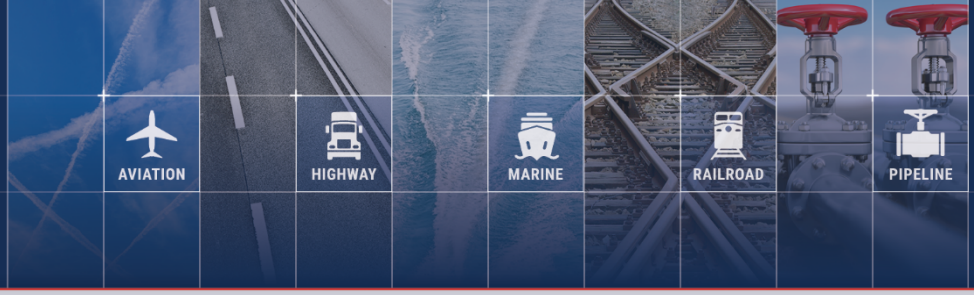

Aviation Investigation Factual Report

Location:	Fallon, Nevada	**Accident Number:**	DCA12PA049
Date & Time:	March 6, 2012, 09:14 Local	**Registration:**	N404AX
Aircraft:	ISRAEL AIRCRAFT INDUSTRIES F21-C2	**Aircraft Damage:**	Destroyed
Defining Event:	Fuel exhaustion	**Injuries:**	1 Fatal
Flight Conducted Under:	Public aircraft		

Factual Information

HISTORY OF FLIGHT

On March 6, 2012 at 0914 Pacific Standard Time (PST, all times in this report are PST unless otherwise noted, and are based on radar and voice recordings from the U.S. Navy Fallon Air Traffic Control (ATC) facility), an Israeli Aircraft Industries Kfir F-21-C2 single-seat turbojet fighter type aircraft, registration N404AX, operated by Airborne Tactical Advantage Company (ATAC) under contract to Naval Air Systems Command (NAVAIR) crashed while attempting an emergency landing at Van Voorhis Airfield, Naval Air Station Fallon, Fallon, Nevada (NFL). The sole occupant pilot aboard was killed and the airplane was substantially damaged by impact forces and fire. The flight was conducted under the provisions of a contract between ATAC and the U.S. Navy to support adversary and electronic warfare training with the Naval Strike and Air Warfare Center (NSAWC), which includes the Navy Fighter Weapons School (NFWS) commonly known as "Topgun", among others. The airplane was operating as a non-military public aircraft under the provisions of Title 49 of the United States Code Section 40102 and 40125.

The accident airplane was to be part of an NFWS training exercise consisting of 11 airplanes and was scheduled to depart at 0730. Four of the airplanes were F/A-18's comprising the "blue team," exercising the training mission. The other seven airplanes, 3 F-16s, 3 F/A-18s, and the accident airplane, comprised the "red team," acting in the adversary or aggressor roles for the training scenario (there were F/A-18 C, E, and F; and F-16 A and B variants participating in the exercise, the variants are not significant for this report so will all be termed F/A-18 or F-16 respectively). The pilots involved in the exercise had all participated in a pre-mission briefing beginning at about 0515 that morning. The briefing included tactical information about the exercise, emergency procedures, radio frequencies, deconfliction procedures, weather, and Notices to Airmen. The airplanes participating in the exercise were assigned radio call sign "Topgun" followed by two digits. The accident airplane's radio call sign was "Topgun29."

Prior to takeoff, the accident pilot radioed the duty weather observer (DWO) about the conditions twice, at about 0723 and again at 0745, because snow flurries and gusty winds had begun earlier than forecast. The DWO advised the accident pilot of an advisory which called for variable winds from southwest to northwest at 20-25 knots with peak gusts to 38 knots. The DWO also advised that there were radar-observed snow showers north of the airport that would arrive in about 30 to 45 minutes. At the time, the Fallon terminal area forecast called for greater than seven miles visibility and no other conditions below criteria for the mission, typically five miles visibility with a defined horizon. At about the same time, one of the other red team airplanes who departed early as a weather pathfinder, observed the weather in the exercise area was sufficient.

At about 0748, Topgun29 departed and proceeded to the mission area normally. Investigators estimated that the airplane used about 400 liters of fuel during start, taxi, and awaiting clearance. The exercise proceeded according to the brief, with some limitations due to cloud layers.

An F-16 that had been conducting an unrelated currency flight in the same area returned to NFL prior to the Topgun exercise. He reported that at about 0834, the cloud base was about 7,600 feet (the initial approach altitude) and observed weather moving in from the north.

At about this time, the exercise was concluded and airplanes began to return to NFL. Snow began falling at the airport, and an ATAC employee in their facility on the field radioed the accident pilot on a company frequency to advise him that the weather was deteriorating. The pilot acknowledged and said he was already returning. At this time, the airplane was about 22 miles southeast of the airport at 10,000 feet. The accident pilot was the sixth of the exercise airplanes to check back in with NFL ATC Approach Control (AP) returning to base.

The pilots ahead of the accident pilot all experienced steadily worsening weather. Two F/A-18s were able to conduct visual approaches and landed uneventfully. Both pilots reported rapidly deteriorating conditions. The third returning exercise flight landed at 0843 and was the last to conduct a visual approach.

The next arrival, Topgun24, was unable to maintain visual contact with the third airplane and was broken off the approach to be radar vectored for a Precision Approach Radar (PAR) procedure. At about this time, the accident pilot and another F/A 18, Topgun 22, established radio contact with NFL AP. AP began the initial sequence of vectors and instructions to the accident pilot at about 0843 (now the first in the sequence of three), and a fourth pilot also made radio contact (Topgun28). AP's task was to provide ATC separation and sequencing to the inbound airplanes toward the initial part of the radar approach, at which point the radar final controller would take over and provide precise navigational guidance to the runway.

The Radar Final Controller 1 (RFC1) acquired radar and radio contact with the accident pilot at about 0844 and gave several consecutive course calls of "well right of course and correcting" utilizing the surveillance radar control console (which does not display the precise glide path as the PAR does) while attempting to set up the PAR console. Between eight and nine miles from touchdown, RFC1 instructed the accident pilot to begin descent, but after two more course calls of "well right of course and correcting," informed him "radar contact lost" and instructed him to execute a missed approach at 0846 when the airplane was about 3 miles southeast of the airport at 7,000 feet. The accident pilot then contacted AP who informed him that he was taken out due to a radar "malfunction" and provided vectors for the missed approach pattern. At this time the NFL weather observation indicated winds were from 340° at 21 knots with gusts to 31 knots, visibility one and a half statute miles in light snow.

At this time, an additional radar final controller (RFC2) was called over to assist RFC1 with the setup of the PAR equipment. The pilot of Topgun24, who had been holding to conduct a PAR, declared a low fuel state. Topgun24 was handed off to RFC1 and successfully landed at 0856. At about this time, weather was relayed to another pilot indicating ground visibility was ½ mile.

Meanwhile the accident airplane tracked further east than a normal radar approach pattern before being vectored to the downwind leg. The total length of the pattern flown by the accident airplane was 53 miles.

At 0854 RFC2 began PAR approach guidance to the accident pilot. For about the next minute, RFC2 issued guidance to bring the airplane onto the approach course. At 0855 RFC2 advised the pilot he was approaching the glide path (vertical guidance).

The airplanes flight path varied both laterally and vertically from the approach, as the pilot responded to RFC2 instructions. From 0856:38 the airplane's lateral deviation varied from "slightly right of course [and] going further right" to 16 seconds later "going well left of course". RFC2 also advised the pilot that he was "above glide path." At this point the accident pilot said "I need to divert to Reno [International Airport (RNO)]" and initiated a missed approach climb and was instructed to contact AP. At this time, the official weather observation at NFL had dropped to ½ mile visibility.

At 0857:28 AP was providing vectors to two other returning airplanes, Topgun 22 and 28, and advised the accident pilot to "maintain 10,000 [feet] and heading 310, standby for further clearance." At 0858:09, AP instructed the pilot to climb to 12,000 feet and change transponder code. AP asked the pilot to "say reason for divert?" the pilot replied that "I haven't got the gas to do this again, [they] got a half mile vis[ibility]", and requested to divert to RNO via a 260 degree heading. AP cleared the pilot to RNO via the Mustang navigational aid and to maintain 12,000 feet.

At 0902, Topgun22 successfully landed at NFL and reported braking action poor.

At 0903, the accident airplane was about 22 miles west of NFL (28 miles east of RNO), and the pilot advised AP to coordinate with Northern California Terminal Radar Approach Controller (NCT) that he would be emergency fuel. AP called NCT and advised of the pilot's intentions and that he was emergency fuel. NCT acknowledged and stated that Reno was also below weather minimums. At the time, RNO was reporting ½ mile visibility the visibility minima for the Instrument Landing System (ILS) minimum is 1 ½ miles and the non-precision approach minima are at least 2 ½ miles. The accident airplane, like most of the Navy airplanes, was not equipped with an ILS receiver.

Shortly after, AP instructed the pilot to contact NCT. He did not relay the weather minimum advisory to the pilot. At 0904, the pilot checked in to the NCT frequency, the controller repeated the advisory about RNO weather and asked the pilot's intentions. The pilot said he would go back to NFL, and NCT provided vectors.

At 0905 Topgun28 successfully landed at NFL.

The accident pilot made contact with NFL AP at 12,000 feet proceeding direct to NFL and stated he was "critical fuel." AP replied to expect to be number one in the arrival sequence. At 0906 the pilots of Topgun25 and Topgun23 asked AP numerous times if the airport (NFL) was able to accept approaches. There was no response by NFL AP. At 0907, the accident pilot began a transmission which was interfered with by other radio calls. AP then instructed the pilot to fly a heading of 100 degrees and descend to 10,000 feet, "report [the airport] in sight when able." AP also reported NFL conditions were ½ mile visibility in snow, ceiling 15,000, then corrected to 1,500 foot ceiling.

The accident airplane was about 18 miles west of NFL, descending through 9,000 feet when the pilot reported he had 8 minutes of fuel remaining and needed a visual descent to the airfield. AP cleared him to the minimum vectoring altitude of 7,400 feet due to the underlying terrain, and said to expect lower in five miles. At 0909 the pilot said "I need lower now, if you don't get me on deck in 5 minutes, I'm gonna hit the deck the hard way." AP asked the pilot if he could accept a "short hook to 31?" The pilot said "I'll

give it a shot" and AP cleared the airplane to 6,400 feet. At 0910 the pilot reported the ground in sight and requested a contact approach. (A contact approach is an IFR procedure in which the pilot proceeds to the destination airport by visual reference to the surface. Ground visibility must be at least one statute mile.). AP advised "unable" due to the reported low visibility, and advised him to "climb immediately" due to the minimum vectoring altitude. The airplane continued a rapid descent, reaching about 4,500 feet at 0911. AP reported that at this time, the radio frequency became very hectic, and other aircraft kept calling him asking if the airfield was open. The accident pilot transmitted, "I'm gonna crash this airplane if I don't get down and land" and advised he was proceeding "due regard, is there any traffic between me and the airport?" AP advised that the airplane was at 4,500 feet "below my minimum vectoring altitude, climb to 6,400." The pilot advised he was switching frequencies to the Tower.

At this point, the airplane was about 5 miles west of the airport, over the flatter farmland terrain, between 200 and 500 feet above the ground. The pilot contacted the NFL ATC Tower and advised he was "seven miles east *(sic)*" maneuvering for runway 31(L). The tower controller cleared him to land on 31L. Radar and ground witnesses indicated the airplane turned to a close in downwind for runway 31L, and at about 1.5 miles southwest of the runway threshold the airplane turned to the northwest, but did not align with the runway. The airplane then proceeded northwest bound, at low altitude, parallel to the runway until northwest of the airport. The pilot requested a right base turn for runway 13R, and the tower controller cleared him to land on 13R. At 0914, the airplane made a right turn, about 100 feet above ground level, less than one mile from the runway 13R threshold, and appeared to line up with taxiway A. Witnesses along a nearby road, and on the airfield, reported seeing the airplane crossing the airport perimeter at low altitude, in a high pitch attitude. Some of the witnesses described a "wobbling" motion as it turned toward the southeast. The airplane struck the ground in an open field in the northwest corner of the airport property and impacted a concrete munitions storage building in the Combat Aircraft Loading Area (CALA).

Witnesses reported high winds and snow squall conditions in the area of impact. The weather observation immediately following the accident indicated northwesterly winds at 23 knots, gusting to 34 knots, visibility ½ mile in light snow. Navy personnel on the field ran to the wreckage to attempt to rescue the pilot, but could not remain close to the airplane due to fire and explosions from the ejection seat components. Airport fire and rescue responded quickly thereafter.

INJURIES TO PERSONS

The pilot was fatally injured by multiple blunt force injuries.

DAMAGE TO AIRPLANE

The airplane was substantially damaged by impact forces and fire. The forward one-third of the airplane, from the nose to a point just aft of the leading edge of the delta wing was highly crushed and fragmented from impact with a steel-reinforced concrete bunker. There was evidence of fire in the forward portions of the airplane and was mostly contained within the bunker. Cockpit and instrument panels were largely consumed or damaged by fire. The aft portions of the airplane sustained less impact damage and little fire damage..

OTHER DAMAGE

Two concrete munitions storage buildings sustained damage along with airfield fencing and pavement due to impact forces and post-crash fire.

PERSONNEL INFORMATION

Pilot

The accident pilot, age 51, held an Airline Transport Pilot certificate with no aircraft type ratings. His last flight review was March 2011. He reported 4,679 hours total time, and 79 hours pilot in command in the Kfir. Most of the pilot's flight experience was in the U.S. Navy on F/A-18 and other tactical aircraft. There were no accidents or incidents noted in the pilot's FAA record and he held a valid FAA Class 1 medical certificate with a restriction for corrective lenses for near vision.

The accident pilot was a former NSAWC instructor and had worked for ATAC for approximately six months. He had completed the ATAC Kfir training program in September of 2011. The training plan consisted of seven blocks of instruction over approximately 10 days. The final blocks were three transition flights in the airplane, two with a chase plane flown by the instructor pilot and one solo. No instrument approaches were required. A review of ATAC records indicate that from September 13, 2011 until the accident, the pilot had logged 79 hours in the Kfir, of which 4.9 was under instrument meteorological conditions (IMC), and had logged 54 PAR and 14 GCA approaches. 14 of the PAR approaches were logged on flights which also indicated IMC time, but the records did not specify if the approaches were flown under instrument conditions.

The pilot had flown a mission from about 1120 to 1300 on the day prior to the accident, in which the airplane drag chute failed. He conducted debriefs and administrative work during the remainder of the afternoon. The previous day was off-duty, but ATAC personnel noted that he likely performed some administrative work as he was the training officer. On a personal blog site five days prior to the accident, the pilot related an event in which a pilot "successfully ejected and was dragged to his death by the surface winds."

Air Traffic Controllers

The Approach Controller was a U.S Navy Petty Officer. He began air traffic control training in September 2004 at the Naval Air Technical Training Center (NATTC) in Pensacola, Florida. He was assigned to the USS Abraham Lincoln (CVN-72) and served until March 2008 when he transferred to Naval Air Station Brunswick (NHZ) in Brunswick, Maine. He remained at NHZ until July 2010 when he was transferred to NFL. He held a current medical clearance with no restrictions or waivers, and was not taking any medications. He held no other aeronautical ratings or certifications. He was current and proficient in accordance with facility standards, and had been certified on AP in February 2012. He had no documented operational errors, deviations, nor history of suspensions while stationed at NFL. He held no collateral duties at the ATC facility. He reported no unusual activities in the previous 72 hours and was working the AP position from about 0715 until the accident time.

During an interview, he stated that he did not know why the first two aircraft executed missed approaches. He said that it became very busy with all of the aircraft calling at once looking for IFR clearances; one of the pilots stated that they were low fuel. He was then concentrating on getting the two aircraft that had gone missed approach vectored back around to final. He stated that it just got so hectic so quick, and he didn't understand why one aircraft landed and the accident airplane missed twice, it

confused him and he wondered why the accident pilot would request to divert when the aircraft in front of him landed with no problem.

He said it wasn't necessarily uncommon for a pilot to request to divert, usually for fuel, and that pilots would normally divert to Naval Air Station Lemoore approximately 45 minutes away. He was not aware of any other nearby divert fields and that RNO was the closest in an emergency. He said he did not look at the RNO weather after the accident pilot had requested to divert there because he was "just trying to fix stuff and then get back to him". He stated that he had received only minimal training on local aircraft performance characteristics, mostly regarding speeds but nothing about fuel. When asked about how things work "normally" at NFL, he stated that things were actually pretty simple most of the time since 95% of the time the weather was visual meteorological conditions. The main issues at the airport was with aircraft returning from the Special Use Airspace (SUA) at high speed with little to no notice.

The Radar Final Controller One (RFC1) was a U.S. Navy Petty Officer, Air Traffic Controller Second Class (AC2). His ATC experience began in August 2006 at the Naval Air Technical Training Center (NATTC) in Pensacola, Florida, where he attended initial training for ATC. After graduating in March 2007, he reported to Fleet Area Control and Surveillance Facility (FACSFAC) in Jacksonville, Florida, and served there until June 2008 when he was deployed to Camp Bucca, Iraq, for an assignment outside of ATC as part of a prison security detachment. After completing one year in theater in Iraq, he reported to the USS Essex (LHD-2) where he served from September 2009 until November 2011 when he transferred to NFL. He held a current medical clearance that was completed in March 2012. He did not wear corrective lenses, had no other medical restrictions or waivers, and was not taking any medications. He held no other aeronautical ratings or certifications. He had just been certified on March 5, 2012.

In an interview, he stated that on the day of the accident the traffic load was moderate to heavy and complexity was above average. He performed alignment checks for all runways on both PAR consoles at the beginning of shift and again prior to the accident. He had very short notice when the first recovery commenced and had to hurry to conduct alignment checks on the PAR console, completing them only about five minutes before conducting the first approach. He recalled that he had issues getting the equipment set up correctly in time for the first aircraft. He stated the weather was getting pretty bad and he was unable to keep a good return on the PAR display. When he switched to Moving Target Indicator (MTI) mode in an attempt to get a better return, a complete "white out" appeared on the display. He attempted to adjust the PAR console but was unable to rectify the display and so discontinued the accident airplane's approach. He then switched off the MTI mode and was able to adjust the presentation clear enough to run PAR approaches. Once he had the console set up correctly, he had no further equipment issues and was able to continue conducting PAR approaches. He did not recall any other aircraft having to execute a missed approach. He stated that he did not conduct the second PAR approach attempted by the accident pilot, but did conduct the PAR approaches to the aircraft immediately before and after. He also recalled that winds were a big issue during the remaining approaches he conducted and stated "it was kind of hard to keep them on course," the winds were steady in direction, but high.

He stated that he had not conducted any PAR approaches in IMC while in a training status. He began training on PAR in January 2012 and was certified one day prior to the accident. He stated that equipment settings were covered in the training process, but hadn't had any experience with settings during bad weather. He said he did not know what the normal settings would be in poor weather, i.e.; precipitation, fog, etc.

The Radar Final Controller Two (RFC2) was a U.S. Navy Petty Officer, Air Traffic Controller Third Class (AC3). His ATC experience began in June 2009 at the Naval Air Technical Training Center (NATTC) in Pensacola, Florida where he attended initial training for ATC. After graduating in November 2009, he reported to NFL. He held a current medical clearance that was completed in May 2011. He did not wear corrective lenses, had no other medical restrictions or waivers, and was not taking any medications. He held no other aeronautical ratings or certifications. He was certified on RFC in January 2011.

In an interview he said that on the day of the accident the traffic load was normal and not busy, but the complexity was more difficult than it was on a day-to-day basis due to the weather. He remembered looking over at the PAR displays and seeing they were pretty "fuzzy," which was not uncommon during bad weather, and stated that he was used to it. He recalled that he did a quick check of the PAR console; made sure his equipment was set and then asked AP who was coming to him first. He didn't remember all of the aircraft that he worked at that time, but remembered that he conducted three PAR approaches and that the first and third one landed, but the second one, the accident pilot, executed a missed approach. On the accident pilots approach, he remembered that he had him on glide path and on course, then at about four and a half miles or so he seemed to be steadily climbing well above glide path and going well left of course, but he continued to give trend calls because he knew the winds were bad and thought maybe they were blowing him around up there. He said the accident pilot then requested to divert to RNO and didn't tell him why, so he discontinued the approach and instructed him to execute a missed approach and remain that frequency for AP.

AIRCRAFT INFORMATION

The Israeli Aircraft Industries F-21-C2 Kfir is a single seat single engine multi-role combat aircraft based on the Dassault Mirage. It is powered by a license built variant of the General Electric J-79 engine equipped with an afterburner. The airframe is a delta-wing configuration, with a pair of fixed canard lifting surfaces just below and aft of the cockpit above the leading edge of the wing, and a vertical stabilizer. There is no horizontal stabilizer. Movable control surfaces include two independent elevons on the trailing edge of each wing, a single rudder on the vertical stabilizer, and four wing-mounted speedbrakes. The airplane has tricycle retractable landing gear.

The airplane fuel system consists of multiple interconnected tanks. The wing tank group consists of two each main wing, leading edge, and rear bay tanks. The fuselage group consists of two "saddle" tanks mounted between the aft edges of the canards on the upper part of the fuselage along with a feeder or surge tank, and a forward tank mounted on the fuselage centerline just behind the pilot. An additional accumulator tank for negative-G or inverted flight is mounted between the fuselage saddle tanks and the forward tank. Total internal fuel load is 3,240 liters. External tanks can add up to another 3,750 liters, although the Fallon configuration is typically one 500 liter external tank, resulting in a nominal load of 3,700 liters. All tanks are pressurized with bleed air to maintain flow in all attitudes. Fuel feed is automatically balanced in an appropriate ratio to maintain center of gravity. Cockpit display and control of the fuel is via a fuel quantity detotalizer, which is a manual digital counter that indicates the fuel fed to engine, preset by maintenance to the total preflight fuel load. An analog fuel quantity needles indicator is readable at the last 1,000 total liters, approximately the fuselage tanks, to give the pilot a direct measure of the quantity. An indicator light system also displays when each tank fuel transfer is complete, giving the pilot an overview of the fuel system status. A fuel flow meter is adjacent to the indicator lights and near the detotalizer. ATAC policy for fuel minima is the same as the Navy 3710

manual, 800 liters in the pattern, minimum fuel declaration at 500 liters. Nominal fuel flow is 40 liters per minute, depending on mission profile and afterburner use. The IAI airplane manual indicates the airplane contains about 20 liters of unusable fuel.

The airplane has a basic instrument flight capability gyroscopic and pneumatic instrumentation. Navigation capability consists of a TACAN receiver and a Garmin 530 IFR-certified GPS unit with moving map. A non-IFR capable Garmin Aera 510 GPS with XM weather display capability is also installed in the panel. The airplane does not have an ILS receiver or an autopilot.

The airplane is equipped with a Martin-Baker JM6 ejection seat. The seat is capable of successfully operating at zero altitude, zero airspeed. The seat is self-contained. Ejection is initiated by pulling either the upper or lower ejection handle. The seat mechanically fractures the canopy prior to the ejection of the seat. The ATAC flight operations manual provides guidance on controlled bailout procedures.

The airplane is owned by and registered to ATAC. The airplane holds an FAA Special Airworthiness Certificate under the Experimental category for the purpose of Exhibition, issued on December 20, 2007 with no expiry. The airplane's Experimental Operating Limitations –Exhibition, paragraph 22 states that "No person may operate this aircraft for other than the purpose of exhibition flight" and paragraph 36 states that "Any flight operations that are not considered…exhibition purposes must occur with the aircraft having been declared a public aircraft."

METEOROLOGICAL INFORMATION

The morning of the accident flight the accident pilot received his weather briefing from the Top Gun Instructor. The Top Gun Instructor used the Aviation Digital Data Service (ADDS) from the Aviation Weather Center (AWC) website to brief the current weather conditions including the current observations, NOTAMs, TAFs, and the local airfield wind advisory. The accident pilot may have received addition weather information beyond what the Top Gun Instructor briefed. Based on the weather forecast the morning flight exercise was thought to be "good to go" as the worse weather was expected during the late morning and afternoon hours. The Top Gun Instructor also reviewed ways to mitigate icing if that was needed during the morning flight. A weather reconnaissance FA-18 took off before the mission to determine if there were icing conditions and what the actual flight conditions were within the military operations areas (MOAs) and restricted areas. This reconnaissance flight was done prior to launching any aircraft and the weather was found to be clear above a broken layer with cloud tops to 18,000 feet.

When a weather warning or advisory is issued for NAS Fallon the products are disseminated using the automated "One Call Now" system which calls out a voice recorded warning to a variety of recipients. In addition, a copy of the warning or advisory is faxed and emailed to the weather office during non-working hours so the civilian weather observers have a copy of the products when they open the office.

The typical procedure for the dissemination of weather information and forecast to and from NAS Fallon is from the FWC-SD. The TAF and weather forecast for NAS Fallon are solely the responsibility of FWC-SD. A contracted civilian weather observer located at NAS Fallon takes and verifies the ASOS observations, responds to radio weather questions about current conditions, and disseminates weather warnings and advisories issued from FWC-SD to the local points of contact. FWC-SD is available 24 hours a day, 7 days a week for flight weather briefings for any flights departing from NAS Fallon.

The TAF given to the pilot during the weather briefing was issued for KNFL at 0500 PST and was valid for a 19-hour period beginning at 0400 PST. By 0600 PST the TAF forecast for KNFL expected wind from 320° at 18 knots with gusts to 27 knots, visibility around 5 miles, light snow, scattered clouds at 2,000 feet, a broken ceiling at 4,000 feet, overcast skies at 6,000 feet, moderate rime icing in cloud from 4,000 feet through 13,000 feet, moderate rime icing in cloud from 13,000 feet through 21,000 feet, light to occasional moderate turbulence in clear air from the surface through 18,000 feet, light occasional moderate in cloud turbulence from 18,000 feet, through 27,000 feet, light to occasional moderate turbulence in clear air from 27,000 feet through 40,000 feet, minimum altimeter setting of 29.55?. Temporary conditions of wind from 330° at 22 knots with gusts to 32 knots were forecast from 0600 PST to 1200 PST.

The KNFL observations valid at the time of the weather briefing were as follows:

KNFL weather at 0356 PST, wind from 260° at 11 knots with gusts to 20 knots, visibility 10 miles, clear skies below 12,000 feet, temperature of 9° C, dew point temperature of -8° C, and an altimeter setting of 29.67 inches of mercury. Remarks: automated station with a precipitation discriminator, sea-level pressure 1002.9 hPa, temperature 9.4° C, dew point temperature -7.8° C, 6-hourly maximum temperature 13.3° C, 6-hourly minimum temperature 4.4° C, 3-hourly pressure decrease of 3.6 hPa, lightning detection sensor is not operating.

KNFL weather at 0456 PST, wind from 250° at 17 knots with gusts to 23 knots, visibility 10 miles, clear skies below 12,000 feet, temperature of 8° C, dew point temperature of -7° C, and an altimeter setting of 29.65 inches of mercury. Remarks: automated station with a precipitation discriminator, sea-level pressure 1002.4 hPa, temperature 8.3° C, dew point temperature -6.7° C.

Pre-Takeoff

The accident pilot talked with the duty weather observer, a contractor in the BaseOps facility, before takeoff at both 0723 and 0745 PST. The duty weather observer reported the local winds, known icing areas (of which there were none), and provided the local airfield wind advisory and winter snow advisory products issued by FWC-SD at 0723 PST. At 0745 PST the duty weather observer relayed to the accident pilot that there was shower activity north of the field with the local weather radar indicating that the shower activity would begin on station in 30 minutes and lasting 30 to 45 minutes.

Actual Conditions

The NWS Surface Analysis Chart for 1000 PST depicted an active weather pattern with a surface trough just south of the accident site, stretching from north-central California to central Nevada. A cold front stretched southwestward from northern Utah, across central Nevada, and into southern California. The station models around the accident site depicted air temperatures from the mid 20's to mid 30's Fahrenheit (F), with temperature-dew point spreads of 15° F or less, a north wind around 5 to 20 knots, cloudy skies, and light snow.

The NWS Storm Prediction Center (SPC) Constant Pressure Charts depicted a mid-level trough moving across the accident site from 0400 to 1600 PST, and an upper-level jet streak across the Pacific Northwest with the accident site in the left exit region of the jet streak. These areas are considered conducive for lift to help produce clouds and precipitation.

KNFL had an Automated Surface Observing System (ASOS) whose reports were supplemented by a human observer. Between 0838 and 0846, the ASOS reported visibility at KNFL dropped from 10 miles to 1 ½ miles, and the 0850 observation indicated ½ mile visibility. Observations closest to the accident time were as follows:

KNFL weather at 0856 PST, wind from 350° at 24 knots with gusts to 33 knots, visibility a half mile, moderate snow and freezing fog, an overcast ceiling at 1,200 feet, temperature of -1° Celsius (C), dew point temperature of -3° C, and an altimeter setting of 29.71 inches of mercury. Remarks: automated station with a precipitation discriminator, peak wind from 350° at 33 knots at 0854 PST, snow began at 0836 PST, sea level pressure 1004.1 hPa, braking action is impeded but accurate decelerometer readings are not available, one-hourly precipitation of a trace, temperature -0.6° C, dew point temperature -2.8° C.

KNFL weather at 0903 PST, wind from 350° at 22 knots with gusts to 33 knots, visibility a half mile, light snow, a broken ceiling at 1,500 feet, overcast skies at 4,500 feet, temperature of -1° C, dew point temperature of -3° C, and an altimeter setting of 29.71 inches of mercury. Remarks: automated station with a precipitation discriminator, peak wind from 360° at 31 knots at 0901 PST, surface visibility three quarters of a mile, braking action is impeded but accurate decelerometer readings are not available, one-hourly precipitation of a trace.

KNFL weather at 0920 PST, wind from 350° at 23 knots with gusts to 34 knots, visibility one and a half miles, light snow, a broken ceiling at 1,500 feet, overcast skies at 4,500 feet, temperature of -1° C, dew point temperature of -4° C, and an altimeter setting of 29.72 inches of mercury. Remarks: automated station with a precipitation discriminator, peak wind from 360° at 41 knots at 0905 PST, surface visibility 2 miles, wet runway, one-hourly precipitation of a trace.

Five-minute data obtained from the ASOS site also indicated ½ mile visibility with high winds and snow from 0850 through the time of the accident.

At about 0900, approximately the time the accident pilot was diverting toward Reno, the NCT air traffic controller reported that Reno was below minimums. The nearest observation to that time, was taken at 0859, and indicated visibility½ mile, in light snow and blowing snow.

There were no pilot reports (PIREPs) near the accident site.

No SIGMETs or CWSU Advisory or Meteorological Impact Statements were active for the accident site at the accident time.

AIRMETs TANGO, SIERRA, and ZULU were active for the accident site at the accident time, and they forecasted moderate turbulence for FL180 and below, IFR flight conditions, mountain obscuration by clouds, precipitation, and mist, and moderate icing between the freezing level and FL180.

AIDS TO NAVIGATION

The primary aids to navigation for instrument approaches to NFL runway 31L for tactical fighter type aircraft are radar Ground Controlled Approach (GCA) procedures. NFL ATC can provide either ASR (airport surveillance radar) or PAR (precision approach radar) guidance.

An ASR approach is a non-precision procedure, which does not provide positive glide path information. The NFL ASR approach to runway 31L specified a minimum descent altitude of 4,200 feet above sea level (274 feet above the touchdown zone), with weather minimum of 300 foot ceiling and one statute mile visibility.

PAR approaches provide course, range, and glidepath information using a dedicated radar system. The controller continually advises the pilot of his position laterally and vertically from the desired path, and whether the aircraft is correcting or diverging from the procedure. The PAR approach to NFL runway 31L had a glidepath of 3.5 degrees to a specified decision height of 4,126 feet above sea level (200 feet above the touchdown zone) with a weather minimum of 200 foot ceiling and ¾ statute mile visibility.

The airplane's normal enroute navigation system was GPS, and no anomalies with the GPS system were noted. No ground radio aids to navigation were relevant to the accident.

COMMUNICATIONS

There were no malfunctions in any communications equipment.

AERODROME INFORMATION

Fallon Naval Air Station, Van Voorhis Field (KNFL) was located 3 miles southeast of the city of Fallon, Nevada. The airport is an active Naval Air Station and private airport, prior permission is required to operate at the airport. Runway 31L/13R was 14,005 feet long, 201 feet wide. Elevation of the approach end of 13R (near the accident site) was 3,934 feet above mean sea level. Both ends of the runway are served by a precision approach path light system. Runway 31L/13R is oriented 311/131 degrees magnetic. Taxiway A lies about 1,100 feet southwest of runway 31L/13R on a parallel orientation and is approximately the same length. A stub taxiway leads from the northern end of taxiway A onto a ramp used as a combat aircraft loading area. The ammunition bunker is at the northwestern edge of the loading area.

High mountainous desert terrain lay immediately to the east and southeast of the airport. A section of flat farmland, about 7 to 10 miles across, lay west of the airport before terrain began to rise toward a low ridgeline. North and northeast of the airport is a large desert and dry lake bed area. The Fallon training area consisted of a number of Restricted Areas, Military Operating Areas and Air Traffic Control Assigned Areas over NFL and the city of Fallon, extending to the east approximately 115 miles, and with altitude blocks ranging from the surface to Flight Level 350 (35,000 feet).

FLIGHT RECORDERS

The airplane was not equipped with any recording devices, nor was it required to be.

WRECKAGE AND IMPACT INFORMATION

The airplane first impacted in an open field northwest of the runway 13R threshold. Witness marks in the ground are consistent with a slightly right wing low and nose high attitude, aligned approximately 140 degrees magnetic. The airplane struck a low dirt berm crossing the field and marks are consistent with the airplane slewing about five degrees right and rotating nose down. There were no observed burn marks in the dry grass in the field along the initial impact area, however, witnesses noted there was snow

on the ground at the time of the accident. Numerous small pieces of debris were found in the field, mostly associated with the underwing stores, antenna components and other small fragments. The electronic warfare pod separated in the field.

The airplane impacted a chain link fence and another berm at the edge of a paved area associated with the munitions bunker, and slewed further right. Larger structural components were located in the pavement short of the building, including external tank, and the nose cone.

The majority of the wreckage impacted the concrete building, at the blast-resistant wall between two storage components. The forward approximately one-third of the airplane, including the cockpit and forward fuselage to the leading edge was highly fragmented and burned.

The engine showed no evidence of fan blade bending and no dirt or debris in the engine compressor stage. The Variable Stator Vanes (VSV) were in the closed position (which is the normal position at low power, idle, and shutdown) and the first stage compressor blades had minimal to no bending. Metal slag was visible hanging down from the inlet case center housing, but there was no metal on the first stage VSVs or compressor blades. The main engine fuel control was removed and found to be in the cutoff position but it is unknown if this occurred through pilot action or post-impact forces.

Ejector seat components were found in the cockpit area, and retained for examination. The drag chute was hanging free of airplane, but appeared consistent with having dropped free from impact forces. The landing gear was retracted.

MEDICAL AND PATHOLOGICAL INFORMATION

No relevant medical or pathological findings were identified in the autopsy records.

FIRE

Eyewitnesses to the impact stated that there was a fireball following the airplane impact with the bunker. Airport rescue and firefighting crews responded to the site in less than 3 minutes, although some time elapsed as crews determined what hazardous materials might have been in the bunker. The fire was largely contained in the bunker and forward portion of the airplane area. There was little to no evidence of fire outside the immediate area of the two storage compartments of the bunker.

SURVIVAL ASPECTS

The accident was not survivable.

TESTS AND RESEARCH

The ejection seat was examined by the manufacturer, Martin-Baker. No preexisting failures were noted and there was no evidence that the firing mechanism was pulled.

ORGANIZATIONAL AND MANAGEMENT INFORMATION

Company Description

ATAC started business as an independent company in 1996, and is based in Newport News Virginia, with facilities in Point Mugu, California; Kaneohe Bay, Hawaii; Atsugi, Japan, and Zweibruken, Germany. ATAC provides civilian tactical airborne training to U.S. military customers. The primary service, as in the accident flight, is to provide aggressor or adversary aircraft capability for training and readiness missions, as well as electronic warfare, ship defense, research and development, target towing, and other capabilities. At the time of the accident, ATAC's fleet consisted of six Kfirs including the accident airplane, two of which were based at Point Mugu, and four based in Newport News. ATAC additionally had 13 Hawker Hunter transonic multi-role aircraft in the U.S. and Japan, and four Czech L39 Albatross trainer/light attack airplanes in the U.S. and Germany. ATAC had a pilot cadre of 31 former military tactical pilots, and all maintenance personnel were military trained. ATAC does not hold an FAA 14 CFR Part 119 air carrier certificate, nor was it required to do so.

History of Certification and Contract

The Navy contract with ATAC stemmed from a portion of a contract with Flight International in the mid 1990's, using Saab Draken airplanes. The initial effort with the ATAC Drakens sought to initiate flying for maintenance, training, and exhibition or filming purposes. Initially, ATAC was issued a Special Airworthiness Certificate in the Experimental category for the purpose of Research and Development (R&D) certification for the airplanes, with the ejection seats disabled. In 1996, the first military work for ATAC was obtained, doing threat simulation. This operation was conducted on the Experimental R&D certificate, Public Aircraft status was not approached at this time.

In 2002, ATAC obtained the initial fleet of Kfirs (which were a variant of the airplane that the Navy also owned and operated at the time.) The airplanes were first imported on a "diplomatic" certification, as they were leased by ATAC, and still owned by the Israeli government. Eventually, ATAC was able to obtained U.S. registration, by demonstrating the lease would lead to ownership. The Kfirs were issued Special Airworthiness Certificates in the Experimental category for the purpose of Exhibition in about 2004-2005. In 2007, the FAA denied renewal of the certificates, and according to ATAC, they were told that the Navy would need to take over airworthiness certification and oversight. The Navy would not take over complete responsibility for the airworthiness, as they did not own or exclusive lease the airplanes.

A series of meetings between ATAC, FAA, and Navy in the 2007-2008, led to ATAC receiving Experimental – Exhibition airworthiness certificates for the airplanes, and an understanding that the Navy contract flights would be conducted under Public Aircraft Operations. At the time, ATAC understood that the FAA's position was that they were not authorized to certify aircraft conducting work for the U.S. government and that certification would be a Department of Defense (DoD) function. Additionally, pilot certification was also in question, as the FAA removed the pilot Letters of Authorization for training, and there was no policy for Experimental Authorizations under the limitations section of a pilot certificate. In a presentation given to the FAA in 2008, ATAC proposed a shared solution in which FAA would continue the certification of aircraft and airmen, and responsibility for oversight of the operations and on-going programs would rest with the military.

ATAC representatives expressed a concern to NTSB investigators regarding what portions of a flight, what regulations, and what type of operations, were Public Aircraft Operations (PAO), civil, or only some regulations were applicable. They asked, for example, if training for a PAO is also automatically a PAO, if maintenance functional test flights applied, and other unclear status. Additionally, ATAC

expressed concern over the appropriate method to train and certify the pilots. Some pilots held "Experimental Authorization" under the limitations section on their airmen certificates, previously some pilots held Letters of Authorization, and some pilots have no endorsement or letter (including the accident pilot), as under PAO there is no requirement for a pilot certificate.

At the time of the accident, ATAC was operating under the terms of contract N00019-09-D-0021 dated March 19, 2009, which "provides contractor owned and operated aircraft to United States Navy (USN) Fleet customers for a wide variety of airborne threat simulation capabilities to train shipboard and aircraft squadron weapon systems operators and aircrew how to counter potential enemy Electronic Warfare (EW) and Electronic Attack (EA) operations in today's Electronic Combat (EC) environment." The contract specified details of the capabilities of the aircraft, and mission planning and operations. The contract specified that all aircraft "shall carry a valid FAA airworthiness certificate for non-public use activities that are similar in nature to the missions required to be performed under this PWS for the duration of the contract. The aircraft shall be operated and maintained as civil aircraft. All pilots and crew shall be FAA certified." It further specified details of airplane equipment requirements. There is no FAA experimental category that directly relates to air combat training, nor is there an FAA type rating for the Kfir.

The contract required that the pilots "Must be FAA certified to fly in the required type aircraft, [hold a] Current FAA Class 2 Medical Rating, FAA Instrument Rating, FAA Commercial Pilot License [and have logged] 1200 tactical flight hours in a USN, USMC, or USAF air to air radar equipped tactical jet aircraft." It further detailed currency and other requirements. Crew Resource Management training was not required.

The Navy (representatives from both NAVAIR and a representative from Commander - Naval Air Forces Atlantic (CNAF)), and ATAC agreed that the accident flight, as all other operations under the contract with event numbers and Navy tasking orders, were operating as Public Aircraft Operations as described in USC 40102 and 40125. An FAA notice released on March 23, 2011, stated that the contractor must have a declaration statement from the government agency, specifying that the aircraft was operating under Public Aircraft. ATAC did not have a letter from NAVAIR, according to NAVAIR representatives, although they acknowledged the PAO nature of the flights, they did not consider the regulations in force at the time of the accident required a declaration statement, nor did the FAA specify what such a declaration was to include. According to the FAA, operations under those statutes require that the sponsoring government agency (e.g. U.S. Navy) takes on responsibility for operational and airworthiness oversight of many portions of the flights.

Navy representatives from NAVAIR and CNAF, described the process of oversight used for contractors such as ATAC. The Navy's baseline "first step" was the FAA airworthiness certification of the airplane, and airmen certification of the pilots. NAVAIR will audit maintenance practices to assure the asset is properly maintained, and audits the contractor for conformance with OEM, military, or equivalent procedures. Oversight and requirements are then built upon this starting point. The Navy representatives described that the Fleet squadrons that are supported by the contractor (e.g. CNAF, NSAWC, etc.) are the "consumer" of the service and define the requirements, and NAVAIR manages the contract, as well as providing for R&D, test and evaluation (T&E) etc. The two organizations develop the contract together, and provide oversight to the operator through the Navy DCMA 3710.1F/8210.1 instruction (portions of which will be reflected in the contract), and appendices as needed. The contractor (ATAC) will provide the operational and safety procedures, which Navy assess via audits on a two-year cycle,

with partial reviews every six months and then the fourth audit is more in-depth and completes a review by NAVAIR, the Government Flight Representatives (GFR), and the Fleet customer. NAVAIR representatives explained that the Navy does not "approve" or "certify" procedures, but reviews the contractor's procedures and controls are sufficient. The contractor may use Navy procedures, civilian industry practices, or unique procedures to satisfy the GFR. The audits are conducted by teams of subject matter experts, using the same standards used to evaluate acquisitions and production facilities for regular Navy aircraft.

FAA representatives explained that the civilian certification and operation of former military turbojet airplanes dates back almost as far as the use of turbojets. The first imports of ex-military airplanes were in 1957, as a slow trickle of first generation jets began to enter civilian hands. Use of such airplanes in contract work began in the late 1960's, then greatly increased in the 1980's when former Eastern Bloc airplanes became common and affordable. The typical airworthiness certification is Experimental-Exhibition. Although operators may intend to use the airplane for other purposes than Exhibition (i.e. Public Aircraft), if the FAA is presented with a legitimate program letter, showing intent to operate in Exhibition, they cannot deny a certificate. Beginning in August of 2011, the FAA has begun a process to develop a more detailed set of criteria for each type of aircraft in this category. FAA aircraft certification representatives noted that although the DoD contracts require an airworthiness certificate, the Experimental category does not necessarily provide a baseline for oversight.

ADDITIONAL INFORMATION

FAA Order 7110.65, Air Traffic Control, paragraph 4-7-12, Airport Conditions, instructs controllers to "inform an aircraft of any … destination airport conditions that you know of which might restrict an approach or landing."

On 8 July 2010, about 1340 Pacific daylight time, a Douglas A4L, N132AT, operated by ATAC, collided with terrain after the pilot ejected following a loss of engine power on takeoff from Fallon Naval Air Station. The airline transport pilot sustained minor injuries. The airplane sustained substantial damage by impact forces and post-crash fire. The NTSB determined the probable cause of this accident to be a loss of engine power during takeoff due to the failure of the engine's stator and turbine. Contributing to the accident was inadequate maintenance. (NTSB #WPR10LA339)

On 10 April 2012, Navair personnel visited the ATAC Fallon facility in order to review ATAC's oversight procedures and "review evidence that ATAC is following their procedures." Additionally, the audit was intended to "provide findings and recommendation of ATAC's capability to operate safely under the terms of the contract." The audit concluded with no significant findings and recommended "continued normal operation."

On 18 May 2012, an ATAC Hawker Hunter crashed at Point Mugu, California, destroying the aircraft and fatally injuring the pilot. (NTSB #DCA12PA076)

Pilot Information

Certificate:	Airline transport	**Age:**	51
Airplane Rating(s):	Multi-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	4679 hours (Total, all aircraft), 79 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	ISRAEL AIRCRAFT INDUSTRIES	**Registration:**	N404AX
Model/Series:	F21-C2	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	130
Landing Gear Type:	Retractable - Tricycle	**Seats:**	1
Date/Type of Last Inspection:	AAIP	**Certified Max Gross Wt.:**	35714 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo jet
Airframe Total Time:	2275 Hrs at time of accident	**Engine Manufacturer:**	GE/Israeli Aircraft Industries
ELT:		**Engine Model/Series:**	J79-J1E-QD
Registered Owner:	AIRBORNE TACTICAL ADVANTAGE CO LLC	**Rated Power:**	17860 Lbs thrust
Operator:	AIRBORNE TACTICAL ADVANTAGE CO LLC	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KNFL,3900 ft msl	**Distance from Accident Site:**	2 Nautical Miles
Observation Time:	09:03 Local	**Direction from Accident Site:**	140°
Lowest Cloud Condition:		**Visibility**	0 miles
Lowest Ceiling:	Broken / 1500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	22 knots / 33 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	350°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.7 inches Hg	**Temperature/Dew Point:**	-1°C / -3°C
Precipitation and Obscuration:	Light - None - Snow		
Departure Point:	Fallon, NV (NFL)	**Type of Flight Plan Filed:**	IFR
Destination:	Fallon, NV (NFL)	**Type of Clearance:**	IFR
Departure Time:	07:52 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Van Voorhees Field NAS Fallon NFL	**Runway Surface Type:**	Concrete
Airport Elevation:	3900 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	13	**IFR Approach:**	Contact
Runway Length/Width:	14000 ft / 150 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.417778,-118.698608

Administrative Information

Investigator In Charge (IIC):	English, William
Additional Participating Persons:	
Report Date:	June 5, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=83057