Aviation Investigation Final Report

Location:	Willows, California	**Accident Number:**	WPR23FA122
Date & Time:	March 7, 2023, 16:11 Local	**Registration:**	N8424V
Aircraft:	ROCKWELL INTERNATIONAL S-2R	**Aircraft Damage:**	Substantial
Defining Event:	Low altitude operation/event	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot departed on a routine agricultural flight to spray multiple orchards. Recorded onboard GPS data showed that after spraying three fields, he flew to an almond orchard where he made numerous north-to-south passes over the target area in a racetrack pattern at speeds of about 160 mph, and an altitude of about 135 ft above ground level (agl). Several seconds after he sprayed an area adjacent to a set of 130 ft tall power transmission lines that ran parallel to his flight pattern, he made one more lap in the pattern. The data ceased when the airplane was at the south end of the field while turning north, likely several seconds before impact. The airplane subsequently impacted a powerline and came to rest about 500 ft northeast of the point of initial impact, which was a powerline next to a tower.

Postaccident examination revealed no preimpact mechanical anomalies or malfunctions with the airplane or engine that would have precluded normal operation. The propeller signatures indicated that the propeller was rotating at moderate to high power when it impacted the powerline. The powerline was found wrapped around at least one blade and the propeller hub.

A witness recount suggests that the accident took place several seconds after the last flight data point. The pilot was familiar with this orchard and was likely not fatigued at the time. In addition, the position of the sun at the time of the accident would not have been a factor.

Although a recount of the pilot's flying habits indicated he was unlikely to have flown beneath the powerlines, the pilot struck the inside wire between two towers at about the lowest point, which suggests he flew under the powerlines. Thus, the accident was the result of the pilot's failure to maintain clearance from powerlines while attempting to fly beneath multiple conductors during a low-altitude aerial application flight, which resulted in propeller contact with a powerline and a subsequent loss of control.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's failure to maintain clearance from powerlines while flying under multiple conductors during a low-altitude aerial application flight, which resulted in propeller contact with a powerline and a subsequent loss of control.

Findings

Environmental issues	Wire - Effect on equipment
Personnel issues	Monitoring environment - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	Low altitude operation/event (Defining event)
Maneuvering-low-alt flying	Collision with terr/obj (non-CFIT)

On March 7, 2023, about 1611 Pacific standard time, a Rockwell International S-2R, N8424V, was substantially damaged when it was involved in an accident near Willows, California. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 137 aerial application flight.

According to the operator, the pilot was scheduled to spray fungicide over several orchards. Data retrieved from an onboard GPS aerial application guidance system showed that the airplane departed Willows/Glenn County Airport (WLW), Willows, California, about 0848 and sprayed 3 fields in about 5 hours.

At 1509, after the pilot finished spraying a field, he flew to the accident almond orchard and performed an orbit of the field. The field was 1/2 mile square, and divided by 2 banks of parallel power transmission lines running north-south, and held by 3 equally spaced sets of 130 ft tall towers. The owner of the plot reported that he employs a ground crew to spray the trees that grow beneath the power lines.

The pilot returned to WLW about 1519 and departed at 1541 for the almond orchard and began spraying at 1544. The airplane flew a racetrack pattern in a north-south direction over the field immediately west of the powerlines. During each pass over the field the airplane descended to between 130 ft agl and 140 ft agl, at speeds of about 160 mph. After he refilled the hopper again at 1549, the pilot departed at 1554 to continue spraying. He returned to WLW one more time at 1601 for about 4 minutes and departed for the almond orchard for the last time.

The pilot flew the same racetrack pattern as he had previously. The pilot's 2 final northerly passes over the field took place at 1609:30 and 1610:39 about 100 ft west of the bank of the powerlines at an altitude of 131 ft agl. The flight track ceased at 1611:33 about 0.6 nautical miles (nm) southwest of the accident site. A witness located about 0.5 nm northwest of the accident site reported that he observed the airplane make several passes in a racetrack pattern on a north/south heading directly over him about 25 minutes before the accident. The airplane left the area and then returned about 1610 and made additional passes. He heard a loud noise about 2 minutes after the last pass.

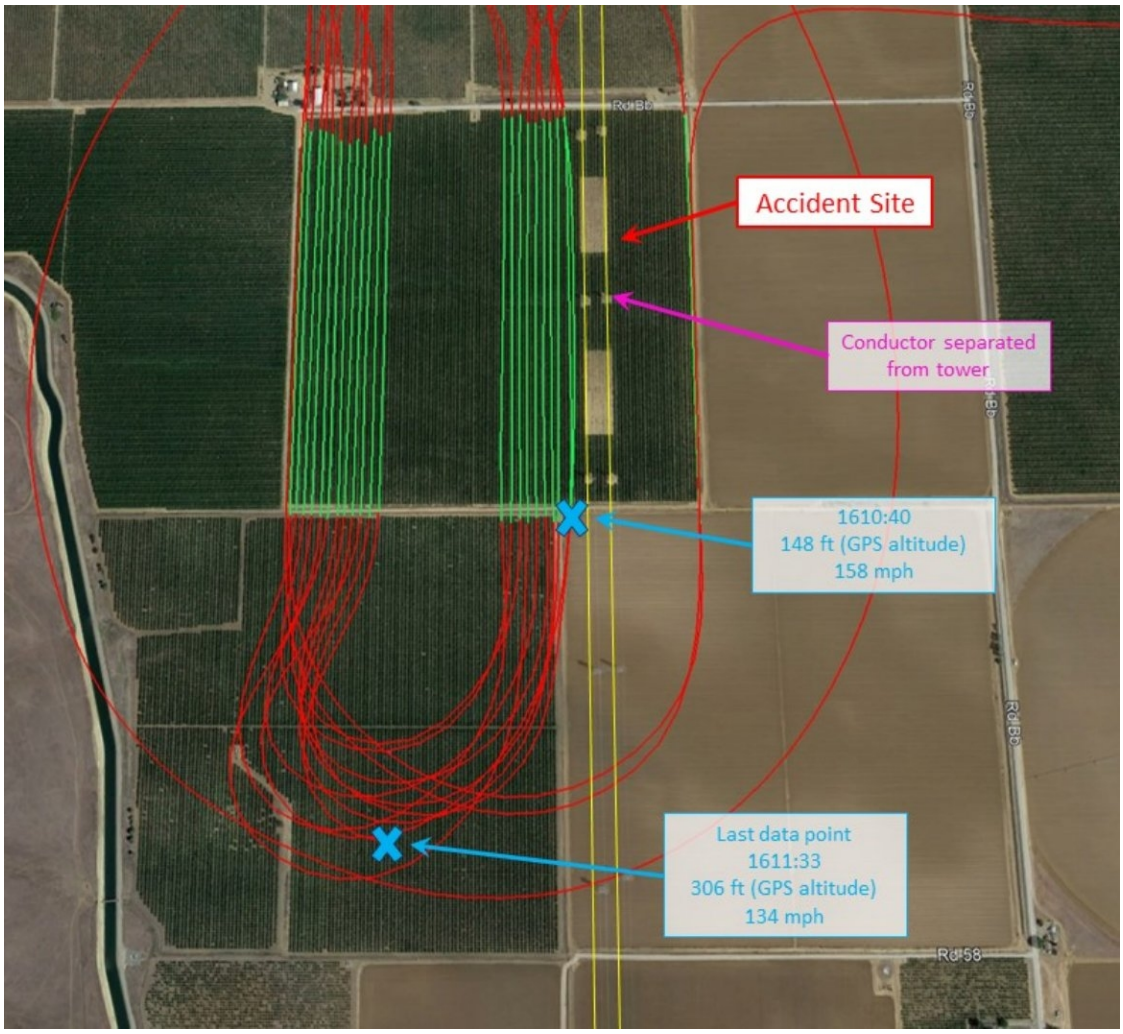

Figure 1. GPS flight track with annotations and last data point before accident

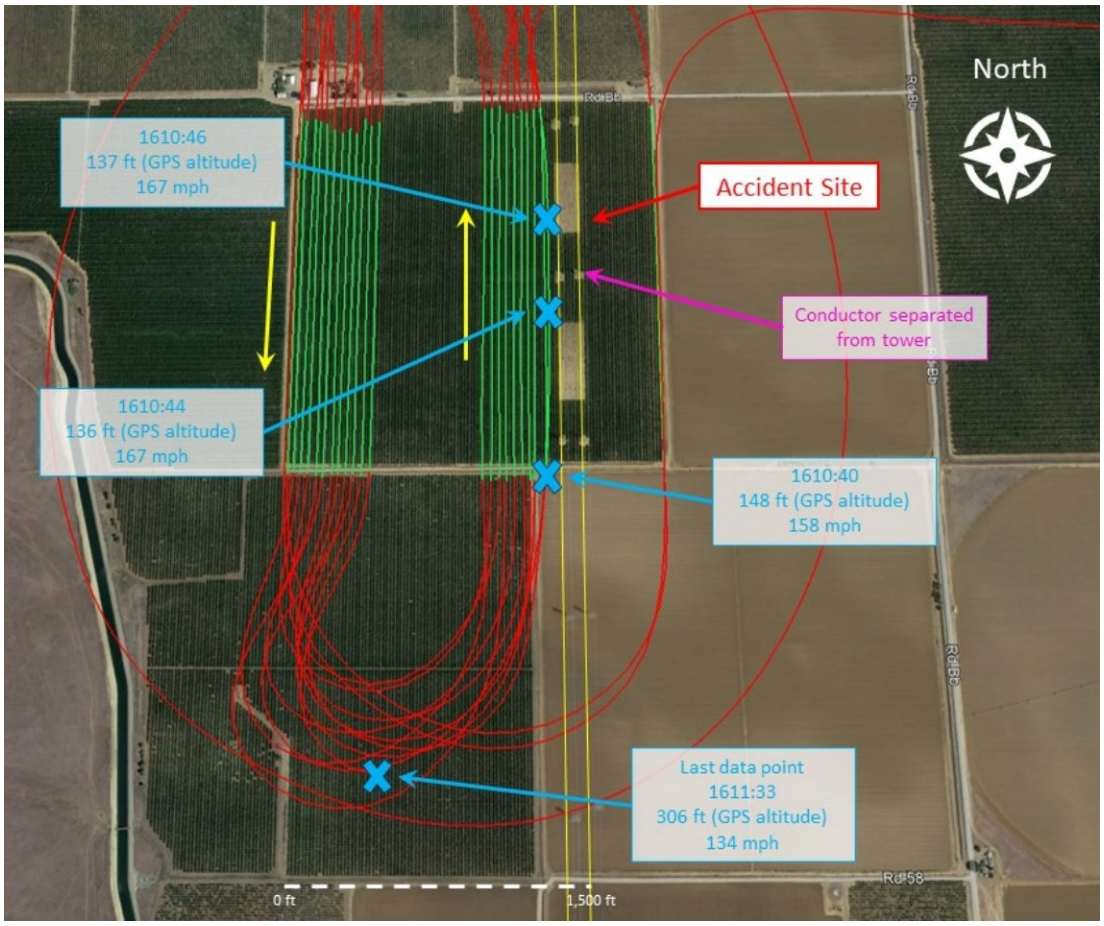

Figure 2. Diagram of parallel passes about 100 ft west of powerlines

Pilot Information

Certificate:	Commercial	**Age:**	66,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	October 1, 2022
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 18, 2023
Flight Time:	25000 hours (Total, all aircraft)		

Although the pilot had completed a flight review 2 months before the accident, his paper logbook did not contain any recorded flights beyond 1999 and no additional pilot records were found.

The operator reported that the pilot had been flying for about 8 hours when the accident occurred and that he had sprayed the accident field multiple times in the past.

According to the pilot's wife, she did not observe any unusual behavior or sleep habits from the accident pilot in the 72 hours before the accident. She noted that the accident took place during the agricultural "off season" and that the pilot had not been flying long hours.

Aircraft and Owner/Operator Information

Aircraft Make:	ROCKWELL INTERNATIONAL	**Registration:**	N8424V
Model/Series:	S-2R	**Aircraft Category:**	Airplane
Year of Manufacture:	1976	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2184R
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	May 27, 2022 100 hour	**Certified Max Gross Wt.:**	6000 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo prop
Airframe Total Time:	20935 Hrs as of last inspection	**Engine Manufacturer:**	Garrett
ELT:	Not installed	**Engine Model/Series:**	TPE-331-5
Registered Owner:	JONES AVIATION INC	**Rated Power:**	850
Operator:	JONES AVIATION INC	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KCIC,226 ft msl	**Distance from Accident Site:**	27 Nautical Miles
Observation Time:	15:47 Local	**Direction from Accident Site:**	50°
Lowest Cloud Condition:	Few / 1800 ft AGL	**Visibility**	4 miles
Lowest Ceiling:	Broken / 2600 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	18 knots / 24 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.09 inches Hg	**Temperature/Dew Point:**	11°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Willows, CA (WLW)	**Type of Flight Plan Filed:**	
Destination:	Willows, CA (WLW)	**Type of Clearance:**	None
Departure Time:	16:05 Local	**Type of Airspace:**	Class E

The reported sunset on the day of the accident was 1807 and dusk began at 1834. The sun's position at the time of the accident was about 21° above the horizon on an azimuth of 244°.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.499499,-122.28518

The airplane came to rest inverted in an almond orchard about 500 ft northeast of a powerline tower and was oriented on a heading of 038° magnetic and adjacent to a severed lower conductor (powerline). All the major structural components of the airplane were accounted for at the accident site. The debris field was marked by several broken tree branches about 50 ft southeast of the accident site. A ground scar about 5 ft in diameter was collocated with the main wreckage. Both ailerons and flaps remained attached to their respective wings, which were both attached to the fuselage. The right wing displayed a depression about 3 ft in diameter with accordion style deformation and tree remnants several feet outboard of the wing root. The left wing leading edge exhibited a depression about 10 ft from the wing root. A section of conductor, about 2 inches in diameter, was wrapped around the propeller hub (see Figure 3). The conductor line was traced through the left wing depression to the trees southeast of the accident site.

The airplane's first point of impact was the west inboard powerline about midspan between 2 towers about 500 ft southwest of the accident site. (See annotation on Figure 4, "East set of powerlines".) According to the operator of the powerlines, the lowest conductor at the towers that held the powerline that was severed was about 75 ft agl at the tower and sagged down to 36 ft agl midspan. The powerlines were in a north-south configuration and were held by 130 ft tall towers that supported multiple powerlines at various heights. An identical set of powerlines, also in a north-south configuration, was located about 115 ft west of the first impact point.

Figure 3. View of airplane at accident site from front with cable wrapped around propeller

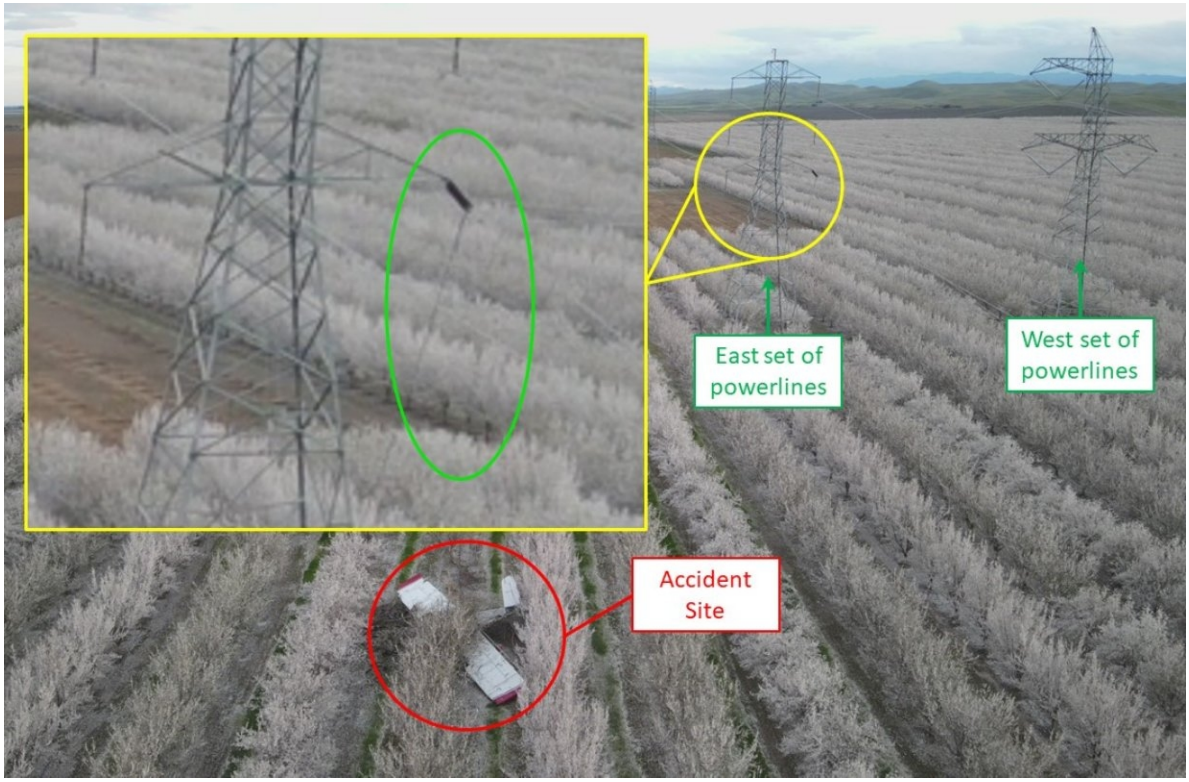

Figure 4. Powerlines and accident site facing south

Postaccident examination of the airplane and engine revealed no preimpact mechanical malfunctions or anomalies that would have precluded normal operation. Continuity of the flight control and fuel systems were confirmed, and the auxiliary fuel boost pump functioned normally when tested. The propeller shaft exhibited rotational scoring consistent with engine operation at the time of impact.

The propeller spinner dome exhibited braided scoring and cable notches in three of the propeller blade leading edges. Propeller blade 2 displayed a gouge in the trailing edge consistent with cable wrap damage.

The propeller also exhibited rotational scoring and leading edge notches/cuts, consistent with an inflight impact of a cable as the propeller rotated. An impact signature noted on the internal surface of the piston corresponded to a 17.7° blade angle, consistent with a power condition in flight. The two dowel pin holes on the mounting flange appeared deformed in the direction of rotation. A counterweight impact mark in the spinner dome was measured at 17.4°, which corresponded with a blade angle of about 4° closer to flight idle and consistent with a lower power signature at the time of impact with terrain.

Administrative Information

Investigator In Charge (IIC):	Stein, Stephen
Additional Participating Persons:	Tim Snyder; Federal Aviation Administration; Sacramento, CA Dana Metz; Honeywell; Phoenix, AZ Les Doud; Hartzell Propeller; Piqua, OH
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