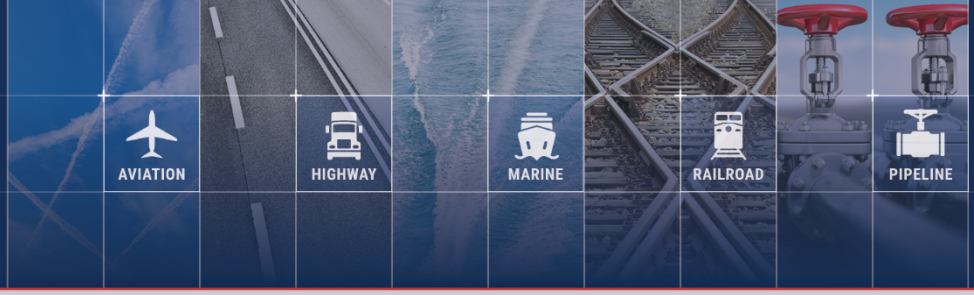

Aviation Investigation Final Report

Location:	Port Allen, Louisiana	**Accident Number:**	CEN23FA142
Date & Time:	March 26, 2023, 02:38 Local	**Registration:**	N441PD
Aircraft:	ROBINSON HELICOPTER COMPANY R44 II	**Aircraft Damage:**	Destroyed
Defining Event:	VFR encounter with IMC	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Aerial observation		

Analysis

With cloud ceilings at or below 1,000 ft above ground level (agl), the police department helicopter departed about 0226 to provide aerial support to law enforcement ground units that were conducting a high-speed pursuit of a vehicle. The helicopter flight crew (pilot and tactical flight officer) advised dispatch and ground units via radio that they were assisting and requested updates to the vehicle movement and location. ADS-B data showed the helicopter departed the airport to the south, turned west, then overflew a highway to the west of the departure airport. Unable to maintain safe pursuit of the vehicle, dispatch terminated the pursuit to all responding units, including the helicopter, via radio at 0235. There were no further communications received from the helicopter. About that time, the data showed the helicopter executed a shallow left deviation to the south of the highway. Following the deviation, the helicopter turned left, and the turn rate increased. A series of turns and altitude changes followed. The ADS-B data ended at 0238 at an altitude of about 1,450 agl. There were no witnesses to the accident. The pilot did not obtain a weather briefing or complete a department-required flight risk assessment before the flight.

Although the accident was not survivable, police department personnel were unaware the helicopter had not returned to the base. Later that day, a family member reported that the tactical flight officer had not returned home, and his cellular phone was sending a signal from a remote area. The local sheriff's department searched the area and located the helicopter at 1114.

Postaccident examination of the airframe and engine revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation. Debris

location at the accident site and wreckage signatures are consistent with main rotor blade contact to the cockpit/cabin structure near the end of the flight.

There was a stationary weather front in the vicinity of the accident site and that, combined with relatively moist surface air and low-level inversion, helped to create an environment conducive to the formation of low clouds and fog. Weather imagery showed a low cloud cover over the accident site at the accident time.

The pilot did not hold an instrument rating. In addition, he had not received simulator training on strategies and techniques for recognizing, avoiding, and escaping inadvertent encounters with instrument meteorological conditions (IMC). Research indicates that inadvertent IMC training can improve pilot control and increase the likelihood of surviving such encounters. Such training might have recalibrated the pilot's risk tolerance for situations involving continued visual flight rules (VFR) flight in IFR conditions, motivated him to avoid them, and helped him to maintain control of the helicopter in the event of an inadvertent encounter with IMC.

Based on available flight data and weather information, it is likely that the pilot continued the vehicle pursuit into deteriorating weather conditions. After termination of the pursuit, the helicopter's erratic maneuvers are consistent with the pilot experiencing spatial disorientation, a loss of control in flight, and inability to recover the helicopter.

Ethanol was detected at a low level in cavity blood, a specimen type in which n-propanol was also detected. Ethanol was not detected in vitreous fluid, which is generally the specimen type best protected against postmortem ethanol formation. These results indicate that some or all of the small amount of detected ethanol may have been from postmortem production, and that ethanol effects did not likely contribute to the accident.

Probable Cause and Findings

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

The pilot's decision to continue the visual flight rules flight into deteriorating weather conditions, which resulted in spatial disorientation and the loss of aircraft control.

Findings

Personnel issues	Decision making/judgment - Pilot
Environmental issues	Low visibility - Effect on operation
Personnel issues	Spatial disorientation - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Not attained/maintained

Factual Information

History of Flight

Maneuvering-low-alt flying	VFR encounter with IMC (Defining event)
Maneuvering-low-alt flying	Loss of visual reference
Maneuvering-low-alt flying	Loss of control in flight
Maneuvering-low-alt flying	Aircraft structural failure
Maneuvering-low-alt flying	Collision with terr/obj (non-CFIT)

On March 26, 2023, about 0238 central daylight time, a Robinson R44 II helicopter, N441PD, was destroyed when it was involved in an accident near Port Allen, Louisiana. The pilot and tactical flight officer sustained fatal injuries. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 aerial observation flight.

According to Baton Rouge Police Department (BRPD) personnel and ADS-B data, the BRPD helicopter, call sign Air 1, departed the Baton Rouge Metropolitan Airport (BTR), Baton Rouge, Louisiana, about 0226, to provide aerial support to BRPD ground units that were conducting a high-speed pursuit of a fleeing vehicle. Air 1 advised dispatch and ground units via radio that they were assisting and requested updates to the vehicle movement and location. ADS-B data showed the helicopter depart BTR to the south, turned west, then overfly Highway 190, west of Baton Rouge. Unable to maintain a safe pursuit of the vehicle, BRPD dispatch terminated the pursuit to all BRPD units, including the helicopter, via radio at 0235. There were no further communications received from the helicopter. About that time, the data showed the helicopter executed a shallow left deviation to the south of Highway 190. Following the deviation, a left turn was initiated and the turn rate increased. The initial turn was followed by a series of turns and altitude changes (see Figures 1 and 2). The ADS-B data ended at 0238 at an altitude of about 1,450 agl. There were no witnesses to the accident.

Figure 1. ADS-B data overlayed on Google Earth.

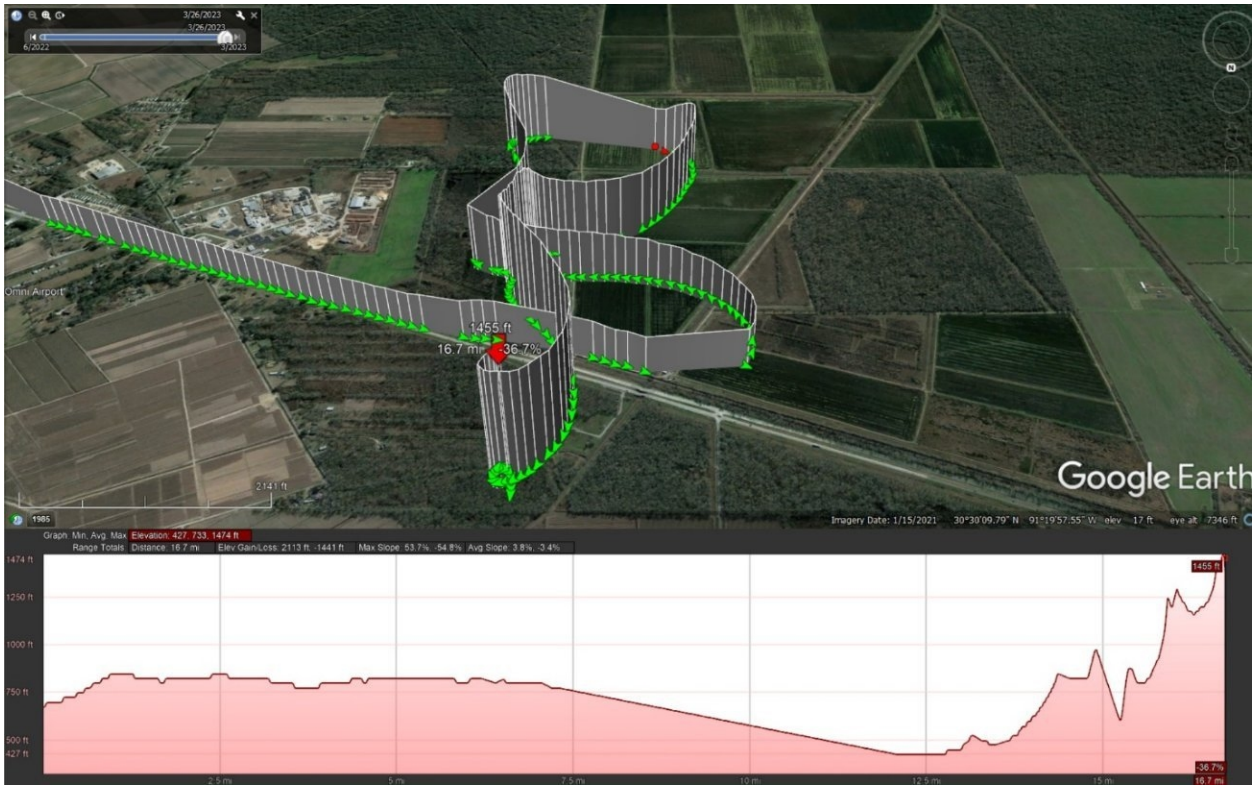

Figure 2. ADS-B data overlayed on Google Earth with an altitude profile.

According to the West Baton Rouge Parish Sheriff's Office, at 1049, a family member reported that the tactical flight officer had not returned home from his scheduled shift, and his cellular phone was sending a signal from a remote area in West Baton Rouge Parish. The sheriff's department searched the area and located the helicopter at 1114.

Pilot Information

Certificate:	Private	**Age:**	38,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	5-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	January 27, 2021
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	August 11, 2021
Flight Time:	1253.3 hours (Total, all aircraft), 1125.6 hours (Total, this make and model)		

Other flight crew Information

Certificate:	Commercial; Remote	**Age:**	47,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	5-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	January 27, 2021
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	April 27, 2021
Flight Time:	1776.1 hours (Total, all aircraft), 1748 hours (Pilot In Command, all aircraft)		

A review of the pilot's original logbook, in which the last entry was dated December 23, 2018, revealed the pilot had accumulated 250.5 night flight hours, no simulated instrument flight hours, and 456.6 total flight hours. The pilot's current logbook did not specify total night flight time or simulated instrument flight time; therefore, the pilot's total night and simulated instrument time could not be determined.

On the day before the accident, the pilot and tactical flight officer participated in a local public relations event from 0900 to 1600, then began their normal work shift, which was scheduled from 1600 to 0400. The BRPD air support unit (ASU) base quarters had a couch available should the staff need to rest; however, BRPD policy typically did not allow rest periods while on shift.

The tactical flight officer held a commercial pilot certificate with rotorcraft-helicopter and remote pilot ratings. The tactical flight officer did not hold a current medical certificate.

Aircraft and Owner/Operator Information

Aircraft Make:	ROBINSON HELICOPTER COMPANY	**Registration:**	N441PD
Model/Series:	R44 II	**Aircraft Category:**	Helicopter
Year of Manufacture:	2009	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	12494
Landing Gear Type:	None; Skid	**Seats:**	3
Date/Type of Last Inspection:	January 2, 2023 Annual	**Certified Max Gross Wt.:**	2500 lbs
Time Since Last Inspection:	79.1 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	6565.2 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-540-AE1A5
Registered Owner:	BATON ROUGE POLICE DEPARTMENT	**Rated Power:**	260 Horsepower
Operator:	BATON ROUGE POLICE DEPARTMENT	**Operating Certificate(s) Held:**	None

On January 2, 2023, a 2,200-hour airframe inspection was completed on the helicopter. During this maintenance, a new Lycoming engine, a Garmin GTN 750Xi, and other avionics upgrades were installed. The ASU stated the helicopter received the Garmin GTN 750Xi upgrade to assist the department pilots with traffic avoidance and weather information.

The police configuration helicopter had removable anti-torque pedals and removable collective control installed in the left seat position at the time of the accident. The configuration does not allow for a removable cyclic; the cyclic control is installed in the right seat position.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KBTR,67 ft msl	**Distance from Accident Site:**	9 Nautical Miles
Observation Time:	02:37 Local	**Direction from Accident Site:**	81°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Overcast / 900 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.86 inches Hg	**Temperature/Dew Point:**	24°C / 22°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Baton Rouge, LA (BTR)	**Type of Flight Plan Filed:**	
Destination:	Baton Rouge, LA (BTR)	**Type of Clearance:**	None
Departure Time:	02:26 Local	**Type of Airspace:**	Class E

The BTR Automated Surface Observing System observations around the time of the accident identified IFR to marginal VFR conditions.

Geostationary Operational Environmental Satellite Number 16 (GOES-16) visible and infrared data were reviewed for the period from 0000 to 0700, and the closest images to the time of the accident were documented. The imagery indicated the cloud cover above the accident site was a combination of low and very low-level water clouds with the cloud cover moving northward and expanding in area coverage with time.

The National Weather Service Aviation Weather Center had text Airmen's Meteorological Information (AIRMET) advisory Sierra valid for the accident site at the accident time. The AIRMET was issued at about 5 hours before the accident on March 25, at 2145, and forecast IFR conditions due to mist and fog.

The Graphical Forecasts for Aviation (GFA) issued before the accident flight and valid from 0100 to 0700 indicated broken to overcast clouds at the accident site with bases between 300 and 600 ft agl.

A search of archived information indicated that the pilot did not request weather information from Leidos Flight Service or ForeFlight. It is unknown what weather information, if any, the pilot checked or received before or during the accident flight. According to the ASU standard operational procedures (SOPs), the pilot in command (PIC) will obtain and assess an official weather briefing upon beginning his tour of duty and/or as required.

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	30.511753,-91.324385

The main wreckage, which consisted of the cockpit, fuselage, and tailcone, came to rest inverted next to an irrigation ditch at the edge of a sugar cane field (see Figure 3).

Figure 3. Main wreckage at accident site.

The main rotor transmission, mast, and sections of the main rotor blades came to rest in a wooded wetland area about 250 ft east of the main wreckage. Fragmented Plexiglass, forward and upper cockpit structure, instrument console components, and tactical flight officer station

(left seat) equipment were scattered between the main rotor assembly and main wreckage. A majority of the helicopter was accounted for at the crash site except for the outboard 5 ft of one main rotor blade. The blade spar, skin, and honeycomb structure were missing; the blade separation location exhibited a pattern of scores on the blade lower surface area, consistent with contact with other helicopter structure.

The helicopter was equipped with a 406 MHz emergency locator transmitter that was found in the debris field and separated from the mounting structure. The antenna wire was severed about 4 inches from the transmitter.

Examination of the helicopter structure revealed impact signatures consistent with main rotor blade contact to the cabin structure above the forward looking infrared (FLIR) gimbal, to the top of the windshield bow and left seat passenger door frame. Main rotor blade leading edge damage and blade separation locations corresponded to the impact signatures on the cabin structure. Both elastomeric teeter stops were split horizontally through the middle. One main rotor blade spindle appeared to be straight or undamaged, and the other blade spindle was torn open at the coning bolt. The main rotor gearbox rotated one full revolution when it was manually rotated. The tail rotor gearbox was intact and free to rotate.

Flight control continuity could not be established due to the breaks in the system and small missing portions of the push-pull tubes; however, some breaks were matched and examined for evidence of malfunction or failure; none were found. All fractures and breaks were examined and exhibited characteristics consistent with overload fractures.

The pilot's throttle twist grip was found in the full ON position, and the collective was near the full UP position.

The engine cooling fan rear inlet lip exhibited scoring on the aft-most surface. The cooling fan scroll inlet rings exhibited rotational scoring in a circular arc pattern, on both the upper and lower halves of the scroll.

Postaccident examination of the helicopter revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation.

The helicopter was equipped with a Garmin GTN 750Xi, which will log up to 100 hours of flight data in the unit's internal memory, and an AeroComputers UC-5300 tactical mapping system. The Garmin unit, without its display, exterior SD card, and exhibiting minor exterior damage, and the AeroComputers unit, were recovered from the accident site and sent to the National Transportation Safety Board (NTSB) Vehicle Recorders Laboratory for potential data extraction.

Examination of the Garmin device revealed the device did not contain an internally mounted SD card. Due to the damage and missing data cards, the manufacturer was contacted for additional support. The manufacturer indicated the unit contained a multi-media card chip on the main circuit board that stored limited GPS data. Due to the existence of ADS-B data for the

accident flight, attempts to recover the limited GPS data were not pursued, and no data was recovered from the device.

Examination of the AeroComputers unit revealed the unit and the internal solid-state drive (SSD) sustained impact related damage. When attached to the NTSB laboratory computer via a write blocker device, the SSD did not have a recognizable filesystem. Due to the extent of damage, the SSD was sent to a third-party laboratory that specializes in recovering data from SSDs. The third-party laboratory indicated that their recovery attempts were unsuccessful. Despite multiple recovery attempts, no data were recovered from the unit.

Medical and Pathological Information

An autopsy of the pilot was performed by the Office of the Coroner, Parish of West Baton Rouge. The autopsy report was reviewed by the NTSB Investigator-In-Charge and an NTSB Medical Officer. According to the autopsy reports the cause of death was multiple blunt force traumatic injuries and the manner of death was an accident.

Toxicology testing performed on the pilot's specimens at the Federal Aviation Administration (FAA) Forensic Sciences Laboratory detected ethanol at 0.012 g/dL along with n-propanol in blood; ethanol and n- propanol were not detected in vitreous fluid. Pramoxine was detected in cavity blood and liver tissue.

Ethanol is the intoxicating alcohol in beer, wine, and liquor, and, if consumed, can impair judgment, psychomotor performance, cognition, and vigilance. FAA regulation imposes strict limits on flying after consuming ethanol, including a prohibition on piloting a civil aircraft while having a blood ethanol level of 0.04 g/dL or greater. Alcohol consumption is not the only possible source of ethanol in postmortem specimens. Ethanol may sometimes be produced by microbes in a person's body after death, potentially elevating ethanol levels in some postmortem specimens but not others. Vitreous fluid generally is the specimen type best protected against postmortem microbial ethanol production. N-propanol is another alcohol that can be produced by microbes in a person's body after death. Detection of n-propanol in a postmortem specimen is potentially indicative of postmortem microbial activity in the specimen, with or without associated ethanol production.

Pramoxine is a topical anesthetic medication available over the counter in a variety of products for temporary relief of skin pain and itching. Pramoxine is not generally considered impairing.

Organizational and Management Information

According to ASU SOPs, the ASU Operational Parameters are divided into three types of missions: routine, priority, and emergency. Each type of mission is limited by minimum weather criteria. The ASU Commander stated that he would have classified the accident mission (vehicular pursuit) as a priority mission. The priority mission minimum weather criteria at night are 3 statute miles visibility, and a cloud ceiling of 1,500 ft agl. The SOPs also require the PIC to complete a risk assessment using the ASU's Risk Assessment matrix to determine the flight risk. The ASU Commander reported the accident pilot did not complete a risk assessment before the accident flight.

According to the ASU Commander, the unit did not have a formal instrument training program, and the goal was to have all ASU pilots obtain an instrument flight rating. Any department instrument training was conducted typically over water with the use of foggles to simulate instrument conditions. The ASU program had night vision goggles (NVG) available and did not have a standard or formal program. The ASU was considering developing a NVG program. The accident helicopter was not equipped with any NVG modifications, and no NVG goggles were located in the wreckage.

Additional Information

Spatial Disorientation

The FAA Civil Aeromedical Institute's publication, "Introduction to Aviation Physiology," defines spatial disorientation as a "loss of proper bearings; state of mental confusion as to position, location, or movement relative to the position of the earth." Factors contributing to spatial disorientation include changes in acceleration, flight in IFR conditions, frequent transfer between visual flight rules and IFR conditions, and unperceived changes in aircraft attitude.

The FAA's *Airplane Flying Handbook* (FAA-H-8083-3B) describes some hazards associated with flying when the ground or horizon are obscured. The handbook states, in part, the following: *The vestibular sense (motion sensing by the inner ear) in particular can and will confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in airplane attitude, nor can they accurately sense attitude changes that occur at a uniform rate overa period of time. On the other hand, false sensations are often generated,*

leading the pilot to believe the attitude of the airplane has changed when, in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation.

Preventing Similar Accidents

Preparing for Emergencies in Helicopter Simulators (SA-031)

The Problem

Improperly performed emergency procedures have led to numerous helicopter accidents. Although pilots practice emergency procedures during flight training, safety considerations (such as deteriorating weather conditions, helicopter limitations, and autorotation performance characteristics) restrict what scenarios can be performed in a helicopter. During flight training, it is difficult to recreate the element of surprise and the realistic, complex scenarios that pilots may experience during an emergency. Without simulators, viable lesson components may be limited.

What can you do?

Through simulator training, operators can provide pilots a valuable tool to ensure proficiency in emergency procedures, including autorotations, use of NVGs, recognition of degraded visual conditions, and recovery from unusual attitudes. Consistent, standardized simulator training will help prepare pilots for the unexpected and will decrease the risk of an accident. Simulators can be a helpful tool for operators to provide pilot training on the following:

- Autorotations during any phase of flight, which reinforces the immediate responses required during actual emergencies.
- Scenario-based training tailored to the mission, including NVG missions in low-light situations and site-specific training that considers obstacles and terrain.
- Degraded visual conditions, safe decision-making skills, and inadvertent IMC encounters. By practicing potential emergencies, pilots will be better equipped to handle emergency situations.

See https://www.ntsb.gov/Advocacy/safety-alerts/Documents/SA-031.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA

Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Sauer, Aaron
Additional Participating Persons:	Jose Areizaga; FAA; Baton Rouge, LA Ken Martin; Robinson Helicopter Company; Torrance, CA David Harsanyi; Lycoming Engines; Williamsport, PA
Original Publish Date:	January 29, 2025
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=106956