

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR24FA201

GLOBAL POSITIONING SYSTEM DEVICES

Specialist's Factual Report

November 19, 2025

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A. ACCIDENT

Location: Arco, Idaho
Date: June 20, 2024
Time: 1258 Mountain Daylight Time (MDT)
Airplane 1: AIR TRACTOR INC AT-502B, Visser Ag Inc, N581TW
Airplane 2: AIR TRACTOR INC AT-802, Visser Ag Inc, N802TP

B. GLOBAL POSITIONING SYSTEM DEVICES SPECIALIST

Specialist: Matthew Yandrick
Electrical Engineer – Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A group was not convened. The NTSB Vehicle Recorder Division received the following electronic devices:

Airplane 1 (N581TW):

Recorder Manufacturer/Model:	AG-NAV GUÍA Platinum Lite
Part Number:	P153
Recorder Serial Number:	153200232

Airplane 2 (N802TP):

Recorder Manufacturer/Model:	Insero Solutions AgPilotX Lightbar
Part Number:	ASSY-9001-004
Recorder Serial Number	APX1446L

Airplane 2 (N802TP):

Recorder Manufacturer/Model:	Apple iPad (A2324)
Recorder Serial Number	GG7H816FQ19G

1.0 AG-NAV GUÍA Platinum Lite Description

The AG-NAV GUÍA Platinum Lite is compact Global Positioning System (GPS) navigation device used to provide pilot's customizable agricultural spray application data on a color moving map. The unit has a 6.5-inch display and is enclosed in a ruggedized housing. The moving map displays a customizable interface which allows pilots to monitor application information and navigational landmarks. The device can interface with an agricultural "light bar" that provides directional guidance to the pilot as per user defined aerial application position information. The device has an obstacle warning feature which is compatible with FAA tower obstacle data and provides pilots warnings regarding incoming obstacles via messages and alarms. The

device has recording capabilities and log files can be exported via Universal Serial Bus (USB).

1.1 AG-NAV GUÍA Platinum Lite Data Recovery

The Platinum Lite was in good condition (see Figure 1) and the data were downloaded using the manufacturer's procedure by exporting flight logs to a USB memory stick.

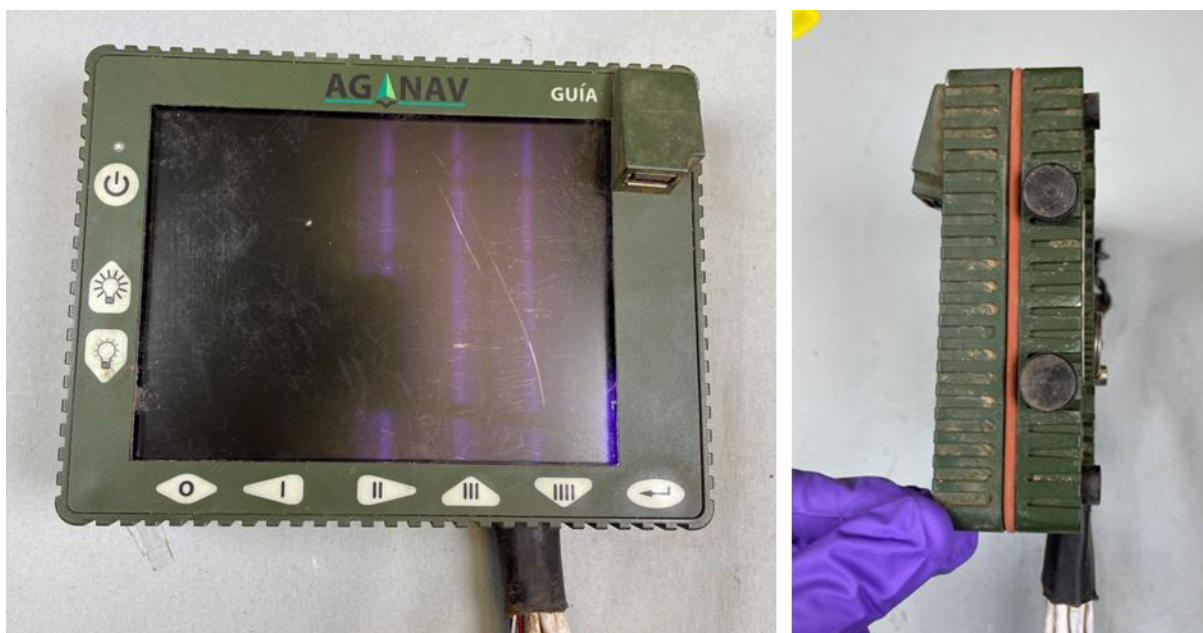


Figure 1. Photos of the front (left) and side (right) view of Platinum Lite, as received.

1.2 AG-NAV GUÍA Platinum Lite Recording Description

The Platinum Lite download contained 69 logs starting from April 1, 2024, through June 20, 2024. Five logs were recorded on June 20, 2024. The last log was identified as the accident flight that contained recorded data from 11:09:19.2 MDT to 12:52:48 MDT.¹ Data were sampled at 5 hertz (Hz) (5 data samples per second) when spray application was active. Data were sampled at approximately 2.5 Hz when the spray application was not active.

1.2.1 AG-NAV GUÍA Platinum Lite Engineering Unit Conversions

In appendix A, table 1 lists the Platinum Lite parameters verified and provided in this report. Additionally in appendix A, table 2 describes the unit abbreviations used in this report.

¹ The recorded time was in Coordinated Universal Time (UTC) and had been converted to local time. See section 1.3 for more details.

GPS groundspeed, as provided by Platinum Lite, were converted from miles per hour (mph) to knots (kts).

1.3 AG-NAV GUÍA Platinum Lite Time Correlation

The Platinum Lite recorded time in UTC. The difference between local time (MDT) and UTC is 6 hours, or 21,600 seconds. The accident flight data has been offset from UTC to MDT by subtracting 21,600 seconds.

2.0 AgPilotX Lightbar Description

The Inero Solutions AgPilotX Lightbar is one part of a three-part system of the AgPilotX guidance system for aerial applicators. The Lightbar provides guidance and has GPS/GNSS onboard. Historical data is stored in the Lightbar and can be exported via USB or wirelessly to a mobile device.

2.1 AgPilotX Lightbar Data Recovery

The AgPilotX Lightbar was in good condition and an internal microSD card was identified (see Figure 2). The microSD card was removed, and the contents of the card were examined. Historical data logs were identified and extracted normally.

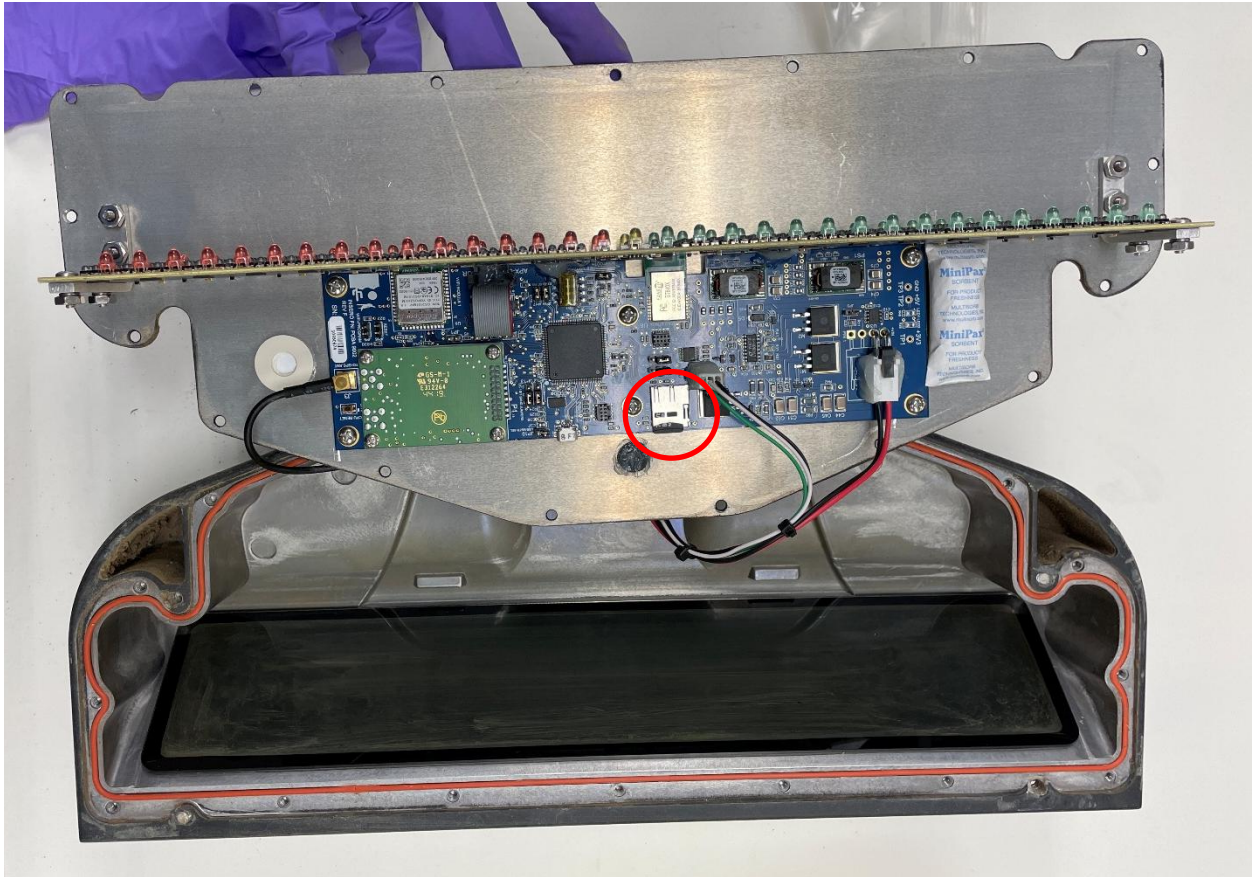


Figure 2. Photo of the AgPilotX Lightbar interior, a microSD card is circled.

2.2 AgPilotX Lightbar Recording Description

The microSD card contained 165 logs starting from February 8, 2021, through June 20, 2024. Two logs were recorded on June 20, 2024. The last log was identified as the accident flight that contained recorded data from 12:38:15 MDT to 12:55:01 MDT.² Data were sampled at 1 Hz.

2.2.1 AgPilotX Lightbar Engineering Unit Conversions

In appendix A, table 1 lists the AgPilotX parameters verified and provided in this report. Additionally in appendix A, table 2 describes the unit abbreviations used in this report.

GPS groundspeed, as provided by AgPilotX, were converted from miles per hour (mph) to knots (kts).

² The recorded time was in UTC and had been converted to local time. See section 2.3 for more details.

2.3 AgPilotX Lightbar Time Correlation

The AgPilotX recorded time in UTC. The difference between local time (MDT) and UTC is 6 hours, or 21,600 seconds. The accident flight data has been offset from UTC to MDT by subtracting 21,600 seconds.

3.0 Personal Electronic Device Description

Personal electronic devices (PEDs) are a category of devices comprised primarily of portable computing devices and mobile phones. Portable computing devices are typically capable of internet access, email, messaging services, and can run user-installed applications to perform specific tasks. Depending on the model, mobile phones can perform many of the same tasks as portable computing devices, plus have voice call and text messaging capabilities. PEDs user and system data are typically stored on non-volatile memory (NVM) and can be accessed through manufacturer-provided interfaces.³

3.1 Personal Electronic Device Data Recovery

An exterior examination revealed the Apple iPad was in fair condition, as shown in Figure 3, and powered on normally. The contents were reviewed for data related to the accident. The iPad was running the AgPilotX application by Insero, version 1.4.0.⁴ AgPilotX spray jobs (logs) were recovered and exported as KML files.⁵

³ Non-volatile memory is semiconductor memory that does not require external power for data retention.

⁴ AgPilotX is an iOS Device app (program) that communicates wirelessly with a Lightbar and flow controller. The app allows pilots to monitor flow rates, view maps, and set up guidance patterns on the Lightbar.

⁵ A Keyhole Markup Language (KML) file is an XML-based file format used to display geographic data on a virtual globe, such as Google Earth.



Figure 3. Photos of the front (left) and back (right) view of Apple iPad, as received.

3.2 Personal Electronic Device Recording Description

The recorded data included 45 spray logs from May 26, 2024, through June 20, 2024. The last log contained spray logs that started at 10:38 MDT and ended at 12:41 MDT.

D. FIGURES AND TABULAR DATA

Figure 4 to Figure 11 contain data recorded on June 20, 2024. All the parameters listed in table 1 from the Platinum Lite device and the AgPilotX Lightbar device are plotted. Additionally, the recorded spray positioning data logs from the PED's AgPilotX app software are plotted.

Figure 4 to Figure 7 are graphical overlays generated using Google Earth showing the two airplanes' flight paths at the time of the accident on June 20, 2024. The cyan line is the flight path of airplane 1, registration N581TW, recorded on the Platinum Lite. The yellow line is the flight path of airplane 2, registration N802TP, recorded on the AgPilotX device. Additionally, the recorded spray positioning log data from the PED's AgPilotX app software is shown as the green lines. The location of the wreckage of airplane 1 and airplane 2 are shown for reference. Note that the weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The last recorded logs show that airplane 1 and airplane 2 conducted four aerial application flights from Arco-Butte County Airport (AOC), Arco, Idaho. Airplane

1's last flight shows the aircraft departed AOC at about 12:46 MDT. Airplane 2's last flight shows the aircraft departed AOC at about 12:53 MDT.

Airplane 1's data ended at 12:52:48 MDT, approximately 6 seconds after finishing a spray application area, and approximately 4 miles from airplane 1's wreckage location. Airplane 2's data ended at 12:55:01 MDT, approximately 2 minutes after departing AOC, and approximately 400 feet from airplane 2's wreckage location.

Figure 8 and Figure 9 are plots of aircraft 1's Platinum Lite device parameters. Figure 8 is from 11:05:00 MDT to 12:55:00 MDT and Figure 9 covers approximately the final 9 minutes from 12:44:20 MDT to 12:52:48 MDT.

Figure 10 and Figure 11 are plots of aircraft 2's AgPilotX device parameters. Figure 10 is from 10:35:00 MDT to 13:00:00 MDT and Figure 11 covers approximately the final 2 minutes from 12:53:20 MDT to 12:55:05 MDT, around the reported time of the accident. The aircraft 1's Platinum Lite device recording ended 2 minutes and 13 seconds before the aircraft 2's AgPilotX device recording ended.

These figures are configured such that right turns are indicated by the trace moving toward the bottom of the page, left turns towards the top of the page, and nose up attitudes towards the top of the page.

The corresponding tabular data used to create Figure 4 to Figure 11 for the parameters listed in table 1 for airplane 1 and for airplane 2 are provided in electronic comma-separated value (CSV) format as attachment 1 and attachment 2 to this report, respectively. Additionally, the recorded spray positioning log data from airplane 2's PED's AgPilotX app software are provided as attachment 3.

Submitted by:

Matthew Yandrick
Electrical Engineer - Recorder Specialist

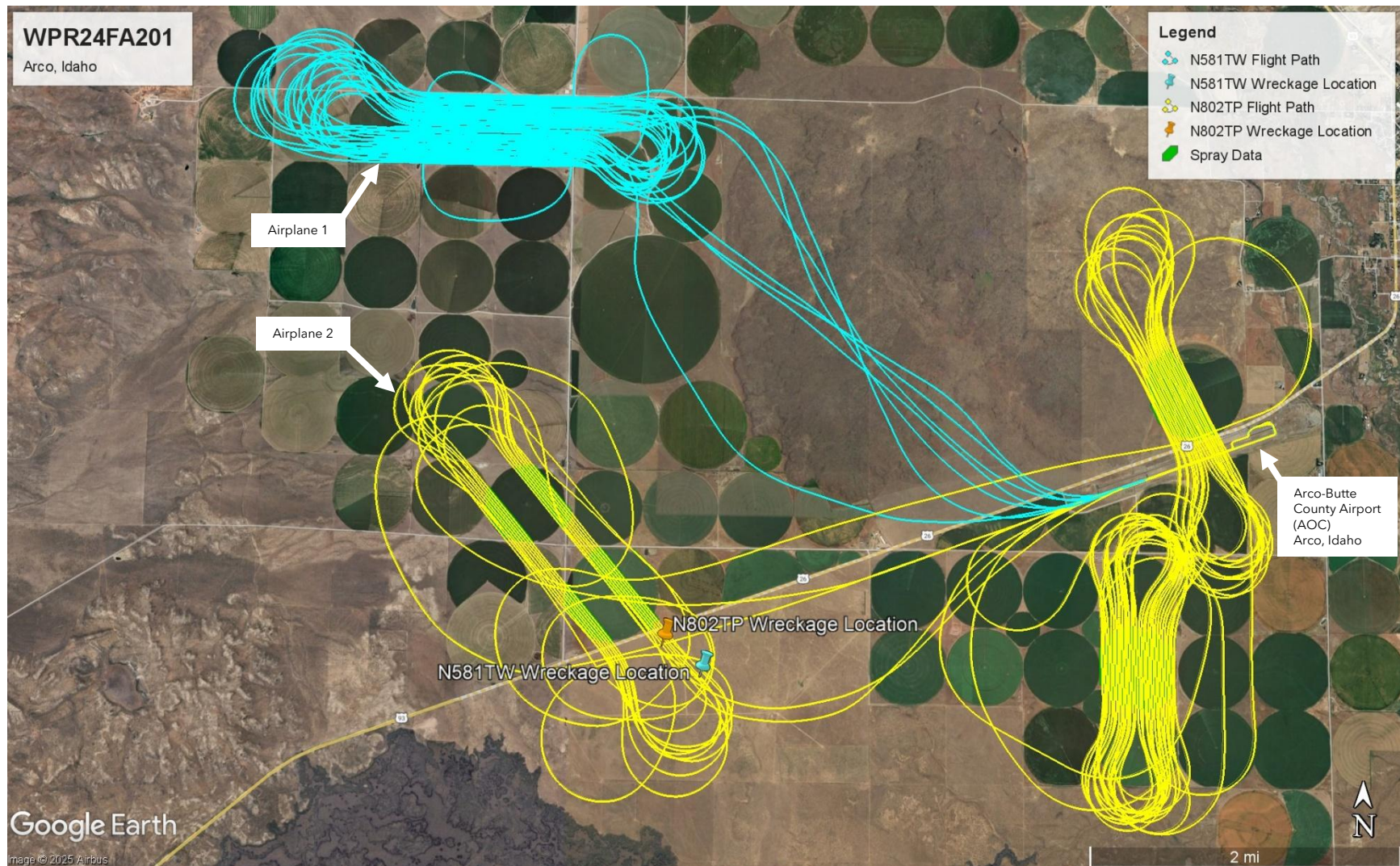


Figure 4. Google Earth overlay showing the flight paths of airplane 1 (N581TW) in cyan and airplane 2 (N802TP) in yellow. Both aircraft operated out of Arco-Butte County Airport (AOC), Arco, Idaho.

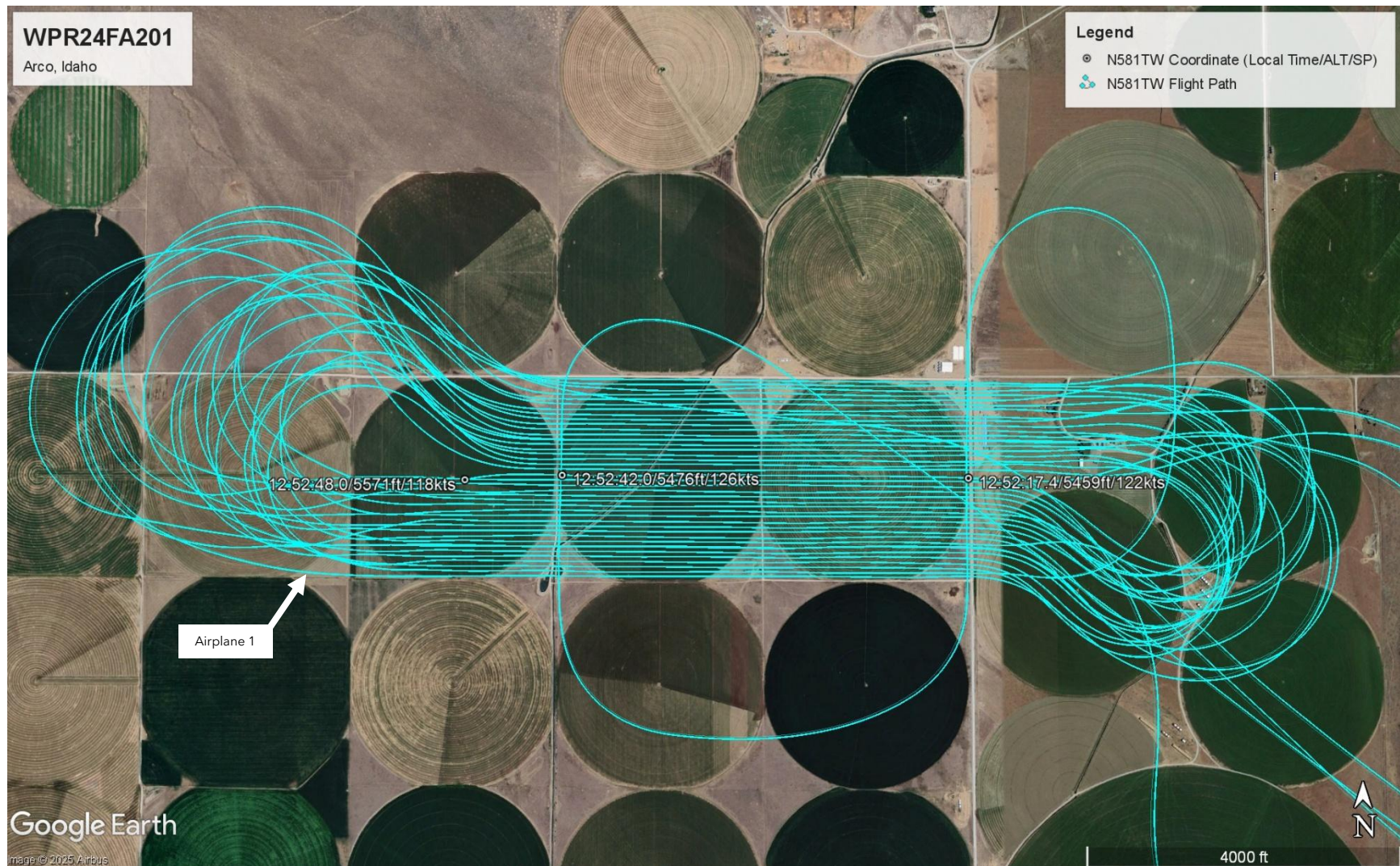


Figure 5. Google Earth overlay showing the last spray application area from airplane 1 (N581TW) recorded on the Platinum Lite.

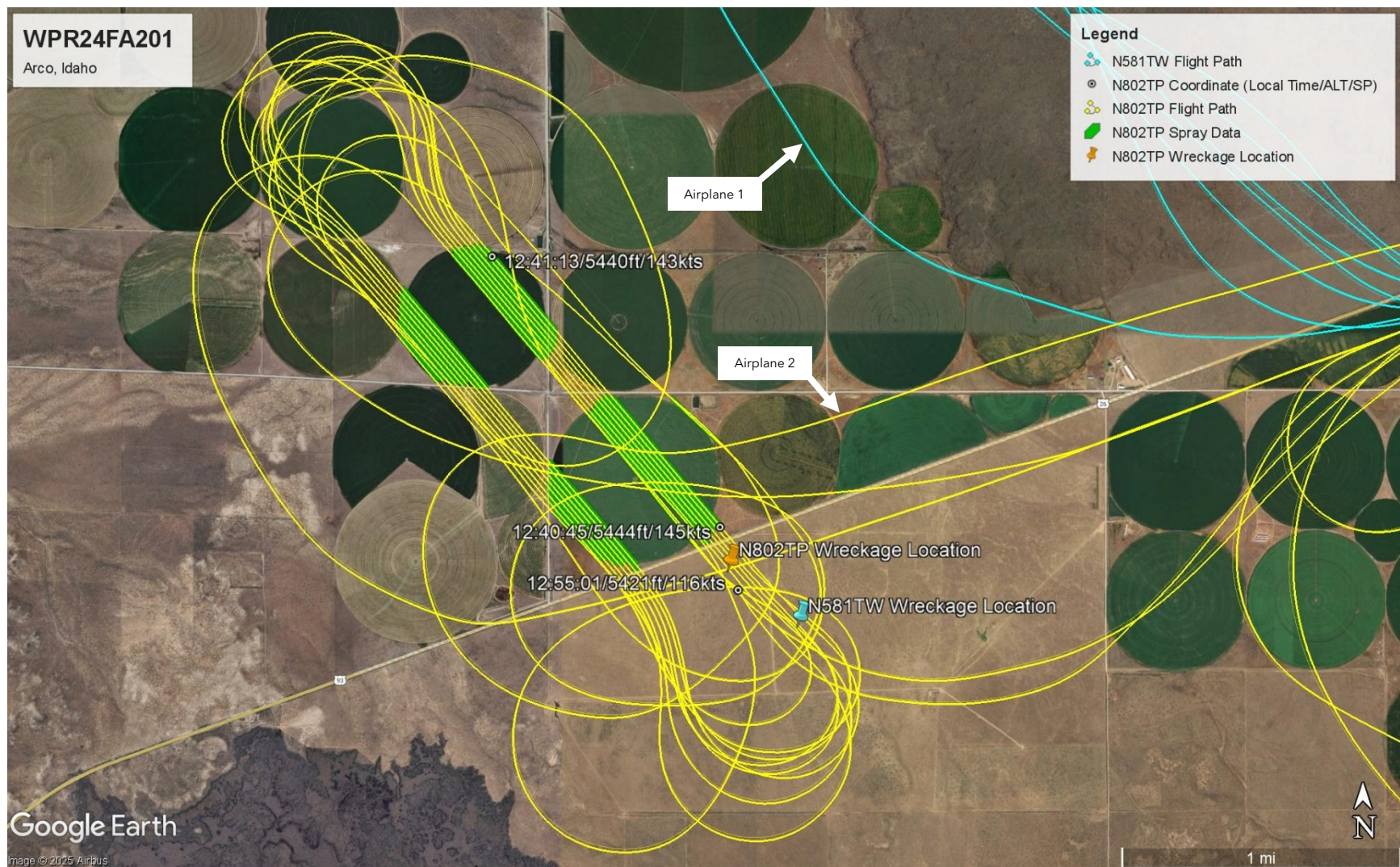


Figure 6. Google Earth overlay showing the last spray application area from airplane 2 (N802TP) recorded on the PED's AgPilotX app.

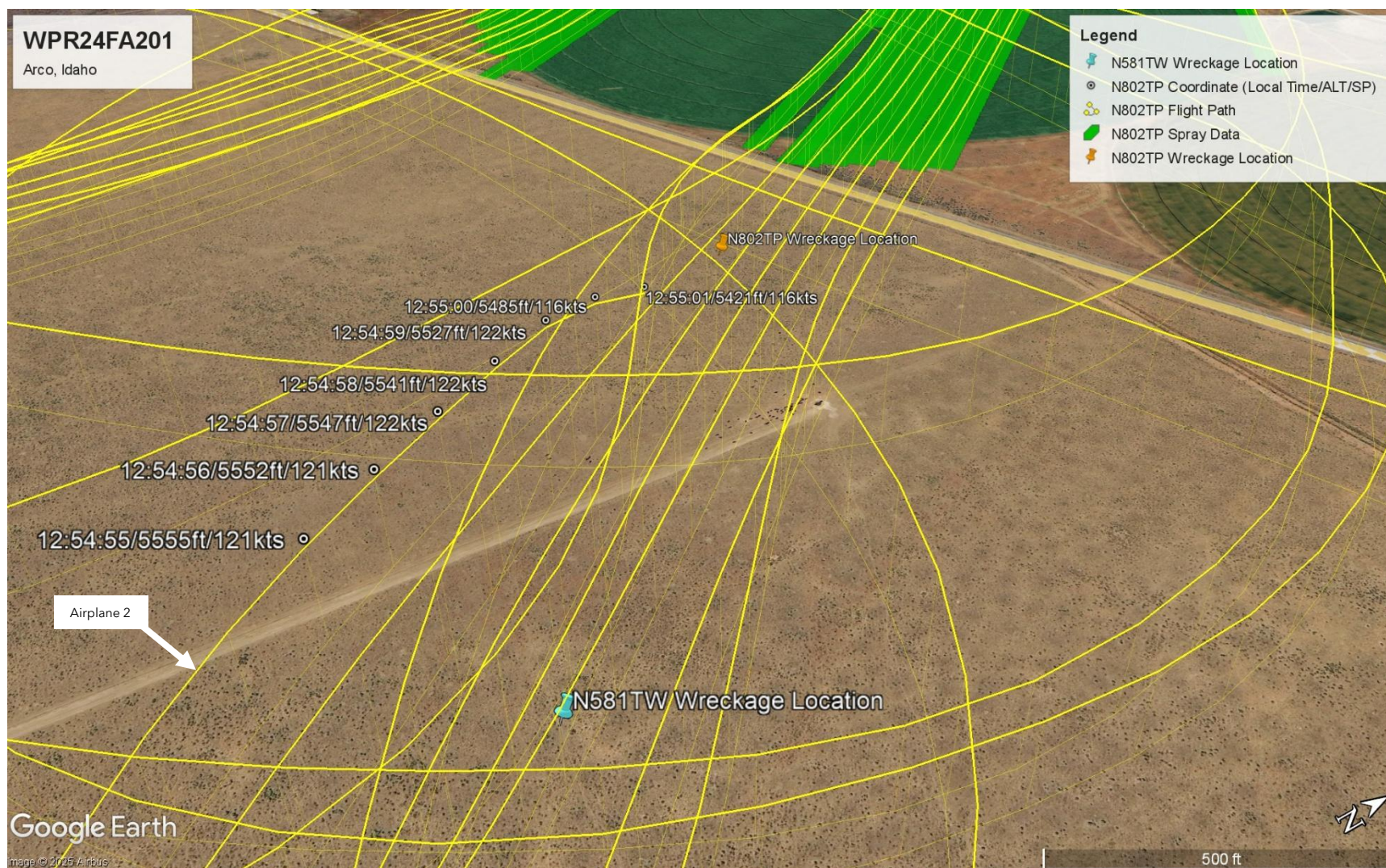


Figure 7. Google Earth overlay showing the flight path of airplane 2 (N802TP) for approximately the last 6 seconds of data recorded on the PED's AgPilotX app. The wreckage location of N802TP is indicated by an orange pin. The wreckage location of N581TW is indicated by a cyan pin.

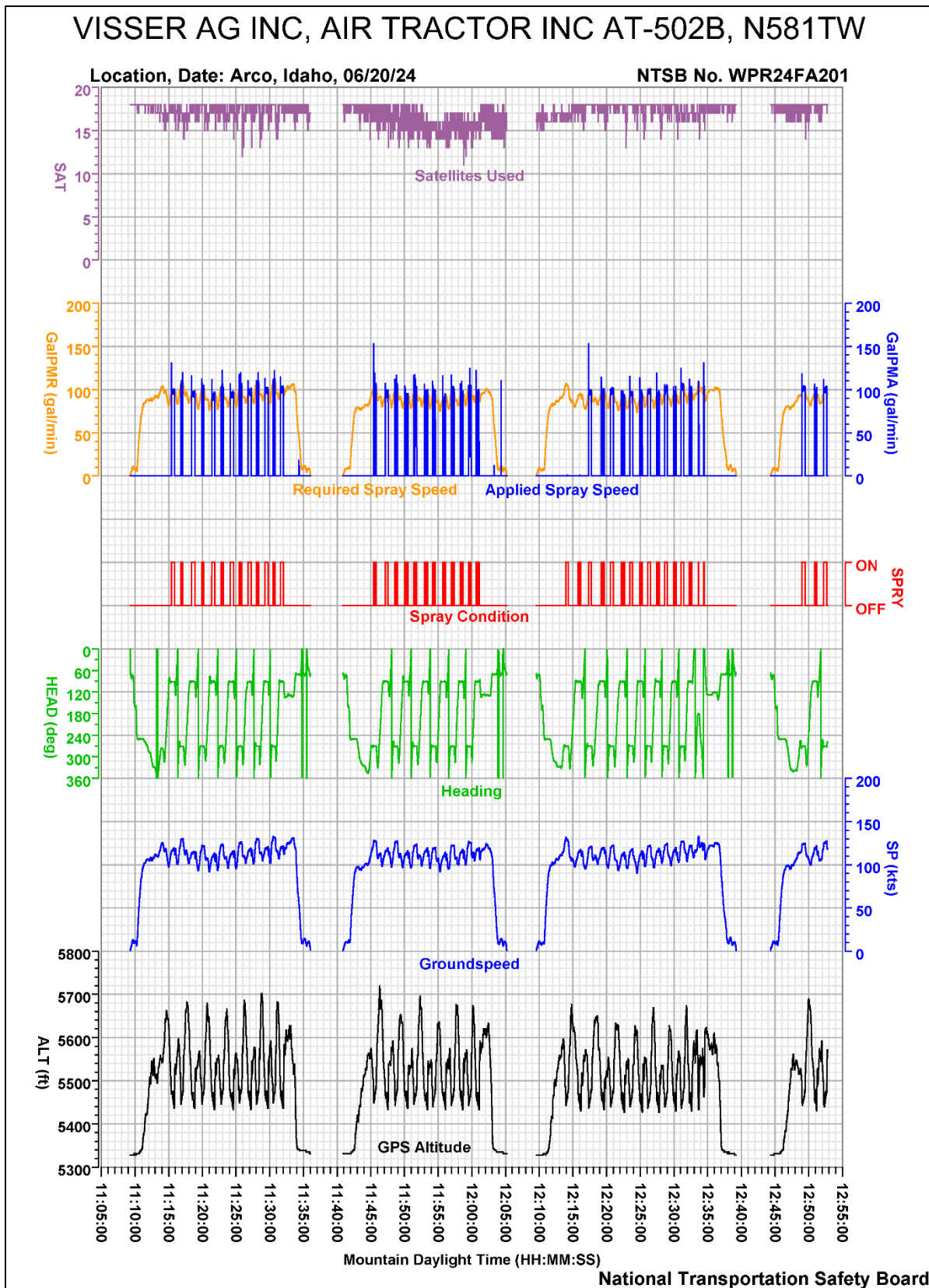


Figure 8. Plot of parameters from Airplane 1 (N581TW) recorded on Platinum Lite.

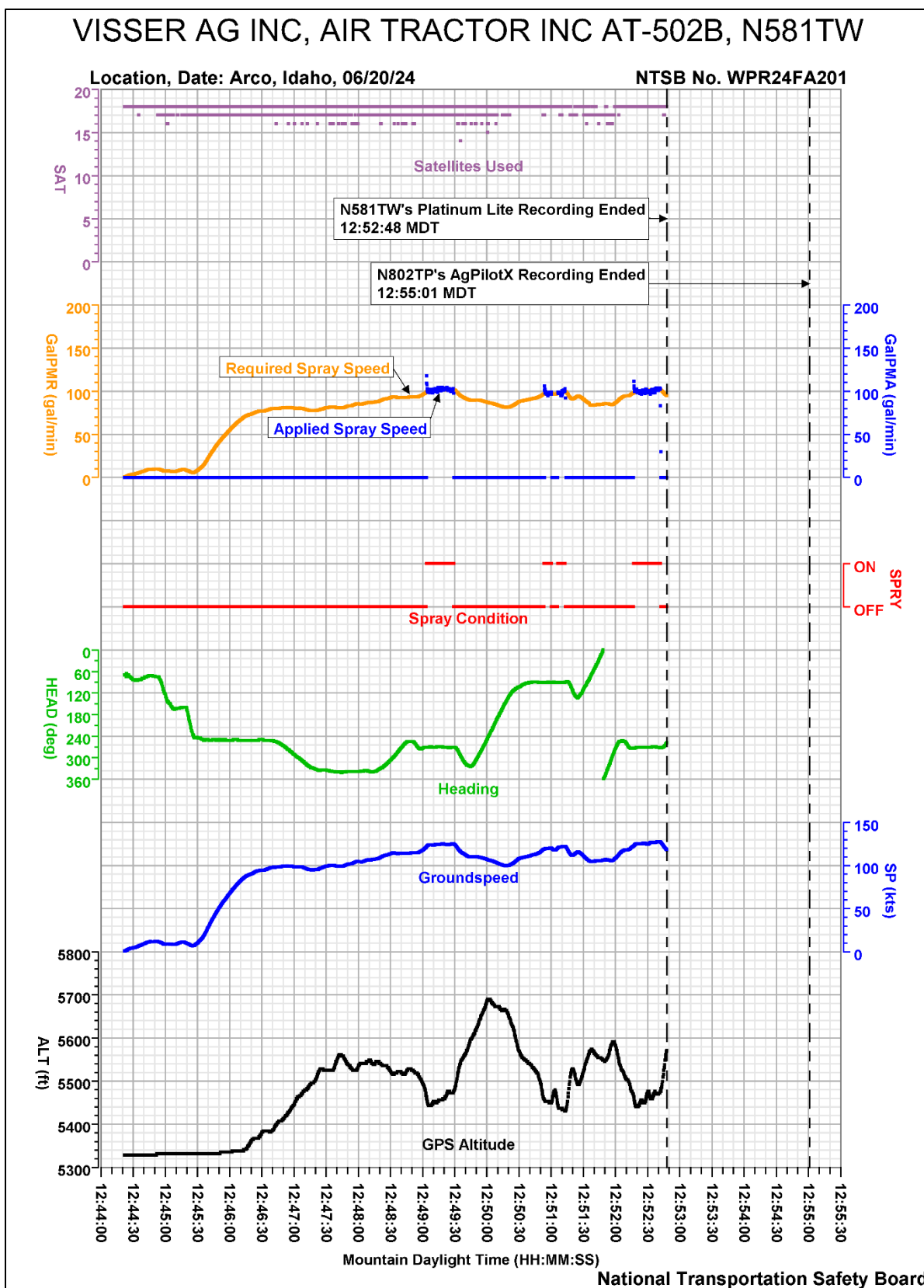
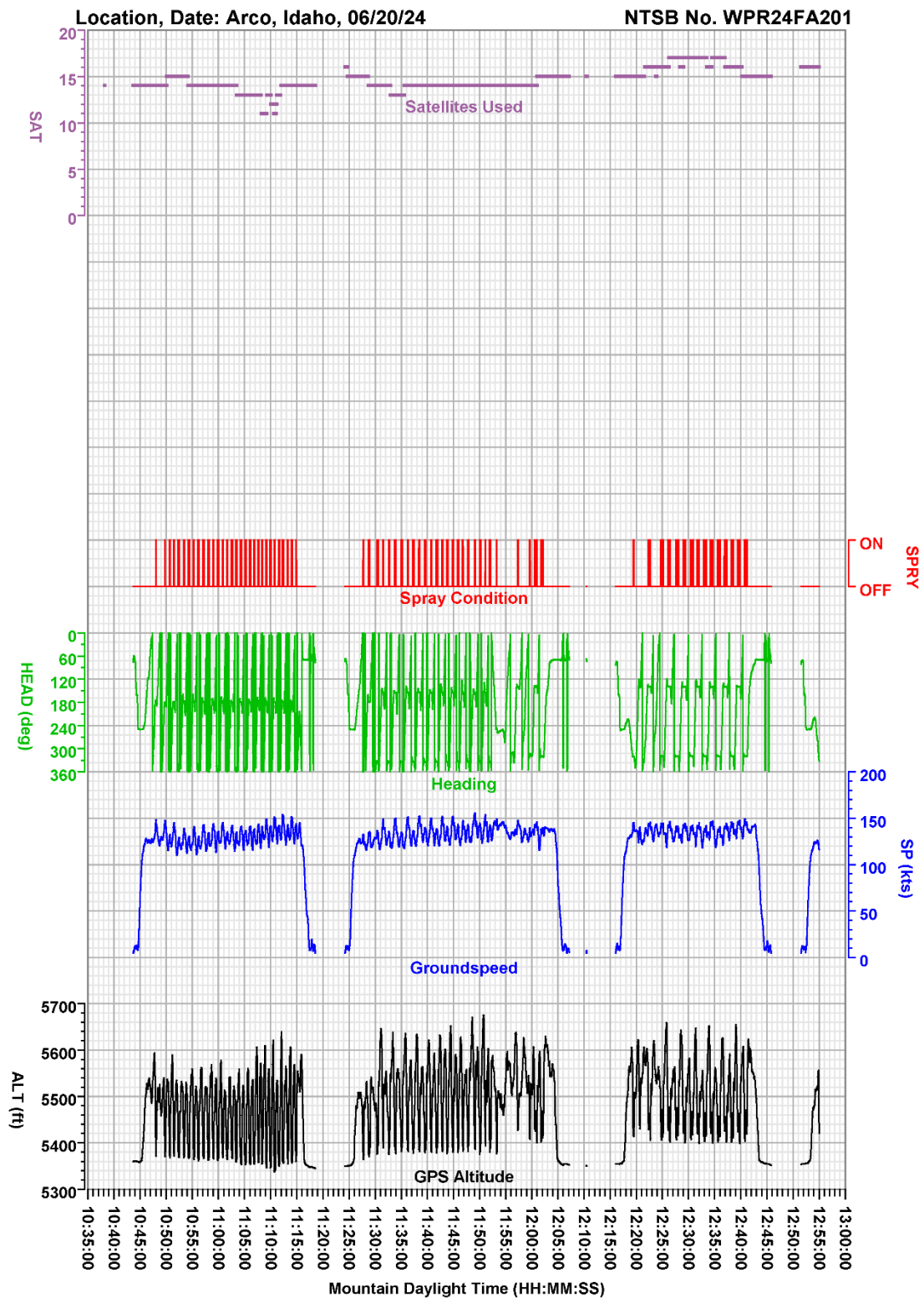


Figure 9. Plot of parameters from airplane 1 (N581TW) near the end of the accident flight recorded on Platinum Lite.

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Figure 10. Plot of parameters from Airplane 2 (N802TP) recorded on AgPilotX Lightbar.

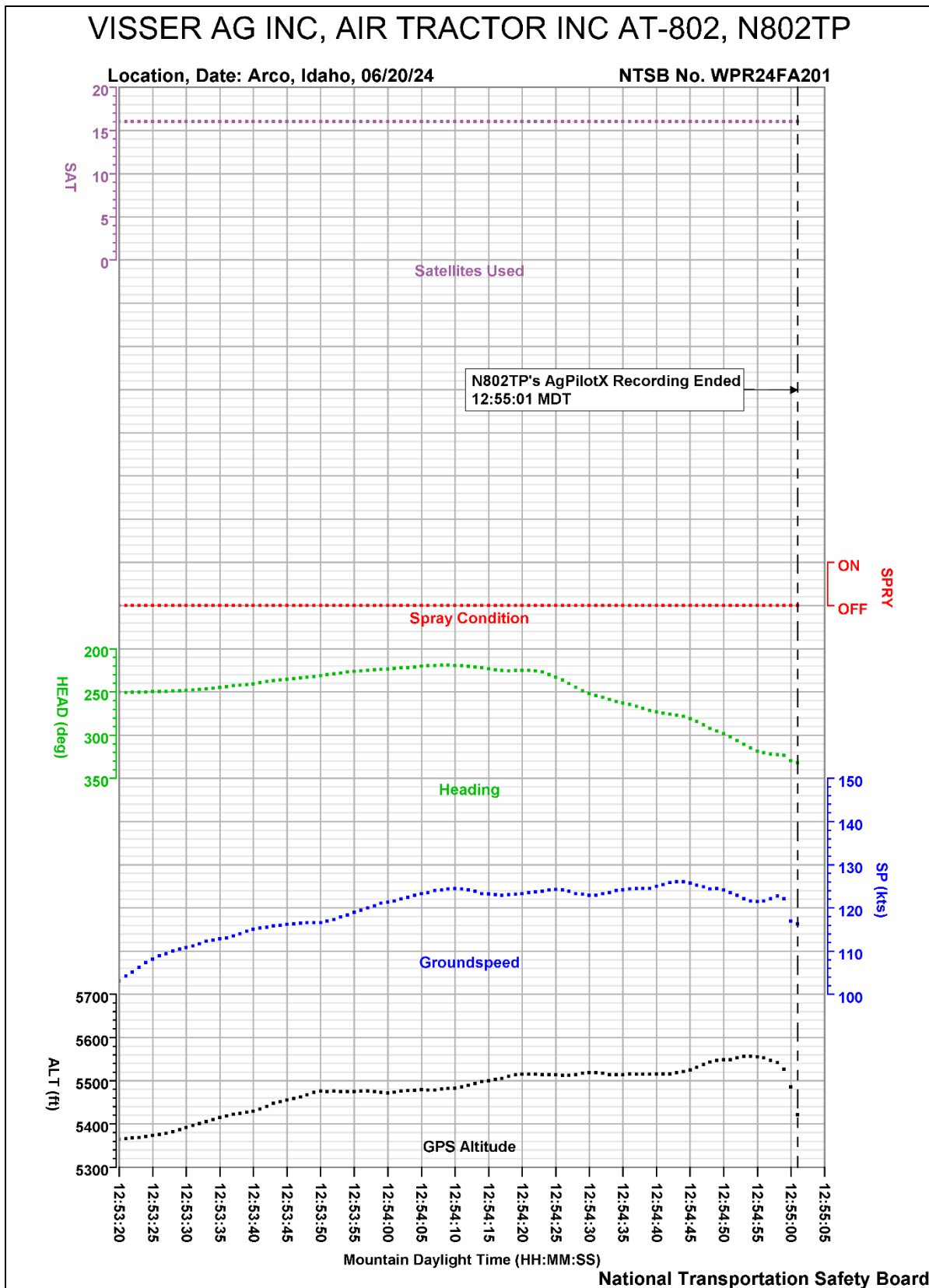


Figure 11. Plot of parameters from airplane 2 (N802TP) near the end of the accident flight recorded on AgPilotX Lightbar.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS

This appendix describes the parameters provided and verified in this report. Table 1 lists the AgPilotX device (N802TP) and Platinum Lite device (N581TW) parameters and Table 2 describes the unit abbreviations used in this report.

Table 1. Verified and provided parameters.

Parameter Name (units)	Parameter Description	Source
ALT (ft)	GPS Altitude	AgPilotX, Platinum Lite
Date (MM/DD/YYYY)	Date for recorded data point (Month/Day/Year)	AgPilotX, Platinum Lite
GalPMA (gal/min)	Applied Spray Speed	Platinum Lite
GalPMR (gal/min)	Required Spray Speed	Platinum Lite
HEAD (deg)	True Heading	AgPilotX, Platinum Lite
LAT (deg)	Recorded Latitude	AgPilotX, Platinum Lite
LON (deg)	Recorded Longitude	AgPilotX, Platinum Lite
SAT	Number of GPS Satellites Used	AgPilotX, Platinum Lite
SP (kts)	GPS Groundspeed	AgPilotX, Platinum Lite
SPRY (discrete)	Spray Condition	AgPilotX, Platinum Lite
Time (HH:MM:SS)	Local Time (MDT) for Recorded Data Point (Hour:Minutes:Seconds)	AgPilotX, Platinum Lite

Table 2. Unit abbreviations.

Unit Abbreviations	Descriptions
deg	degrees
ft	feet
gal/min	gallons per minute
kts	knots

Note: For parameters with a unit description of discrete, a discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.