would leave the ToR alone or make the necessary revision. Mr. Dennis remarked that to validate the SARPS, one would want a MOPS document in place.

This concluded the presentation by Mr. Mabillean. Dr. Hegarty asked the group if there was any discussion on moving the date for ED259B/DO-401A ahead a year. Mr. Wichgers asked if this new date would be based on the document entering FRAC or its completion. Dr. Hegarty asked Mr. Mabillean if he needed more than a year slip since it is FRAC completion and submission to PMC that is the goal. Mr. Mabillean responded that it was the plan to launch FRAC after October, 2026. Dr. Hegarty suggested planning for a March 2027 FRAC completion followed by a submission in June 2027 to the PMC for publication.

Then Mr. Dimos engaged in a discussion with Dr. Hegarty on mitigation of GNSS Jamming and Spoofing through other systems besides the GNSS antenna, He mentioned the aircraft FMS or some other system. Dr. Hegarty mentioned that the GNSS and Inertial system are in a separate document being discussed as well cross checking with SC-227, as other activities under way. Mr. Dimos then asked if when certifying other systems, are you allocating percentages of mitigation these other systems would be responsible for. Dr. Hegarty responded that it was not the intention to force any requirement on any other Special Committee.

Then Mr. Studenny led a discussion on his work within WG2 that is revisiting the MOPS and in particular Appendix W. This is to expand the appendix to accommodate spoofing. This includes identifying the strengths and weaknesses of the receiver so future receivers can best be prepared for spoofing. He also mentioned that this work had identified a need for a timekeeper tied to GNSS. Currently there are no performance standards for a clock for a GNSS receiver. This review of appendix W will also be beyond a single receiver/ single antenna system. Dr. Hegarty added that we do want to continue these type of discussions with other special committees. Mr. Barry also commented that even though there are basic time requirements in CFR14, adequate for today, he sees a need to update them given new comm and other system requirements.

Mr. Gong asked what other work WG-62 SG-1 would need to do given that he was waiting for DO-401B to be completed. Mr. Mabileau answered that he wanted to complete functionality requirements with the current equipment using the current constellations before BeiDou was added. Once this is complete, then there will be a discussion on bringing in BeiDou into the MOPS given all the things we have to do given current scope. Dr. Hegarty confirmed that there would be further discussions on this topic. Ms. Morrison explained to the group that changes to the ToR to capture Mr. Mabileau's changes to his timeline had been made. Dr. Hegarty added that further discussions will limit speed on how we proceed. He suggested discussing this item at March plenary. Dr. Ligler agreed with this. There was some discussion about posting a draft of the ToR but Dr. Hegarty advocated that there needs to be a discussion at the March plenary so that the best ToR is produced. He added that it wasn't due till later in the year anyway. Mr. Studenny offered that possibly a time keeping expert to assist with the clock discussion was needed or possibly see a new Special Committee be added to address development of clock performance standards. Dr. Hegarty indicated a larger discussion would be needed to justify another special committee. He then went back to the question of schedule adjustment for DO-401A. **Dr. Hegarty asked the group if there was any objection to a motion to extend the DO-401A timeline. There was none and the motion passed unanimously.**

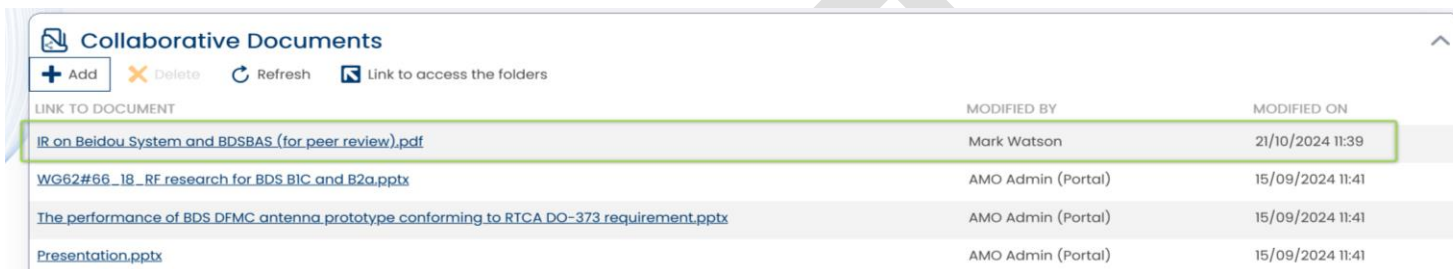
He then remarked that he looked for Mr. Mabileau and others to provide additional input for the March discussion. There was a brief mention of starting a discussion that included the CRPA antenna, but Ms. Morrison reminded the group that while there were indications that the technology would be removed from the ITAR list, that had not happened yet so that discussion should not happen in plenary unless they were prepared to disclose this to their individual companies. Dr. Hegarty added that the rule would change in September 2025 if no other comments against that action were received during their open consultation. Mr. Azoulai offered that there is a need to coordinate all our groups as their discussion needs coordination where there is common ground. Dr. Hegarty then suggested that they move to agenda item 4.

Agenda Item 4. BeiDou Internal Report Status

Item 4a IR (WG-62 SG-1) RAC/Peer Review Resolution Update

Overview

At the last SC-159/WG-62 Plenary, Internal Report on BeiDou System and BDSBAS has been completed and uploaded to the WG-62 SG-1 and RTCA SC-159 WG-2 workspace, for RAC/Peer Review:



LINK TO DOCUMENT	MODIFIED BY	MODIFIED ON
IR on Beidou System and BDSBAS (for peer review).pdf	Mark Watson	21/10/2024 11:39
WG62#66_18_RF_research_for_BDS_B1C_and_B2a.pptx	AMO Admin (Portal)	15/09/2024 11:41
The performance of BDS DFMC antenna prototype conforming to RTCA DO-373 requirement.pptx	AMO Admin (Portal)	15/09/2024 11:41
Presentation.pptx	AMO Admin (Portal)	15/09/2024 11:41

After 30 Days of RAC/Peer Review commenting period, 69 comments received

- **Non concur – 1**
- **High – 2**
- **Medium – 36**
- **Low – 8**
- **Editorial - 22**

Work Progress

- **On Jan 24, A work meeting was organized by SG-1 to discuss the comments and resolution. All comments have been reviewed and gained consensus resolution during the meeting.**
- **All comments are resolved except for 4 comments related to the update on DO-373A and DO-292A still need to be confirmed with the published version.**

- **The updated IR has been shared on RTCA and EUROCAE workspace.**

Next Step

The publication of DO-292A and DO-373A will be in this week, there are two options to move forward:

- **Option 1:**

At the plenary, SC-159 and WG-62 can approve sending to the PMC based on confirmation with the published versions when they are published.

- **Option 2:**

Differ approving until March and ask the PMC for an out-of-cycle review and approval of the internal report.

This concluded Mr. Gongs presentation. Dr. Hegarty asked what the status of DO-292A and DO-373A are. Dr. Kalyanaraman answered that DO-373A is complete just waiting to resolve a question on a figure that is referenced in other documents. In regard to DO-292A, there are a few editorial changes to complete and then it will be sent to Ms. Morrison in a couple of weeks. Ms. Morrison offered to provide a read-only copy for coordination only. DO-292A is only a draft that was sent to the PMC for review. The meeting then progressed to Item 4b.

Item 4b IR (WG-62 SG-1) RAC/Peer Review Resolution Update

Dr. Hegarty continued the discussion asking Mr. Gong if we held off and have approval of the two documents mentioned by the PMC in June, will that work for you. He replied it did. Dr. Hegarty offered that it was better to wait then with the documents complete and in in-line with this Internal Report. This doesn't preclude discussions with Mr. Mabileau. **Dr. Hegarty asked the group for approval of this plan. The approval was unanimous. Thus the group will plan for a March Plenary approval to then send to the June PMC.** Dr. Kalyanaraman committed to the group that his work group would work with Ms. Morrison to ensure that the finalization of DO-373A and DO-292A would not Block progression on the Internal report. With this, Dr. Hegarty moved to agenda item 5.

Agenda Item 5. Discussion of Terms of Reference Updates

Dr. Hegarty declared that this agenda item was complete.

Agenda Item 6. Action Item Review

There were no action items to review.

Agenda Item 7. Assignment/Review of Future Work

No work was noted.

Agenda Item 8. Other Business

Mr. Watson shared with the group that the WG-62 Chairman will resign soon. We are starting the process to identify a new Chair. You can send him any nominations for this position for review. **Mr. Mabileau asked Ms. Morrison if she could add an agenda item for approval for the new Chair. Ms. Morrison responded, “Yes.**

Agenda Item 9. Date and Place of Next Meeting

Mr. Mabileau stated that he would be sending out the calling notice for the next WG-62 Meeting after the March plenary meeting. He indicated that the next two meetings would be in October 2025 and January 2026. Dr. Hegarty then quickly reviewed the next two Plenary weeks at RTCA, March 10 – 17 and October 27 – 31.

Agenda Item 10. Adjourn

Given there was no other business, Dr. Hegarty adjourned the plenary meeting.

CERTIFIED as a true and accurate summary of the meeting.

-S-
Dr. Christopher Hegarty
Co-Chairman

-S-
Dr. George Ligler
Co-Chairman

-S-
Wes Googe
Secretary

DRAFT