



# Aviation Investigation Final Report

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<b>Location:</b>	Heyburn, Idaho	<b>Accident Number:</b>	WPR22FA151
<b>Date &amp; Time:</b>	April 13, 2022, 08:32 Local	<b>Registration:</b>	N928JP
<b>Aircraft:</b>	Cessna 208B	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Collision during takeoff/land	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 135: Air taxi & commuter - Non-scheduled		

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## Analysis

The pilot flew two RNAV (GPS) runway 20 instrument approaches at the Burley Municipal Airport, Burley, Idaho in instrument meteorological conditions (IMC). The accident occurred during the second approach. For the first instrument approach, the pilot configured the airplane with flaps up and flew the final approach segment at speeds above the operator’s training standard of 120 knots indicated airspeed (KIAS). The pilot flew a low pass over the runway, most likely to assess the landing conditions in accordance with company policy, determined the conditions were acceptable, initiated the missed approach and requested to return flying the same approach.

The pilot elected to not use flaps during the second approach but slowed the approach speed during the final approach leg. Reported weather had improved and visibility had increased to about 2.5 miles. During this approach, the airplane intercepted and remained on the glide path to the stepdown fix. The last automatic dependent surveillance - broadcast (ADS-B) equipment plot recorded the airplane about a mile past this fix, or about 0.6 nautical miles (nm) from the displaced threshold, on the glide path, and at an estimated 85 knots calibrated airspeed (KCAS), which was slower than the airplane’s 95-knot minimum speed for flaps up in icing conditions. Shortly afterward, the airplane descended about 130 ft below the glide path, striking an agglomerate stack atop a potato processing plant, fatally injuring the pilot and substantially damaging the airplane.

A witness reported seeing the airplane come out of the clouds and immediately enter a steam cloud coming from six other stacks before striking the accident stack. A security camera at the processing plant captured the last moments of the airplane’s flight as it came into view in a wings-level, flaps-up, nose-high descent and just before it impacted the stack. While snow and visible moisture were present, the agglomerate stack was always in clear view during the

video, with only partial sections obscured. The witness's account of hearing the engine noise increase and then the nose lift-up may have been the pilot's attempt to avoid the obstacle. The Federal Aviation Administration's (FAA) Aeronautical Information Manual advises pilots to avoid overflight of exhaust stacks; however, the accident stack was directly underneath the instrument approach course and overflight would be expected.

Postaccident examination of the airplane, conducted hours after the accident, revealed no structural icing on the wings and empennage. Examination of the airframe and powerplant revealed no mechanical malfunctions or failures that would have precluded normal operation. The flaps were up, and a review of the manifest revealed the airplane was loaded within the specifications of the manifest and within the center of gravity limits.

Between 2016 and 2017, the FAA conducted two aeronautical studies regarding the stack structures. In the first study, the FAA determined that many of the stack structures were a hazard to air navigation that required mitigation by the processing plant. As an interim measure, the FAA placed the runway 20 visual approach slope indicator (VASI) out of service because the stacks penetrated the obstruction clearance surface and were deemed hazardous to aviation. After determining that they needed to increase the height of the stacks, the plant then modified their proposal; the proposed height increase necessitated a second study.

The second study determined the agglomerate stack and the row-of-six stacks exceeded the *Code of Federal Regulations* (CFR) section 77 standards and provided mitigating actions that included painting the stacks with high visibility white and aviation orange paint and equipping the stacks with red flashing warning lights. The control measures also included the permanent removal of the VASI. On the day of the accident, the agglomerate stack and row-of-six stacks had not been painted to the standard required by the FAA. The warning lights had been installed, and five of the row-of-six stacks were equipped with flashing red lights. The agglomerate stack warning light was stolen following the accident, so an accurate determination of its operating status could not be made.

The existing paint scheme and the visible moisture emitted by the stacks provided a low contrast to the environmental background. This low contrast and the lack of a visual glide slope indicator may have caused difficulty for the pilot in maintaining a safe altitude during the visual portion of the approach to the runway. A white and aviation orange paint scheme, as identified in the regulations, may have offered a higher contrast and thus an adequate warning once the pilot transitioned to visual conditions.

## **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 altitude during an instrument approach, which resulted in a descent below the approach path and impact with a vent stack. Also causal was the failure of the processing plant to correctly paint the vent stacks, which had been determined by the FAA to be a hazard to navigation due to their proximity to the landing approach path. Contributing to the accident was the likely distraction/illusion/obscuration created by steam from the processing plant, which intermittently obscured the runway.

## Findings

<b>Personnel issues</b>	Aircraft control - Pilot
<b>Personnel issues</b>	Task monitoring/vigilance - Pilot
<b>Personnel issues</b>	Identification/recognition - Pilot
<b>Personnel issues</b>	Modification/alteration - Other
<b>Environmental issues</b>	Residence/building - Decision related to condition
<b>Environmental issues</b>	(general) - Effect on operation
<b>Organizational issues</b>	Information design specs - FAA/Regulator

## Factual Information

### History of Flight

<b>Approach-IFR final approach</b>	Collision during takeoff/land (Defining event)
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On April 13, 2022, about 0832 mountain daylight time (MDT), a Cessna 208B Grand Caravan, N928JP, was substantially damaged when it was involved in an accident near Heyburn, Idaho. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* (CFR) Part 135 cargo flight.

The pilot was transporting cargo on an instrument flight rules (IFR) flight from Salt Lake City International Airport (SLC) Salt Lake City, Utah to Burley Municipal Airport (BYI), Burley, Idaho under the call sign Gem Air 1826. According to ForeFlight records, the pilot received an online weather briefing for BYI at 0506 on the morning of the accident and filed an IFR flight plan from SLC to BYI at 0553.

The flight plan indicated a proposed departure time of 0700 and an estimated time en route of 1 hour and 7 minutes at an altitude of 12,000 ft above mean sea level (msl) with 4 hours of fuel onboard. According to ADS-B data, the airplane began to taxi at SLC about 0655 and departed runway 16L about 0700. The climb and en route portions of the flight to BYI were uneventful.

ADS-B data and winds aloft were used to capture the airplane's altitude, position, and airspeed during the initial portions of the two approaches to BYI runway 20. The ADS-B data ended about 4,800 ft msl, or about 660 ft above ground level (agl), which was about the time the airplane approached the JAMID stepdown fix. After passing JAMID, a performance study was used for calculating data.

As the airplane approached BYI, the air traffic control (ATC) approach controller issued the pilot the current altimeter setting and verified that the pilot had the current weather for BYI; the controller then cleared the pilot for the RNAV runway 20 approach via the MALTT transition at MUTOE (Figure 1).



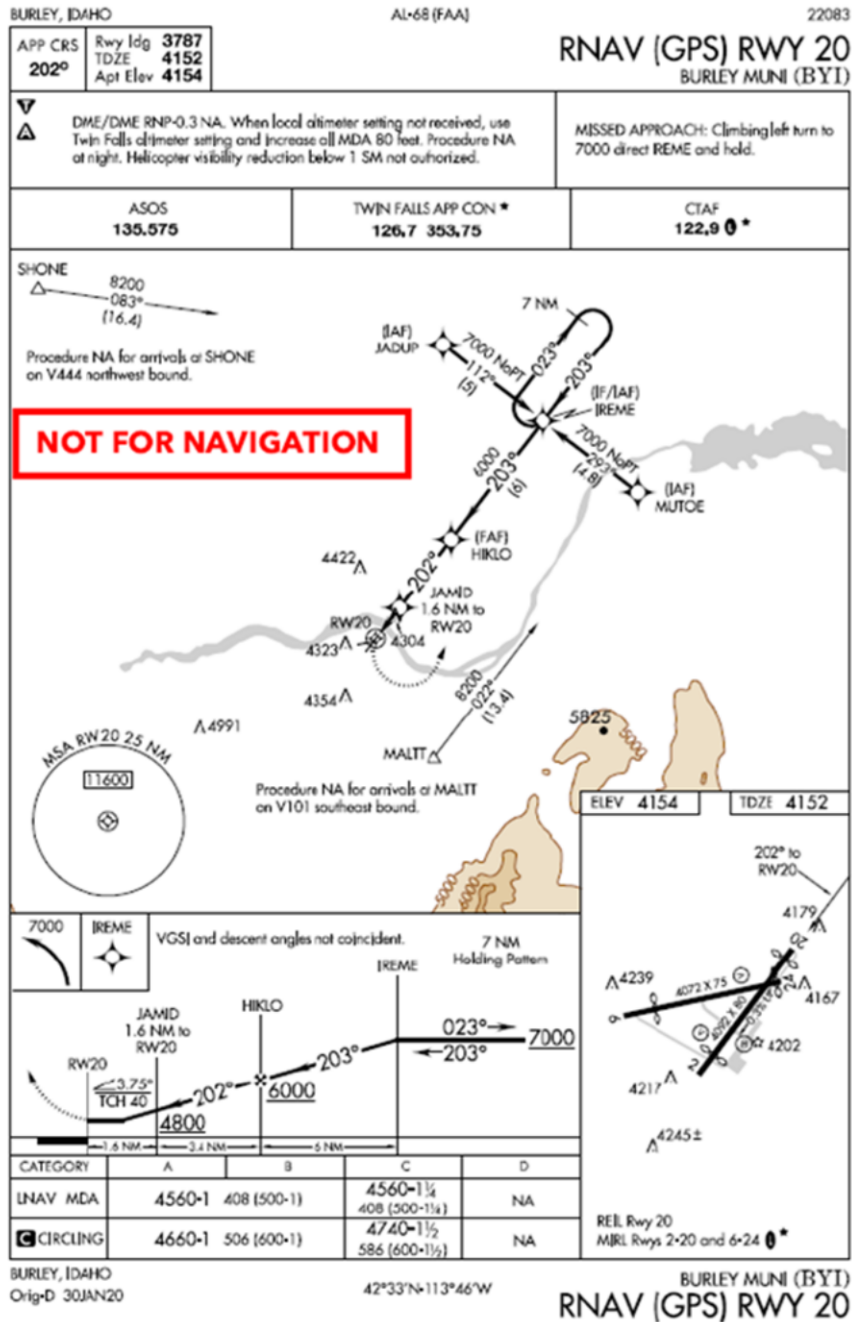


Figure 1. BYI RNAV (GPS) Runway 20 Approach Chart.

The pilot reported passing the MALTT and MUTOE waypoints along the published approach, and at 0807:27 and 7,000 ft reported at IREME, the initial approach fix (IAF) for the approach. Subsequently, ATC provided the pilot with instructions for cancelling the flight's IFR flight plan and cleared the pilot to switch to the BYI airport advisory frequency.

After turning onto the final approach course at IREME, the airplane maintained about 7,000 ft until about 2.5 nm past IREME. The airplane then began to descend at about 200 ft/min (fpm)

until about 6,800 ft, where the airplane intercepted a 3.75° glide path to runway 20. During this initial descent, the computed calibrated airspeed was between about 128 and 132 knots calibrated airspeed (KCAS).

The airplane remained on a glide path of about 3.75° while the rate of descent increased to between 1,000 and 1,100 ft per minute (fpm) and the airspeed increased, peaking at about 156 KCAS. The airspeed then started to decrease continuously, reaching 141 KCAS as the airplane descended below ADS-B coverage near JAMID, about 1.6 nm from the displaced threshold. Between 0810:55 and 0811:27, the rate of descent decreased from about 1,100 to about 960 fpm.

At 0812:23, a surveillance video at BYI recorded the airplane flying wings-level about 20 ft agl over the runway, with the flaps up, about 2,328 ft. beyond the runway 20 displaced threshold. Snow was observed falling and was covering the runway in view. The airplane's ground speed was about 91 knots at this time.

About 0813:56 the pilot reported initiating a missed approach. After the pilot declared a missed approach, ATC asked for the pilot's intentions. The pilot requested the same approach and ATC instructed the pilot to report when the flight was established in the hold at IREME and to expect the RNAV runway 20 approach.

At 0819:46 the pilot reported being established in the hold at IREME. ATC cleared the pilot for the RNAV runway 20 approach and instructed the pilot to cross IREME inbound at 7,000 ft, and to report crossing IREME inbound. The pilot reported crossing IREME inbound while on a track of 218° true and at a ground speed of 122 knots.

Upon reaching a point 1 nm past IREME, the pilot started a descent of about 120 fpm. At 0828:30, the rate of descent increased to about 500 fpm. Between 0828:25 and 0830:05, the airspeed increased from about 114 KCAS to about 134 KCAS as the airplane descended from 6,830 ft to about 6,000 ft.

At 0830:10, about 6,000 ft, the airplane intercepted the 3.75° glide path to the runway. The rate of descent decreased momentarily to zero before increasing again to about 900 fpm, resulting in the airplane deviating above the 3.75° glide path, and then descending back towards it. The airplane intercepted the 3.75° glide path at 0831:12, about 2.4 nm from the displaced threshold, and remained on that glide path until reaching the JAMID waypoint at 0831:36, at an altitude of 4,800 ft. Between 0830:10 and 0831:36, the airspeed decreased from 133 KCAS to 100 KCAS. The last ADS-B point was recorded at 0832:17; at that point, the airplane was 0.6 nm from the displaced threshold at 4,387 ft (245 ft above the displaced threshold), on the 3.75° glide path to the runway, at an airspeed of about 85 KCAS.

Video footage recovered from a security camera located at the processing plant along the approach to runway 20 showed a view of the rooftop of the processing plant, along with a single vent stack supported by steel framework on the roof. Snow was observed falling, and visible moisture was present in the form of billowing steam clouds emitting from other stacks

on the roof of the plant. The stack remained clearly visible in the video, with small sections periodically concealed by the steam clouds. The stack was topped by a warning light, but due to the daylight contrast, and location of the camera below, it could not be determined if it was operating. About 0832:25, the airplane came into view in a wings-level, flaps-up, nose-high descent (Figure 2). The airplane struck the vent stack and fell to the rooftop. The top of the stack was 4,256 ft msl. The airplane struck the stack about 14 ft below the top. The stack was within the lateral boundaries of the approach path, and the distance from the top of the stack to the glide path above it was calculated at 98 ft (Figure 3).



Figure 2. Image from the security camera.

Point	x (nm)	x (ft)	h (ft MSL)	Description
A	0.1004	610	4142	Glide path runway intercept
B	0.0000	0	4142	Displaced threshold
C	-0.0502	-305	4141	Threshold
D	0.0000	0	4182	Glide path threshold crossing height
E	-0.4332	-2632	4156	Agglomerator stack base
F	-0.4332	-2632	4256	Agglomerator stack top
G	-0.4332	-2632	4354	Glide path altitude at stack
H	-1.5508	-9423	4800	Glide path altitude at JAMID

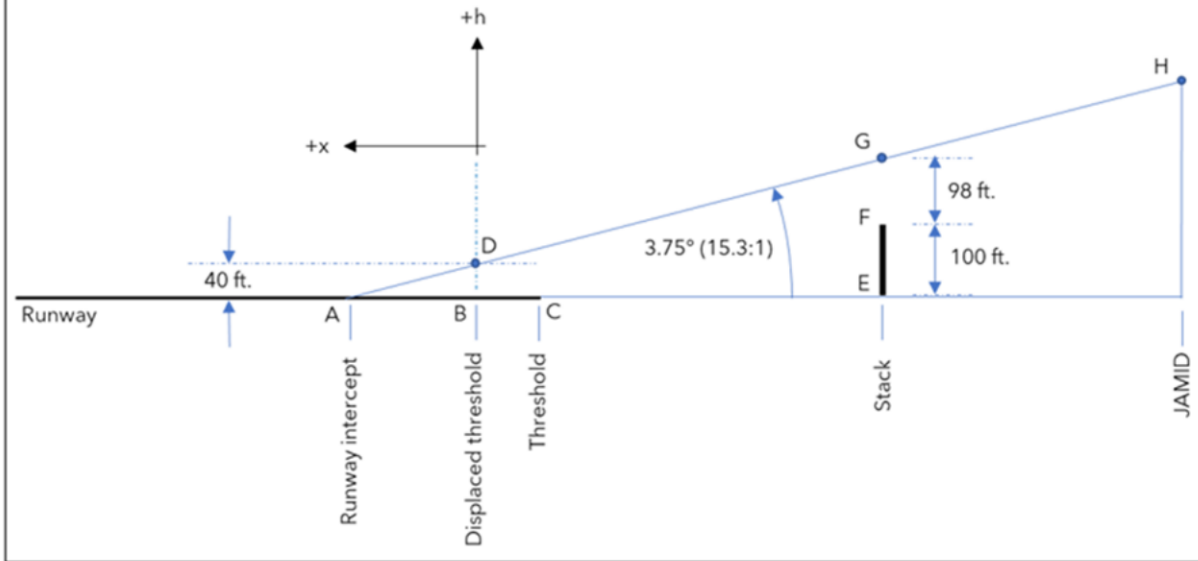


Figure 3. Illustration showing the height of the stack and distance from the glide path to runway 20.

A witness located about 1/4 mile away heard and then observed the airplane descend out of the clouds before it immediately went into a steam cloud produced by a set of six smokestacks located at the processing plant. The witness heard the engine sound increase and saw the nose lift shortly before the airplane struck the vent stack and descended to the rooftop.

## Pilot Information

<b>Certificate:</b>	Commercial; Flight instructor; Private	<b>Age:</b>	30,Female
<b>Airplane Rating(s):</b>	Single-engine land; Single-engine sea; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	5-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	February 16, 2022
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	1380 hours (Total, all aircraft), 193 hours (Total, this make and model), 1100 hours (Pilot In Command, all aircraft), 213.5 hours (Last 90 days, all aircraft), 85.9 hours (Last 30 days, all aircraft), 4.2 hours (Last 24 hours, all aircraft)		

A review of records revealed that on April 9, 2022, the pilot was on duty between 0630 and 1000 and flew a roundtrip from SLC to BYI and logged a total of 2.4 hours in the CE-208B (N928JP).

On April 10, 2022, the pilot was off duty.

On April 11, 2022, the pilot was on duty between 0600 and 1900 and logged a total of 5.0 hours (no routing information was provided).

On April 12, 2022, the pilot was on duty between 0600 and 1030 and was scheduled to fly a roundtrip from SLC to BYI. According to Gem Air LLC interviews, the pilot had to divert from BYI to Joslin Field/Magic Valley Regional Airport (TWF), Twin Falls, Idaho due to "ground icing conditions" at BYI. The pilot logged a total of 3.2 hours in the CE-208B (N928JP) for the day.

On April 13, 2022, the day of the accident, the pilot went on duty at 0600.

The pilot completed initial CE-208B training on November 16, 2021. On February 17, 2022, the pilot successfully completed 14 CFR 135.293, 135.297 and 135.299, proficiency, instrument, and line checks.

The Gem Air pilot training program included standards for performing non-precision instrument approaches. According to the operator's Flight Maneuvers Description Manual, the non-precision approach section stated, in part, "if you are approaching an airport, without current weather reports, even if the approach is straight-in, you may wish to plan on circling over the airport to check the winds and runway condition." The document's standard for airspeed after passing the final approach fix was 120 knots indicated airspeed (KIAS).

According to the Chief Pilot, Gem Air did not teach the pilots to follow the Garmin vertical flight path indicator but did teach pilots to use it as advisory guidance. Gem Air taught pilots to use the autopilot on non-precision approaches in both VNAV and Approach mode. If engaged, the autopilot would follow the vertical path indications when available. Additionally, the Flight Maneuvers Description Manual stated, in part, *“After passing the final approach fix inbound, begin descent to MDA [minimum descent altitude] or step-down fix, if applicable. Descent should be approximately 1000 fpm to ensure that you are at the next required altitude. Failure to make the descent to MDA in a timely manner may result in missing the opportunity to visually identify the airport in time to continue a normal descent to landing.”*

The pilot calculated the takeoff weight of the accident flight at 8,762.6 pounds and an arm of 201.4, with a fuel load of 140 gallons. Calculations made by Textron Aviation revealed the airplane was within center of gravity limits.

A review of the pilot’s records revealed that she had operated to and from BYI at least 13 times within the year, including the accident flight.

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Cessna	<b>Registration:</b>	N928JP
<b>Model/Series:</b>	208B	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2013	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	208B2428
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	March 25, 2022 Annual	<b>Certified Max Gross Wt.:</b>	8785 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Turbo prop
<b>Airframe Total Time:</b>	5116.9 Hrs	<b>Engine Manufacturer:</b>	Pratt & Whitney Canada
<b>ELT:</b>	C126 installed, not activated	<b>Engine Model/Series:</b>	PT-6A-114A
<b>Registered Owner:</b>	SPIRIT AIR INC	<b>Rated Power:</b>	675
<b>Operator:</b>	Gem Air LLC	<b>Operating Certificate(s) Held:</b>	Commuter air carrier (135), On-demand air taxi (135)

According to the operator’s Operations Specifications, the accident airplane was authorized to conduct commuter and on-demand operations in IFR/VFR and day/night conditions. The airplane was not equipped with a cockpit voice recorder or a flight data recorder, nor was it required to be.

The airplane had an S-1 Icing Supplement to the Pilot's Operating Handbook that was applicable to airplanes equipped with the TKS Ice Protection System and a cargo pod, such as the accident airplane. "Icing conditions" are defined in the Supplement as "visually detected ice, or the presence of visible moisture in any form at an OAT [Outside Air Temperature] of 5° C (41° F) or below." The airplane's two approaches to runway 20, conducted in temperatures below 5° C in light snow, met this definition of "icing conditions," and consequently the limitations listed in the supplement applied. The limitations in the Icing Supplement included a minimum airspeed of 95 knots indicated airspeed (KIAS) flaps up, and 85 KIAS at flaps 10°-20°, and maximum 20° flap setting for landing.

The airplane was equipped with a Low Airspeed Awareness System (LAA). The LAA was designed to warn the pilot when airspeed falls below 97.5 knots while operating in icing conditions. When the system is operational and the airspeed drops below 97.5 KIAS, the BELOW ICING MIN SPD annunciator will flash between amber and white, and the stall horn will sound intermittently until the speed is increased above 97.5 knots.

An NTSB Performance study included calculations to determine the visibility of the stack from an exemplar airplane at various seating heights. To evaluate the effect of varying eye positions on the visibility of the stack, the azimuth and elevation angles of the cockpit windows and other airplane structures were computed for three different eye heights in the cockpit.

This study presented recreations of possible views from the cockpit created by a flight simulation program using sky and terrain graphics including the exhaust stack, and assuming the nominal or average eye position.

The time and date were set to those of the accident (0832:30 MDT on April 13, 2022), which resulted in the correct placement of the sun in the sky. The weather options were set to match that of the accident time, and the airplane's attitude (heading, pitch, and roll) were based on the accident approach trajectory. The results of the simulation revealed that at an average eye position the airport runway could be seen just above the instrument panel, while the accident stack was obscured by the instrument panel from about 29.5 to 3.3 seconds before impact (Figure 4). According to the Chief Pilot for the operator, the accident pilot had no problems seeing over the instrument panel.



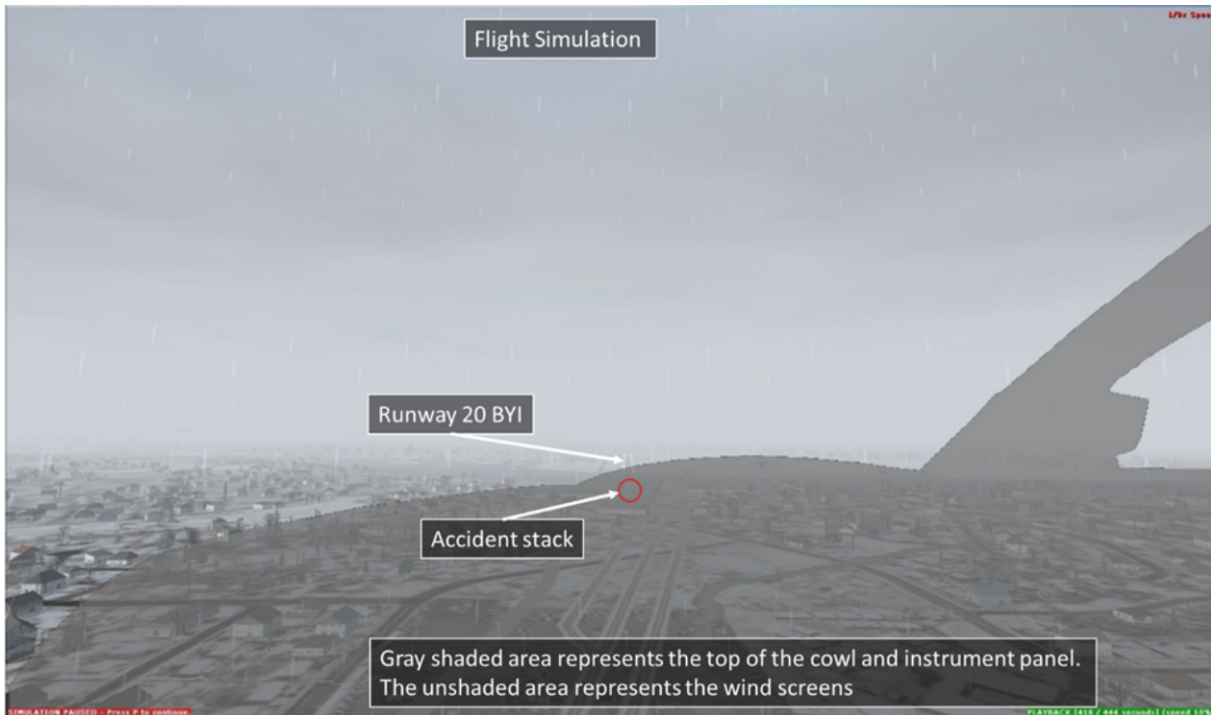


Figure 4. Flight simulation using accident weather conditions and airplane attitude, showing the airport visible above the instrument panel while the stack is concealed by the instrument panel.

A note in the Supplement directs the pilot to multiply normal POH/AFM landing distances by 2.1 for flaps 10°, and to multiply the POH/AFM landing distances by 2.0 for flaps 20°. The note did not provide a multiplier for flaps up. The note did advise pilots to expect the activation of the LAA when slowing to land to include the illumination of the BELOW MIN ICING SPD annunciator and the aural warning to sound [intermittent stall horn].

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KBYI,4143 ft msl	<b>Distance from Accident Site:</b>	1 Nautical Miles
<b>Observation Time:</b>	08:10 Local	<b>Direction from Accident Site:</b>	227°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	1 miles
<b>Lowest Ceiling:</b>	Broken / 2300 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	8 knots /	<b>Turbulence Type Forecast/Actual:</b>	Clear air / Unknown
<b>Wind Direction:</b>	190°	<b>Turbulence Severity Forecast/Actual:</b>	Light / Unknown
<b>Altimeter Setting:</b>	29.96 inches Hg	<b>Temperature/Dew Point:</b>	-3°C / -5°C
<b>Precipitation and Obscuration:</b>	Moderate - None - Mist		
<b>Departure Point:</b>	Salt Lake City, UT (SLC)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Burley, ID (BYI)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	07:00 Local	<b>Type of Airspace:</b>	Class E

BYI had an automated surface observation system (ASOS). Automated BYI weather at 0810, about the time of the first approach, was wind from 190° at 8 kts, visibility 1 mile, light snow, mist, broken ceiling at 2,300 ft agl, overcast skies at 2,800 ft agl, temperature of -3° C, dew point -5° C, and an altimeter setting of 29.96 inches of mercury (inHg). Remarks: automated station with a precipitation discriminator, a trace of precipitation since 0753 MDT, temperature -3.3°C, dew point -5.0°C.

Automated BYI weather at 0840, about the time of the second approach, recorded wind from 210° at 8 kts, visibility 2.5 miles, light snow, broken ceiling at 3,000 ft agl, overcast skies at 4,700 ft agl, temperature of -3° C, dew point -6° C, and an altimeter setting of 29.97 inHg. Remarks: automated station with a precipitation discriminator, a trace of precipitation since 0753 MDT, temperature -2.8° C, dew point -5.6° C.

The 0900 MDT High-Resolution Rapid Refresh (HRRR) sounding for the accident site indicated an unstable to conditionally unstable environment from the surface through 11,000 ft with a stable layer between 6,750 ft and 7,250 ft. Clouds were indicated by RAOB analysis program between 5,700 ft and 10,000 ft. Moderate or greater icing potential was indicated by RAOB between 5,300 ft and 9,500 ft.

Geostationary Operational Environmental Satellite visible and infrared data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison in Madison, Wisconsin, for the period from 0600 MDT through 1200 MDT and reviewed. (Figure 5)

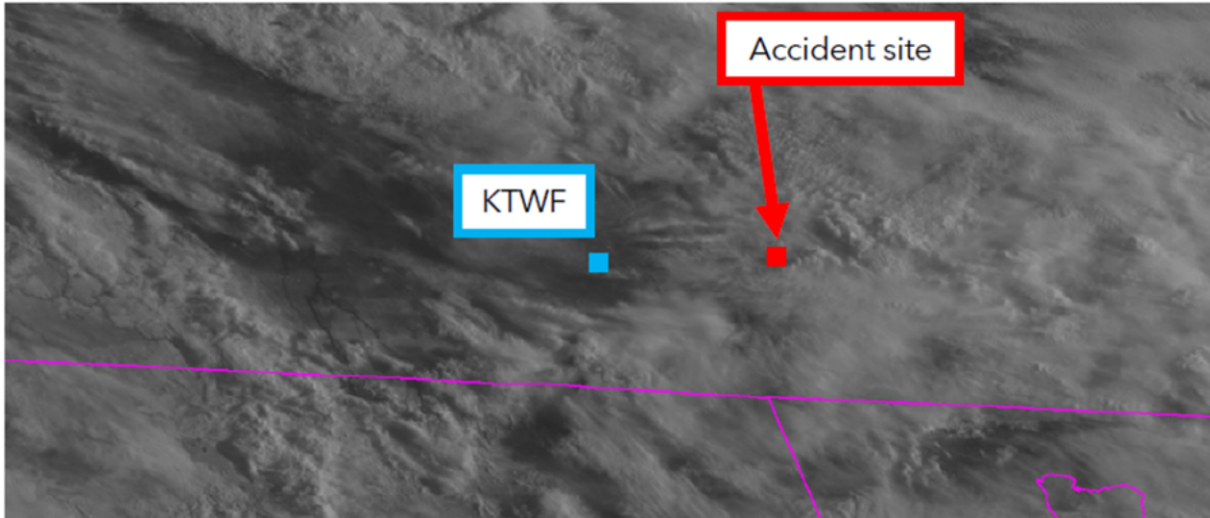


Figure 5. GOES-17 visible image at 0830 MDT at 2X magnification with the accident site highlighted with a red square and cloud cover indicated above the accident site. The cloud cover was moving from west to east with cloud cover remaining over the accident site.

A regional view of the National Weather Service National Reflectivity Mosaic is included as Figure 6 for 0830 MDT with the approximate location of the accident site marked by a red circle. The image depicted 10 to 20 dBZ echoes above the accident site.

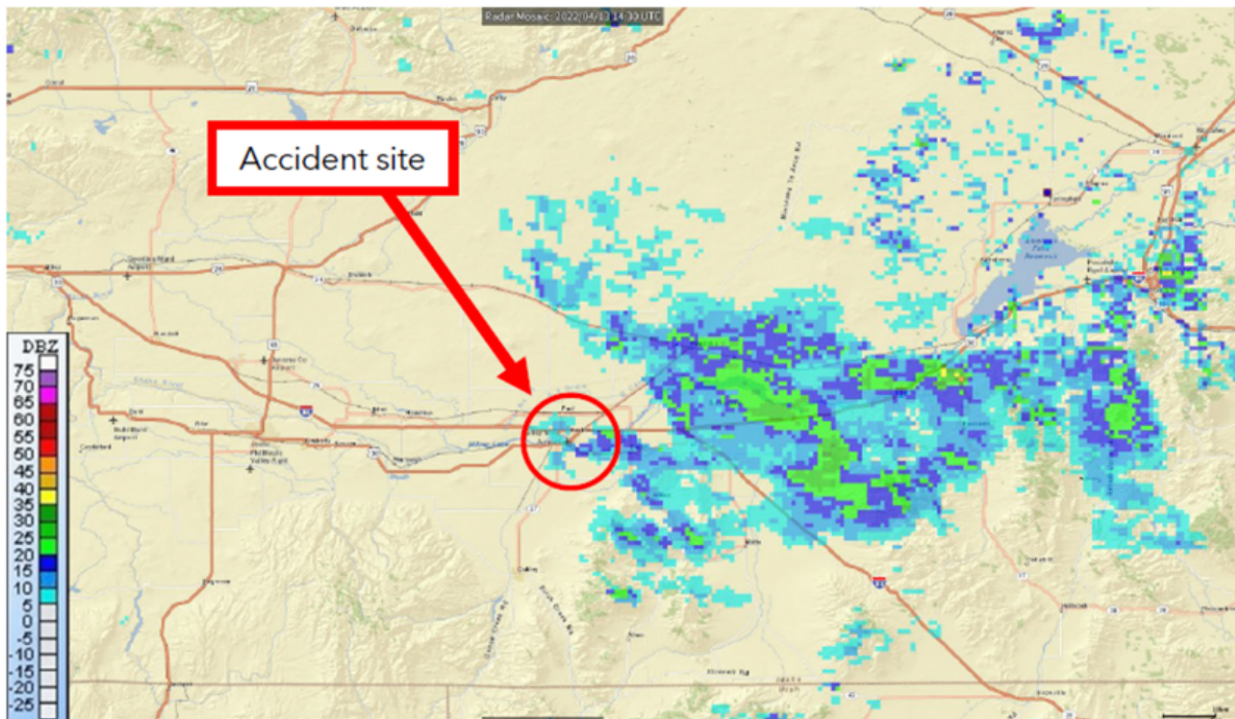


Figure 6. National Reflectivity Mosaic for 0830 mdt.

There were text Airmen’s Meteorological Information (AIRMET) advisories Sierra and Zulu valid for the accident site at the accident time. Text AIRMETs Sierra and Zulu issued at 0410 and 0245 MDT, respectively, forecasted mountain obscuration conditions due to clouds, precipitation and mist, and moderate icing between the freezing level and 16,000 ft.

### Airport Information

<b>Airport:</b>	Burley Municipal Airport KBYI	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	4154 ft msl	<b>Runway Surface Condition:</b>	Snow;Wet
<b>Runway Used:</b>	20	<b>IFR Approach:</b>	RNAV
<b>Runway Length/Width:</b>	4092 ft / 80 ft	<b>VFR Approach/Landing:</b>	None

BYI was located about 1 mile northeast of Burley, Idaho, at an elevation of 4,154 ft msl, and was a publicly owned entity operated by the City of Burley. The airport had 2 runways, runway 02/20 and runway 06/24. Runway 20, on which the accident airplane was trying to land, had non-precision markings, runway end identifier lights, and a 305-ft displaced threshold.

The Gem State Processing plant was located directly to the northeast of BYI, across the Snake River. The processing plant’s roof top had multiple vent stacks. The airplane impacted a 32-inch diameter vent stack known as the agglomerate stack. A group of 6 42-inch diameter drum dryer vent stacks were on the same roof, about 200 ft southwest of the agglomerate stack. The agglomerate stack and the group of six stacks were 100 ft agl and in line with the extended centerline of runway 20. Other smaller vent stacks were present on an adjacent plant building rooftop but were not in line with the runway, as shown in Figure 7.



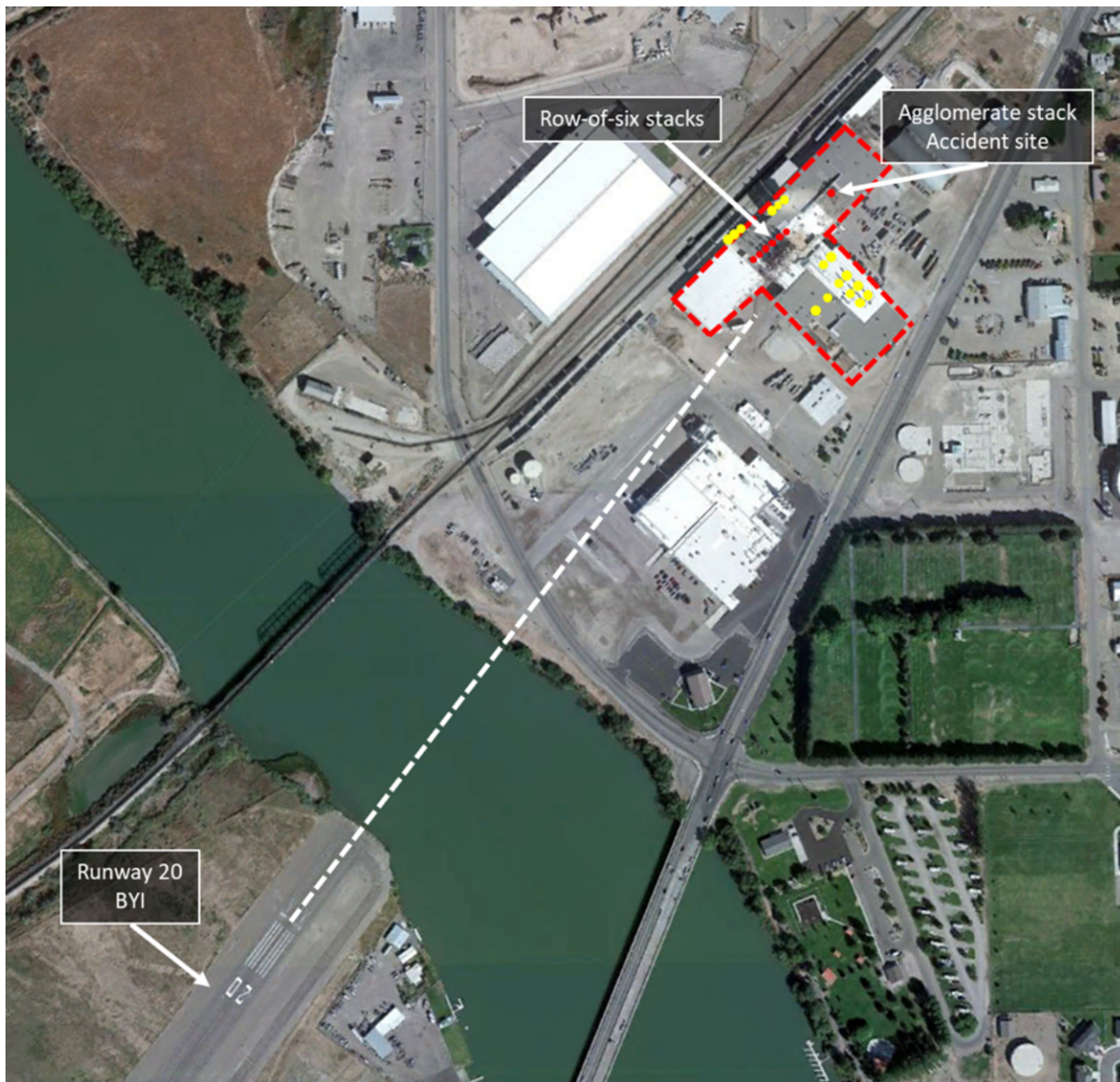


Figure 7. Google Earth view of the Gem State Processing plant and runway 20 at BYI. The plant is outlined in red. The agglomerate and row-of-six stacks are shown in red dots and the other structures are shown in yellow dots. The white dashed line is an estimate of the extended centerline of runway 20.

About 6 years before the accident, the FAA was made aware that the Gem State Processing plant had added stack structures within the airport vicinity that could be a hazard to air navigation. After communicating with the processing plant, from 2016 through 2017, the FAA conducted two aeronautical studies (2016-ANM-878-OE, "Notice of Presumed Hazard" dated September 2016, and 2016-ANM-1617-OE, "Determination of No Hazard to Air Navigation" dated February 2, 2017). The first aeronautical study addressed multiple structures at the processing plant, including the agglomerate stack and a row of six drum dryer stacks. The FAA

determined that many of the structures were a hazard to air navigation and required mitigation actions from the processing plant. As an interim measure, the FAA placed the runway 20 visual approach slope indicator (VASI) out of service because the stacks penetrated the obstruction clearance surface and were deemed hazardous to aviation. Gem State then modified their proposal after needing to further elevate the height of the stacks to meet EPA standards. The increase necessitated termination of the first aeronautical study and the creation of the second.

The second survey determined the agglomerate stack, and the row-of-six stacks exceeded the CFR section 77 standards and provided mitigating actions the processing plant must take for the stacks to receive a determination of no hazard to air navigation. One of the mitigating actions was that the stacks be painted in accordance with Advisory Circular AC 70/7460-1, which detailed a color scheme of high visibility white and aviation orange and that the stacks be equipped with red flashing warning lights. The control measures also included the permanent removal of the VASI. On the day of the accident, the agglomerate and row-of-six stack support structures were painted a red oxide color with yellow handrails. This color scheme was detailed to the FAA in an electronic message from Gem State dated August 17, 2017. Postaccident visual examination by the IIC confirmed the warning lights were installed, and five of the row-of-six stack warning lights were confirmed to flash and were red in color.

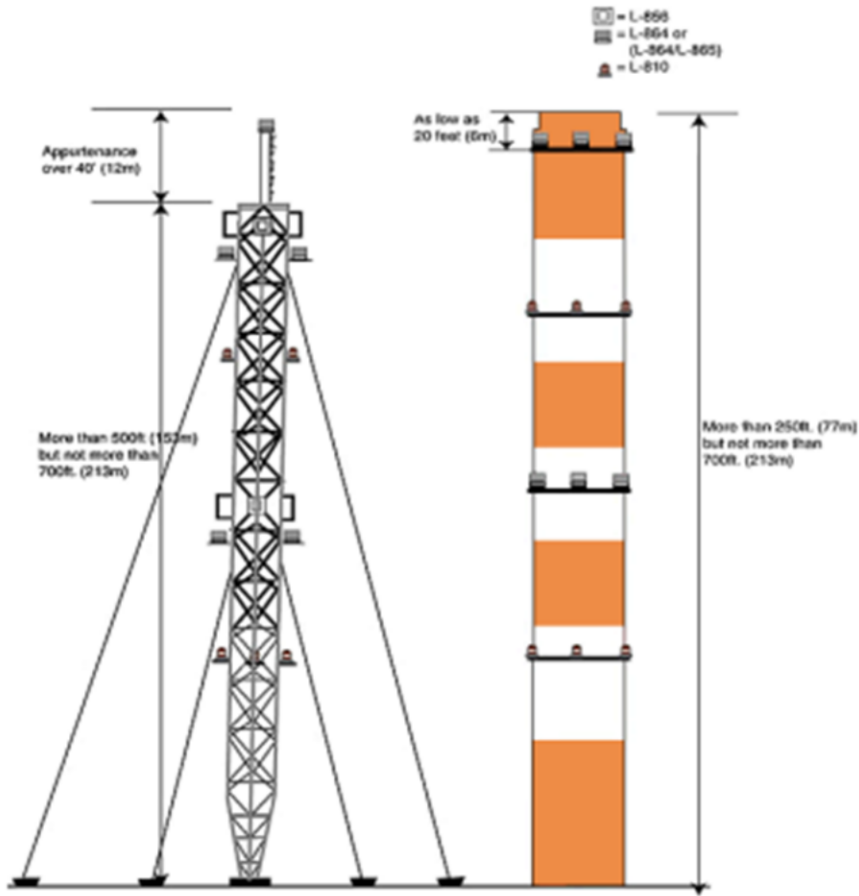


Figure 8. FAA Advisory Circular 70/7460-1K illustration showing an exhaust stack painted white and aviation orange.





Figure 9. Image of the Gem State Processing plant roof top. The agglomerate stack and the group of six stacks are in view. Photo courtesy of the Hayburn Police Department.

On July 10, 2023, in response to questions from the NTSB regarding the FAA's determination of "No Hazard to Air Navigation," the FAA responded that the initial aeronautical studies contained in 2016-ANM-878-OE were terminated before the FAA decided whether the aeronautical effects would be significant enough to result in a determination of hazard under 14 CFR Part 77. The FAA explained that the Notice of Presumed Hazard, issued on May 18, 2016, was a preliminary response to the Gem State Processing plant's initial proposal and that it identified concerns requiring further study or modifications to arrive at a no hazard determination. The sponsor then had an opportunity to modify their proposal, request further study, or terminate the study. Gem State modified their proposal which resulted in the second aeronautical study, 2016-ANM-1617-OE.

While the FAA determined the new [100 ft agl] structures would be obstructions, the determination explained that they would not have significant adverse effect on safe and efficient use of navigable airspace based on the following mitigations:

1. the proposed height (100 feet agl) and location of the stacks (height modified from original proposal),
2. removal of the RWY 20 VASI,
3. marking and lighting of the stacks,

4. new take-off minimums and departure notes for the affected runway,
5. existing altitude restrictions for IFR arrivals, and
6. information published in the Chart Supplement on obstructions and airport conditions.

Additionally, according to the FAA, the instrument approach procedures (IAPs) for this airport were reviewed and it was determined the procedures were adequate and appropriate to ensure obstacle and terrain clearance for each respective IAP.

The NTSB asked for clarification as to whether the stacks in question were required to be both marked and lighted in accordance with FAA Advisory Circular 70/7460-1. The FAA confirmed that “as a condition of the No Hazard Determination, dated February 2, 2017, the stacks were required to be painted with white and aviation orange paint, and lit with red obstruction lights, per FAA Advisory Circular 70/7460-1.” The NTSB noted during the investigation that neither the agglomerate stack nor the six drum dryer stacks were painted with white and orange aviation paint. Each stack in the group of six stacks had a red aircraft warning light.

The agglomerate stack was equipped with an aircraft warning light; however, the light was stolen before it could be examined by the NTSB. The Heyburn Police Department investigated the theft but was unable to recover the light. According to the police report, an individual was found to have trespassed on the property of Gem State Processing after the accident. This individual later published a YouTube video where he reported to have taken the light from the accident site. When questioned further about the location of the light, the individual recanted and stated that he had essentially made the video for dramatic effect, and while he examined the light at the accident site and removed it from its conduit, he had not taken it away. The Heyburn Police Department report, along with a copy of the YouTube video are included in the public docket. Examination of the video appeared to indicate that the light was the same type as initially observed at the accident site and bore similar labels along with signatures of possible damage that matched the accident light.

### Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>		<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	42.551433,-113.75969

The airplane came to rest on its right side on the roof of the processing plant. Both wings, the propeller assembly, belly pod, TKS tank, and the nose wheel separated from the fuselage. All major components of the airplane remained on the rooftop. An examination of the wreckage conducted within hours of the accident revealed no indications of structural ice on the wreckage. The flap actuator exhibited 6.6 inches of exposed threads, consistent with flaps fully retracted. First responders recovered about 40 gallons of jet fuel, which had spilled from both wings. The nose wheel had white, black, and green electrical wiring wrapped around the wheel assembly. A review of the security video from the processing plant revealed the airplane struck the electrical conduit line that ran from the lower platform of the agglomerate stack up to the aircraft warning light. Examination of the airframe revealed no preaccident mechanical malfunctions or failures that would have precluded normal operation.

The engine was recovered to a secure facility where further examination revealed contact signatures to its internal components characteristic of the engine developing power at the time of impact. There were no indications of any pre-impact mechanical anomalies to any of the engine components that would have precluded normal engine operation.

The two memory cards, dedicated to the Garmin G1000 integrated flight deck, were ejected from the airplane and recovered on the rooftop. Examination revealed both memory cards sustained damage and no data was recovered. Additionally, the aircraft data acquisition system (ADAS) was found separated from the airplane among the wreckage. Postaccident examination provided no usable data for the accident flight.

## **Medical and Pathological Information**

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An autopsy of the pilot was performed by the Minidoka County Coroner's Office, Rupert, Idaho. The cause of death was multiple blunt force injuries.

## **Additional Information**

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The Aeronautical Information Manual (AIM) issued by the FAA contained information about the hazards presented by exhaust plumes and advised pilots to avoid flight in the vicinity of exhaust plumes. The AIM stated, in part, "Exhaust plumes are defined as visible or invisible emissions from power plants, industrial production facilities, or other industrial systems that release large amounts of vertically directed unstable gases (effluent). High temperature exhaust plumes can cause significant air disturbances such as turbulence and vertical shear. Other identified potential hazards include, but are not necessarily limited to reduced visibility, oxygen depletion, engine particulate contamination, exposure to gaseous oxides, and/or icing."

The Airplane Flying Handbook further stated, in part, "Flight at higher pitch attitudes requires greater reliance on the flight instruments for airplane control since outside references may be absent."

Title 14 CFR 91.175(c) Operation below DA/DH or MDA stated the following:

"Except as provided in § 91.176 of this chapter, where a DA/DH or MDA is applicable, no pilot may operate an aircraft, except a military aircraft of the United States, below the authorized MDA or continue an approach below the authorized DA/DH unless –

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and for operations conducted under part 121 or part 135 unless that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing.

(2) The flight visibility is not less than the visibility prescribed in the standard instrument approach being used; and

(3) Except for a Category II or Category III approach where any necessary visual reference requirements are specified by the Administrator, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The runway end identifier lights.

(vi) The visual glideslope indicator.

(vii) The touchdown zone or touchdown zone markings.

(viii) The touchdown zone lights.

(ix) The runway or runway markings.

(x) The runway lights.

The regulation further stated, in part,

*“(e) Missed approach procedures. Each pilot operating an aircraft, except a military aircraft of the United States, shall immediately execute an appropriate missed approach procedure when either of the following conditions exist:*

*(1) Whenever operating an aircraft pursuant to paragraph (c) of this section or § 91.176 of this part, and the requirements of that paragraph or section are not met at either of the following times:*

*(i) When the aircraft is being operated below MDA; or*

*(ii) Upon arrival at the missed approach point, including a DA/DH where a DA/DH is specified and its use is required, and at any time after that until touchdown.*

*(2) Whenever an identifiable part of the airport is not distinctly visible to the pilot during a circling maneuver at or above MDA, unless the inability to see an identifiable part of the airport results only from a normal bank of the aircraft during the circling approach.”*

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Salazar, Fabian
<b>Additional Participating Persons:</b>	Craig F. Karel; Federal Aviation Administration; Boise, ID Casey Love; Textron Aviation; Wichita, KS
<b>Original Publish Date:</b>	April 18, 2024
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.ntsb.gov/Docket?ProjectID=104938">https://data.ntsb.gov/Docket?ProjectID=104938</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).