DATA SUMMARY

LOCATION

Date and time	**Wednesday, 14 March 2012; 20:15 UTC**
Site	**Barcelona El Prat Airport (Spain)**

AIRCRAFT

Registration	**EI-DEA**
Type and model	**AIRBUS A320-200**
Operator	**Air Lingus**

Engines

Type and model	**CFM 56**
Number	**2**

CREW

	Pilot	Copilot
Age	**45 years old**	**35 years old**
Licence	**ATPL(A)**	**ATPL(A)**
Total flight hours	**11,500 h**	**4,600 h**
Flight hours on the type	**6,300 h**	**4,400 h**

INJURIES

	Fatal	Serious	Minor/None
Crew			**6**
Passengers			**56**
Third persons			

DAMAGE

Aircraft	**None**
Third parties	**None**

FLIGHT DATA

Operation	**Commercial Air Transport – Scheduled – International – Passenger**
Phase of flight	**Approach**

REPORT

Date of approval	**29 April 2013**

1. FACTUAL INFORMATION

1.1. History of the flight

An Airbus A320 from Cork (Ireland), callsign EIN868, entered a holding pattern above the Calella VOR (CLE) at 19:34 UTC. The runway visual range (RVR) for runway 25R, approved for Cat II approaches and in use at the time for landings at Barcelona, was below the authorized minimums (400 m). The crew requested a change to another runway with lower approved minimums (CATIII) that would allow it to land. ATC denied the request.

After holding for thirty minutes and with visibility conditions not improving, the crew opted to divert to Valencia. En route to Valencia, ATC informed them that the RVR at runway 25R had risen marginally above minimums, as a result of which they decided to go back and attempt to land. While on final approach, they told the tower that in case of a go-around, they would have to divert to Girona, an airport with lower fuel requirements than Valencia, as reflected in the operational flight plan filed for this flight.

Seconds later the reported RVR once again dropped below minimums. The crew aborted the approach and requested radar vectors to Girona. ATC then informed them of the impossibility of landing at Girona due to the lack of parking available on the apron due to the large amount of aircraft that had diverted from Barcelona. The crew then declared an urgency situation due to insufficient fuel ("PAN PAN"), after which they were cleared by ATC to land on runway 25L, which they did without incident.

1.2. Personnel information

The tower supervisor was qualified at the station in October 2008. He was named chief supervisor on a temporary basis in October 2011 after having completed an online supervisory course[1].

In 2011 he received training on special and emergency situations, as well as on low visibility procedures (LVP).

On the day of the incident he worked the afternoon shift after six days off. The work day started at 13:30 and was scheduled to end at 21:00. In the previous month he had mostly worked this same shift.

[1] If there are no internal candidates for the post of "career supervisor", as has been the case in Barcelona for the last three or four years, then the supervisors are named on a temporary basis.

Several coworkers provided positive comments on the tower supervisor, describing him as a good professional.

As for the control area supervisor, he had over 25 years of experience at the post.

1.3. Aircraft information

The aircraft was authorized to conduct CAT IIIB approaches (with no decision height and an RVR of 75 m), as reflected in the special operations section of the company's AOC. Within the classification defined by the ICAO and used to characterize aircraft based on their approach speed, the A320 falls within the C category[2].

1.4. Meteorological information

The weather forecast issued at 11:00 for the BCN airport already indicated the possibility of fog at the airport. An updated forecast was issued at 15:16 that anticipated a reduction in visibility due to fog to 400 m from 16:00 until 21:00. This trend was confirmed in the 17:00 forecast.

Weather observations at the Barcelona Airport (METAR) confirmed the drop in visibility starting at 15:00. The first fog banks rolled in at 16:30 and the forecast called for fog with visibility of around 400 m, as predicted by the forecast. Visibility continued to fall and at 17:06, a SPECI[3] report was issued listing a visibility of 500 m and an RVR of 1000 m for runway 25R. From that moment on the fog settled over the airport such that visibility dropped to 100 m, with the RVR at the 25R threshold reaching a minimum value of 200 m at 21:00.

The trend in RVR measured and recorded by airport equipment at the runway 25R and 25L thresholds over the course of the evening is shown in Figure 1.

[2] In Doc 8168, PANS-OPS, the ICAO defines a classification for aircraft that establishes their maneuverability for the purposes of instrument procedures. The basis for this classification is the threshold speed (V_{REF}), which is in turn based on the stall speed in a landing configuration for the maximum certified landing weight. The categories range from A (V_{REF} below 90 kt) to E (V_{REF} above 166 kt). Most medium-range commercial transport jet airplanes fall within the C category (V_{REF} between 121 and 140 kt).

[3] A SPECI report is a special aerodrome report that can be issued at any time if it meets certain criteria.

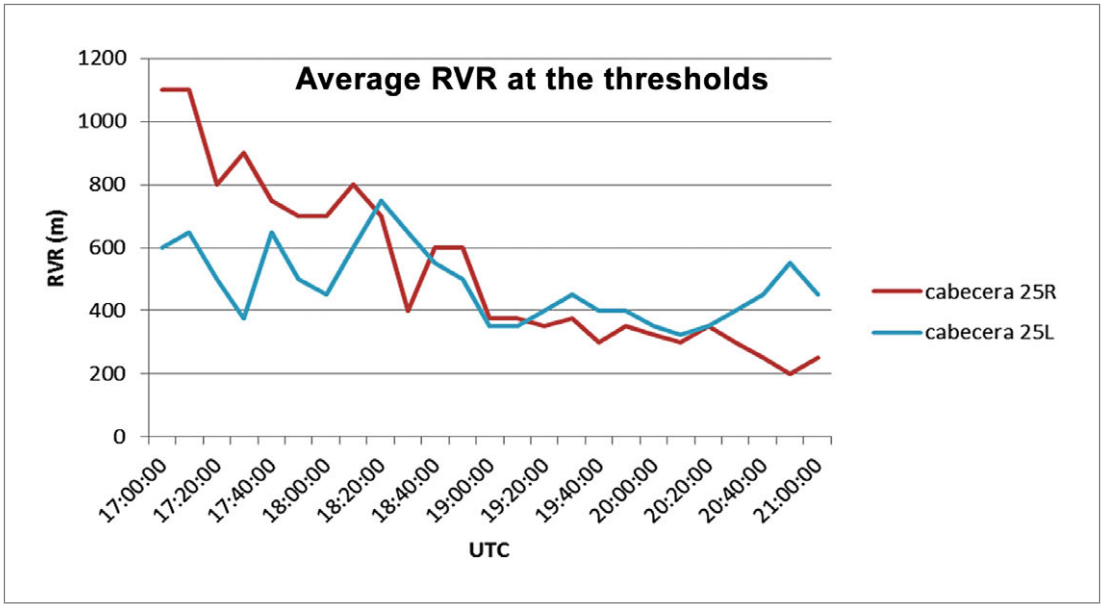


Figure 1. Trend in RVR for both runways on the evening of the incident

The aerodrome observation reports published at 19:30 and 20:30 indicated values of 325 m and 300 m, respectively, for the 25R threshold.

As for the Girona and Valencia airports, weather conditions for the period in question were CAVOK with very good visibility and no significant weather phenomena.

1.5. Communications

The crew was able to contact the different sectors of the Barcelona TMA as well as the control tower without any problems. On several occasions they also contacted their operations base using ACARS.

Several exchanges took place during the incident between the control center responsible for the Barcelona TMA and the Barcelona and Girona towers to coordinate their activities.

The information on the availability of parking on the Girona Airport apron was transmitted from this airport's coordination center (CECOA) to its control tower.

1.5.1. *ATC air-ground and coordination communications*

The table below summarizes the content of the communications between aircraft EIN868 (also identified as Shamrock) and other aircraft and ATC stations, as well as coordination messages between said stations.

UTC	Ground-air communications	Coordination messages between ATC stations
19:22	EIN868 contacts ACC Barcelona Sector T1, which informs it of the LVP in effect at Barcelona and that it is operating in CAT II.	
19:25	The crew requests the RVR for 25R.	
	The controller reports RVR values of 300/250/600. The crew reply stating for the first time that the minimum they need to commence the approach is 400 m and to ask why they cannot use 25L, which is CAT III.	Sector T1 contacts the tower to ask if the approach category is degraded or if there simply is no CAT III available. The tower replies that on that runway only CAT II is available.
19:26	Another aircraft, callsign EZY2197, notifies sector T1 that it is in the same situation and that if runway 25L is not available, it will have to divert to the alternate.	Approach (Sector T1) asks the tower if it expects visibility to improve. The tower replies that the RVR is at the CAT II limit of 300 m. The approach controller asks if the situation is expected to improve, to which the tower controller replies that he will check with the supervisor.
19:27	EIN868 proposes 07R or 07L, in addition to 25L, as possible alternatives for landing.	The T1 Sector controller apologizes for being "such a pain" and relays to the tower the proposal to use 25L. The tower controller says "if conditions get much worse we won't have any choice but to open 25L for CAT III". He goes on to explain that there is no procedure for maintaining both runways in use and that it is the pilot's decision to divert to the alternate if they cannot land.
19:31	Sector T1 clears EIN868 to descend to FL100 and reports the RVR again (375/350/600). The crew reply that they will continue holding, since their minimum RVR is 400 m and they can use any other available runway. The controller informs the crew that he has spoken to the tower and that the runway will change only if conditions worsen. The crew asks if the airport is closed, since according to them "no one" can land in those conditions. The controller finds that strange since airplanes are landing.	
19:35		The tower supervisor contacts the T1 planner and explains that, according to procedure, the parallel runway configuration must be maintained while the RVR is in excess of 300 m. The approach controller tells him that according to two different crews, no airline can land in CAT II with RVR below 400 m and they are asking if the airport is closed.

UTC	Ground-air communications	Coordination messages between ATC stations
19:35		The tower supervisor insists that the CAT II minimum is 300 m, that that is what the procedure says. He literally tells the controller to "have them file a report or do what they want, let them go to the alternate if they deem it necessary or they can come here… we're not going to set a single runway for them or for anybody". The approach controller asks if the procedure is a local or international regulation, to which the tower supervisor replies that it is an ICAO regulation, "it's the ABC of LVP", and adds "what we can't do is change a procedure because he has different minimums". He mentions the procedure he has in front of him at that moment and proceeds to read the definition of Cat II verbatim, adding "the second we have 299 we'll have to go to category 3" and that "it's simple", if he cannot land he has to go around and divert to the alternate.
19:40	The T1 Sector controller relays to both aircraft (EIN868 and EZY2197) the information received from the tower supervisor.	
19:43		Sector T1 calls the Girona tower to ask about the availability of parking for two aircraft. Girona replies that there is definitely room for two and will check to see if there is more.
19:45		The Girona tower informs the ACC supervisor that there are three parking stands open.
19:52		The T1 Sector planner informs the tower that EIN868 is waiting to land at Barcelona and that its alternate (Girona) has no room available. He asks if they are considering changing to 25L. The tower controller states that the RVR has to drop below 300 m before they can change. At the same time the Sector T4 executive calls his counterpart in Sector T1 and tells him "an Iberia says that airline policy is not to land with less than 400".
	An aircraft with callsign BAW486 then informs that it too is on hold over Calella and calls sector T1 to ask if a runway change is expected since they cannot land on 25R due to their minimum required RVR of 400 m for a CAT II landing.	The T1 Sector controller complains to the tower controller for their refusal to change configuration considering that four airplanes that have been waiting for nearly half an hour are requesting it. The tower insists that the conditions for changing configuration do not

UTC	Ground-air communications	Coordination messages between ATC stations
19:52		exist. The approach controller states that no one at the control center understands the situation and that the aircraft crews "don't understand it either" and that he does not know what explanation to give them. He says "we don't know what to tell them anymore. Girona is full and we'll have to do something with them, they can't stay out there flying".
19:59	IBE19GK is transferred to sector T1 and given the choice to commence the approach to 25R. The crew reply that they cannot land on that runway given the reported RVR and indicate their surprise that runway 25L, which has a CAT III, is not made available. The controller states that he too is surprised. "Yes, you and me both, but I can't..." Aircraft EZY932K and BAW486 explicitly request runway 25L. Aircraft EIN868 reports that it can land on any runway except 25R, and that if that is not possible, it will have to divert in 5 minutes.	Sector T1 makes arrangements for an aircraft with the Girona tower, which reports that there is room for five airplanes but to call before sending them to be sure. In any event, the tower confirms that there is room for the Shamrock.
20:03	Aircraft EIN868 requests vectors to Valencia and starts to divert but is immediately told by Sector T1 that the RVR is 400 m. The aircraft is then transferred to approach and then to the tower so as to try to land on runway 25R. At the end of the approach, on the tower frequency, the captain states that in the event of a go-around, they will have to divert to Girona.	
20:10	Three waiting aircraft (EZY923K, IBE19GK and VLG1036) again inform the T1 Sector controller that they cannot land on 25R given the RVR conditions present. They request runway 25L as an alternative and ask the controller to convey the information to the airport tower. Over the course of the conversation the controller says "to be honest sir, I don´t understand either but I cannot tell you why sir".	
20:12		The Control Center requests to speak with the tower supervisor to inform him of the situation with the holding airplanes and request a frequency on which the tower can provide an explanation to the aircraft "so you can tell them about the runway because this is getting to be a burden".

UTC	Ground-air communications	Coordination messages between ATC stations
20:12		The tower supervisor states that 25L is not in use because it is not preferred for landings and that until the RVR falls below 300 m the change will not take place. He insists that that is what the procedure says and he cannot do anything else.
20:13	Sector T1 informs EZY923K that there is room available in Girona if needed as an alternate. The crew describes the situation as "ridiculous" considering that the airport has CAT III runways.	
20:13	Aircraft EIN868 performs a go-around and reports it on the TWR frequency, which transfers it to the T4 Sector frequency.	
20:14	EIN868 requests immediate vectors to Girona. The T4 Sector controller reports that there is no parking available at that airport.	
20:15	EIN868 declares an urgency (triple "PAN PAN") and requests to land on runway 25L.	
20:16	A holding aircraft asks the tower for an explanation.	The tower indicates that it must remain on the approach frequency.
20:18	The T4 Sector controller gives it vectors to Sector T1 and transfers it to the corresponding frequency. Sector T1, in turn, transfers it to final approach.	The ACC informs the tower supervisor that an airplane has declared an urgency and is landing on runway 25L. The tower supervisor replies that the runway is not in use and asks the ACC "which aircraft declared a medical urgency". ACC informs that it is not a medical urgency, to which the supervisor replies that if a PAN PAN call is made, that it must be a medical urgency and insists that if it is not an emergency of a medical nature that runway 25L cannot be used. ACC replies with the expression "OK, sorry..." and later confirms "Yes, I suppose...". The supervisor asks not to transfer airplanes to the tower frequency and insists that if aircraft cannot land at the airport they must divert to the alternates and that aircraft cannot be the ones deciding which runway is in use. He nonetheless requests the activation of the 25L ILS.
20:22		Sector T1 again requests information from the Girona tower on the availability of spaces on the apron, to which the runway replies that there are at least two.

UTC	Ground-air communications	Coordination messages between ATC stations
20:24	The Final Sector controller asks EIN868 to explain its reason for the urgency, to which the crew reply that since there is no room available at Girona, they do not have enough fuel to reach another alternate and therefore must land at Barcelona.	On learning this, the tower supervisor says that if there is no emergency, both the aircraft and he are doing something improper. The ACC argues that the aircraft is low on fuel to which the supervisor replies "low on fuel and emergency are two different things".
20:26		The tower supervisor informs ACC of his decision to change to a single runway configuration with 25L.
20:29	After authorizing the landing, the tower asks EIN868 to exit the runway to the right.	

1.5.2. *ACARS[4] messages from aircraft EIN868*

Messages were identified involving the weather reports at the destination and alternate airports (Barcelona, Girona and Valencia) that were repeated up to six times between 18:12 and 20:07.

At 19:43 the crew made their initial enquiry regarding possible alternate airports if conditions at Barcelona did not permit landing there.

According to the messages recorded, airline operations unsuccessfully tried to contact Girona to check the availability of a ground handling service, as a result of which a message was eventually sent at 20:05 recommending deviating to Valencia.

1.5.3. *Communications between the Girona tower and the Girona Airport coordination center*

After the initial information request by the Barcelona ACC, communications were established between the airport coordination center (CECOA) and the Girona Airport tower for the purpose of gathering information on the availability of parking stands on the airport apron. The reference time may differ from that used in the ATS communications by a few minutes.

At 19:40 the tower first contacted the CECOA to report that two aircraft were being diverted and to ask how many more there was room for. After asking about the type of aircraft involved, CECOA replied that a maximum of five "large" airplanes.

[4] ACARS: Aircraft Addressing and Reporting System. A digital radio link that allows for constant communications between airlines and their airborne aircraft.

At 19:45 the tower asked again, and CECOA reported that they had capacity for five airplanes with "autonomous" (no pushback) departures, and that for airplanes of the Ryanair fleet type (with pushback), they should have room for as many as arrived, without specifying a number.

At 19:50 the tower informed CECOA that three airplanes diverting from Barcelona would be landing: RYR6311, EZY6197 and RYR1284. CECOA specified that the Aer Lingus EIN868 was also scheduled. The tower confirmed that the Shamrock would be the last to arrive.

At 19:58 the tower confirmed to CECOA that the Shamrock was diverting and asked about the capacity available on the apron once it landed, to which CECOA replied that there would be three "autonomous" parking stands. The tower controller in Girona asked for clarification regarding the meaning of the adjective "autonomous", which the CECOA official explained referred to those spaces that allow the aircraft to maneuver autonomously without the need for assistance from a pushback vehicle.

At 20:03 the tower informed CECOA that the Shamrock they were told would land at Girona was going to Barcelona after all.

1.6. Aerodrome information

1.6.1. *The Barcelona Airport*

The Barcelona Airport has two parallel runways (07R/25L and 07L/25R) and a cross runway (02/20), which was inoperative that day.

On the date of the incident, CAT II/III[5] approach and landing operations were being carried out only on runways 25R (only CAT II[6]), 25L and 07R.

The procedure for the ILS instrument approach to runway 25R is published in the AIP and lists the minimum obstacle clearance altitudes/heights (OCA/H) (see Appendix I). These heights depend on the aircraft's approach category and on the climb slope it can attain in the event of a go around (2.5% or 3%), as shown in the table below:

[5] A category II operation consists of a precision approach followed by an instrument landing using ILS or MLS with:

i) a decision height below 200 ft but not less than 100 ft, and
ii) a runway visual range not less than 300 m.

Category III operations are subdivided into Cat IIIA and IIIB. Category IIIB operations are precision approaches and landings using ILS or MLS with:

A) a decision height below 50 ft, or with no decision height, and
B) a runway visual range less than 200 m but not less than 75 m.

[6] Prior to 18/11/2010, runway 25R was also capable of handling CAT III approaches. On that date it was reduced to CAT II. The CAT III capability was regained on 28 June 2012.

	A	B	C	D
CAT II 2.5%	216	233	245	259
CAT II 3%	97	114	125	140

Approach and landing operations in Category II and III weather conditions are carried out as described in the low visibility procedures (LVP)[7]. These procedures are activated in phases as the predicted or actual visibility conditions degrade, such that they must be in full force when the RVR at any runway in use is 600 m or less, the visibility is 900 m or less or the cloud ceiling is 75 m (250 ft) or less.

On the day in question, in light of the weather forecast, the LVP were first activated at 15:35 and they remained in effect from 16:10 until after the incident.

As specified in the AIP, the preferred configuration for daytime LVP procedures is the one referred to as WLR, which consists of the simultaneous operation of the parallel runways in a west configuration with runway 25R used for landings and 25L for takeoffs.

The remaining configurations (in an E or W orientation) available for the duration of LVP operations use a single runway. The use of a single runway obviously involves a reduction in the airport's capacity and requires an increase in the separation of approaching aircraft from 10 NM to 16 NM.

That evening the WLR preferred configuration was active and maintained throughout the incident until 20:26, at which time the tower supervisor decided to change to WLL (single runway with 25L used for landings and takeoffs).

1.6.2. *Parking capacity at the Girona Airport*

The Girona Airport (LEGE) has a total of 21 parking stands for commercial aviation, though there are impediments to the using of all the stands at the same time. Keeping this in mind and the fact that on the day of the incident four parking stands were out of service due to work on the apron, 14 stands were available that day.

On the evening of 14 March, from 18:00 until the end of the day, 16 flights arrived at the airport and 6 departed. A total of nine flights diverted from Barcelona arrived there, of which five landed at Girona after the Shamrock landed at Barcelona.

When the Shamrock requested vectors to Girona, there were eight parking stands available. From then until the end of the day, five arrivals and two departures were scheduled.

[7] ANNEX TO THE BARCELONA TOWER OPERATIONS MANUAL: LOW VISIBILITY OPERATING PROCEDURE S41-11-DCT-001-1.0 dated 4/11/11.

Based on information provided by the airport's operations department, flight EIN868 had a parking stand reserved and assigned until the message was received that it would not be landing there.

The maximum apron occupancy was recorded at 22:52 with 12 aircraft (there were two stands available).

1.7. Flight recorders

The information stored on the quick access recorded (QAR) was used to determine the amount of fuel left onboard during the hold and approach phases.

1.8. Organization and management of the ATS

1.8.1. *The TMA in the Area Control Center (ACC)*

Within the area control center there are posts for controlling the route sectors and posts for controlling traffic inside the TMA.

The TMA in a WRL configuration is divided into five sectors: T1 (NE), T2 (SE), T3 (SW), T4 (NW) and FINAL. Sector T1 handles aircraft coming in from the N, uses holds over Calella (CLE) and Sabadell (SLL) and routes them to approach and land on runway 25R. In this configuration sector T4 handles aircraft that go around on runway 25R. The FINAL sector is the last sector on approach before the aircraft are transferred to the tower, which is the last station that clears them for landing.

The Control Units (CUs) corresponding to each sector are organized in the following order (from left to right): T1, FINAL, T2, T3, T4. In other words, T1 and T4 are at either end, which makes it difficult for the controllers occupying these posts to communicate verbally.

There is an executive and a planner at each post. The executive is mainly on the radio controlling aircraft while the planner handles the necessary information, coordinates with other sectors, with the collateral sectors and with the supervisor and advises the executive. The consoles at each post feature telephone and/or hotline communications with the other posts and with the airports in the TMA.

In the control room there are two route supervisors and one TMA supervisor. As a general rule there is a minimum of one supervisor for every six posts, though this requirement is not specified in any written procedure.

The TMA supervisor coordinates the actions of each post. He has a console behind the five posts but, due to the physical distance between the supervisor's console and the

CUs of each sector's controller, it is typical for the supervisor to physically move between the posts as needed. Specifically, he is charged with processing and relaying the information pertaining to the availability and status of alternate airports within the TMA. This information is typically collected by the T1 sector for the Girona Airport and by the T4 sector for the Reus Airport, though there is no written procedure that specifies who is responsible for gathering such information.

The Control Room Chief coordinates the entire ACC and specifies the entry into force of regulations as required.

1.8.2. *The Barcelona Airport control tower (TWR)*

Tower controllers handle aircraft requesting start-up (CLR), those that are taxiing in any of the four zones into which the maneuvering area is divided (GMC), as well as arriving (LCL ARR) and departing (LCL DEP) aircraft. In addition to coordinating the activities on these seven frequencies, the tower supervisor coordinates with airport services and with the area control center (ACC).

The supervisor is also responsible for determining the active runway configuration at the airport.

When selecting the most suitable configuration during low visibility periods, the supervisor must abide by the requirements of the AIP and the aforementioned procedure (LVP). This procedure reiterates the contents of the AIP as regards the approach category of each runway (Cat III for 07R and 25L and Cat II for 25R). In the definitions section it mirrors the definitions for Cat II approaches.

The procedure lists the configurations available while in LVP and specifies that, when selecting a configuration, consideration will be given to the fact that the west parallel runway (WRL) configuration offers the highest capacity *(unless CAT III minimums exist)* and that the 07R single runway configuration (ERR) is the most environmentally harmful.

The procedure also refers to the aerodrome utilization minimums listed in the EU OPS, specifically in Appendix 1 to OPS 1.430, subpart E of Commission Regulation (EC) no. 859/2008, and that these minimums must be interpreted in accordance with the criteria and exceptions listed in said regulation[8]. Beyond this reference, the procedure has no information on the minimum runway visual range (RVR) values applicable to each airport runway in each category of operation nor on how said values depend neither on the category of the approaching airplane nor on the decision height defined by the operator in the procedure.

[8] This appendix contains the dependence between the minimum RVR values with respect to the decision height and the airplane category. See Section 1.10.1.

Regulation 8/2008 (EU OPS 1) is not among the documentation that is available in the control tower. Also not available are the approach charts published by the most usual providers that list the minimum RVR values and that reference the values most commonly used by airlines operating at the airport.

1.9. Tests and research

1.9.1. *Eyewitness statements*

1.9.1.1. Crew of EIN868

Already in Cork the weather forecast indicated likely low visibility conditions in Barcelona. They checked the approach charts and saw that the airport had Cat III capabilities at three of its runways, and as such anticipated no major problems beyond a holding delay, so they loaded fuel for an additional 25 minutes of flight time. Once onboard the aircraft the forecast was confirmed with RVR values of around 400 m. They were delayed nearly an hour in departing, a delay that was caused, according to the Aer Lingus operations center, by the weather at the destination airport.

On arriving in Barcelona they were surprised to learn that the runway for landings, 25R, was a Cat II. They checked the approach chart for runway 25R and saw that the minimum required RVR was 400 m.

While holding they heard landing clearances on the tower frequency, which made them wonder if they had made any mistakes during the landing briefing. As a result they remained in the holding pattern for about 10 minutes while they checked that the minimum RVR was in fact 400 m. Any doubts they had were confirmed when they realized that other aircraft were in the same situation, even though ATC was using the fact that airplanes were landing to justify its decision .

Over the next ten minutes they analyzed the alternate airports and requested guidance via ACARS from their operations center, which was able to inform them that ground services were available in Valencia but could not confirm the same for Girona.

The decision to divert to Valencia was based primarily on the fact that the flight crew were aware that ground handling facilities were more likely to be readily available, as it was a destination airport on the Company's network, as distinct from Girona, where handling facilities were more likely to result in a prolonged delay. In fact the recommendation from operations to proceed to Valencia was received after they had made the decision.

According to the captain the amount of fuel onboard when they left the holding pattern was in excess of 2.3 MT, which was well above that planned for the diversion to

Valencia, considering the additional margin provided by the fact that the planning included a go-around at the destination airport (Barcelona) that they had not made.

The copilot stated that they set a 2.6 MT limit for leaving the holding pattern, which they did.

Immediately after they diverted they were called by the controller, who informed them of an improvement in the RVR. They decided to try the approach after verifying that they still had enough fuel to go to Girona if they had to go around, something they remembered communicating to ATC.

When they were at an altitude of 1,700 ft, approach control reported a RVR of 300 m. They continued the descent to 1,500 ft in the hope of receiving a higher updated value for RVR. When no such new notification was received, they started a missed approach.

When the controller informed them that there was no room at Girona, the copilot checked the amount of fuel remaining, which, according to him, was 2,240 kg (below the amount planned for diverting to Valencia). They reasoned that the safest option under the circumstances was to declare an urgency (triple "PAN PAN") and request to land at one of the Cat III runways available in Barcelona, thus avoiding an emergency declaration (triple "MAY DAY") due to low fuel on arrival at the other alternate (Valencia).

When asked about ATC's performance, the captain praised the behavior of the approach service, though his impression was that there was a disparity in the criteria used by the approach and tower controllers regarding the possibility of using another runway besides 25R.

Once on the ground, they regarded the visibility as being too low to have satisfactorily made a Cat II approach.

1.9.1.2. ATC control personnel

1.9.1.2.1. *Tower supervisor*

The work load in the tower on the day of the incident was very high, as was the stress level, but he assured that his decision was not the result of stress or fatigue and that he would have made the same decision at the beginning of the work day had it been necessary.

He insisted that he adhered strictly to the applicable low visibility condition procedure. According to him, the definition for Cat II contained in the procedure would have allowed landings on runway 25R with an RVR of up to 300 m, and thus he saw no reason to change the configuration.

He stated that on the day of the incident, he was unaware of the table in the EU OPS that relates RVR, airplane category and decision height. After seeing the table he added that, "impartially", and taking into account that additional information, he may have interpreted the procedure differently, but since the table was not part of the procedure, no other interpretation was possible on the day of the incident.

He underscored that it is typical for certain aircraft to request to land on 25L for reasons unrelated to safety, such as to reduce taxi time or to make a visual approach.

He also noted the great difficulty he had handling the large amount of information he was receiving and the pressure he felt from the insistent calls from the control center. According to him he was not fully aware of the number of aircraft on hold and diverted to the alternates, and he interpreted the fact that airplanes were landing as proof that the RVR was acceptable for some airlines.

He recalled having discussed the situation with a couple of colleagues (also supervisors, one of whom had taken part in drafting the low visibility procedure), who corroborated his decision to maintain the configuration.

As regards similar events, he stated that he experienced low visibility conditions sporadically in Barcelona (typically a couple of times a year), but he did not recall situations involving such a dense or persistent fog.

When asked why he equated the urgency call (triple Pan Pan) with a medical emergency, he could not give an explanation, since he stated being aware and knowledgeable of the fact that it can stem from other types of emergencies, though the most common reason for the call is some kind of medical problem onboard. In this regard, he stated that in December 2011 he had attended a training course specifically on emergencies.

1.9.1.2.2. *Other accounts from tower personnel*

As a general rule they do not know their ACC colleagues, other than seeing them from time to time at a training course.

Two controllers who were in the tower on the day of the incident substantiated the supervisor's account in terms of the pressure they felt their colleagues in the control center were putting on them that day. This was particularly critical considering the high work load that existed on the day in question. The controller authorizing landings underscored how he felt particularly bothered by the excess work resulting from the calls being received from approaching aircraft.

The fact that procedures that are intended to make the decision-making process safe exist was viewed in a positive light by those interviewed. They try to abide by them to

the letter, using their professional judgment to evaluate them and make recommendations as necessary to those responsible for writing them, but they never supplant them using their own judgment because they are written by "more experienced" professionals.

According to another tower supervisor, the 25L single runway configuration has its drawbacks from a control standpoint. In addition to decreasing the airport's capacity, the combining of takeoffs and landings results in less safe operations than if parallel runways are used. Furthermore, this configuration routes the ground traffic flow to one area of the airport, hampering its management.

1.9.1.2.3. *Control center supervisor*

He described the situation as atypical for a low visibility scenario. If the airport remains open, then aircraft either land on the designated runway or divert to the alternate with no further requirement than simply being informed of the estimated delay. In his 27 years of experience he did not recall a fog condition resulting in a conflict regarding which runway to use for landings.

He recalled that given the "chaotic" nature of the situation, both he and the control room chief talked with the tower supervisor about the possibility of changing the airport configuration.

When the tower refused to change the configuration, he initially tried to pressure them, even going so far as to resort to the unusual step of suggesting that they provide a frequency on which airplanes could receive information first-hand from the tower, since the crews did not seem to be settling for the explanations relayed by approach controllers and were insisting on using another runway.

While he is unfamiliar with the tower's protocols and procedures, it was obvious to him that the situation was bound to get worse if the aircraft were not allowed to land, since, as he said, "it's safer for the aircraft to be on the ground than in the air", hence his intention to "pressure" the tower.

At one point he concluded that the tower supervisor was "very sure of himself" and that since it was not possible to persuade him to change runways, he informed the controllers that the aircraft would have to divert to their alternates. Almost immediately the Shamrock declared an urgency, which affected the situation. Given the confidence with which the tower supervisor had presented his arguments, he was surprised that the new configuration was maintained after the Aer Lingus landed.

When asked if he thought they were able to transmit the reality of what was happening in the TMA to the tower, he expressed doubts, stating that he tried to "soften" a

"tense" situation and that perhaps he should have been more "dramatic", but that in any event, in addition to the information they were providing, the tower has a radar display that shows the airspace around the airport.

He did not know the tower supervisor and if he had, he said he may have been able to use a friendlier tone that would have helped them reach a solution.

He confirmed that it is the ACC supervisor's responsibility to manage the information on alternate airports. Although he could not confirm it, he stated that he likely called Girona personally to inquire about the availability of the airport, though the normal routine would be for the T1 sector to find out about the Girona Airport and for sector T4 to do the same regarding the Reus Airport. At no time did he recall having received information that Girona did not have room or that he relayed said information to the T4 sector controller.

He stated that on previous occasions involving massive diversions of aircraft to alternates, some of the airports had experienced a shortage of parking stands, that this is a highly undesirable situation and that this could have predisposed the sentiment in the control room and caused concern when it was assumed that there were no spaces in Girona, something that was not sufficiently verified.

In his opinion a single supervisor could be enough in normal situations, but he can be overwhelmed in exceptional circumstances such as the one that occurred on the day of the incident.

1.9.1.2.4. *Controller responsible for sector T1*

He confirmed that the planner at T1 gathered the information on the Girona Airport, which was then transmitted to the control center supervisor.

1.9.1.2.5. *Controller responsible for sector T4*

He knows the Barcelona tower because he used to work there. In fact, it is relatively common for personnel from the ACC to have been in the tower, but not the other way around. According to him, the Barcelona tower is not a particularly appealing post. It is usually an initial assignment, which means the average age there is lower than at other stations.

In addition to the supervisor and the control room chief, he himself called the tower in the hopes that his knowledge of the work done at the tower would help clarify the situation.

When asked if he thought the tower personnel were aware of what was really happening, he said that having so many people from the ACC call the tower was highly unusual, and thus it would have been logical to surmise that something was happening. In his opinion, the tower had enough information to realize that a lot of aircraft were holding. They could even have seen it on their radar screen. Despite this, they may not have been able to convey exactly what they were seeing and hearing first hand. He admitted that there may have been a communication problem and that ATC could have given a better impression of coordination by not telling crews that they did not understand the decision being made in the tower.

According to him the tower may have been reluctant to establish a WLL configuration in part because "it complicates things for them" since taxiing is considerably more difficult in that configuration.

In his opinion a single supervisor was not enough to properly handle all of the information being received on the day of the incident, especially the information on the alternates, which is a complicated issue. He thought it preferable that the information be more centralized.

He called the Reus Airport for information on the parking situation. He was sure that "someone in the room" had told him that Girona did not have room. In fact he recalled having relayed this information to one of the two other airplanes that went around before the Shamrock.

1.9.2. *Flight planning and dispatching*

The airline's Operations Manual specifies that all flights are to have at least one alternate destination airport.

This policy satisfied the requirements in EU OPS 1 in terms of the need to plan an alternate in the event of restrictive weather conditions at the destination airport[9]. Only if weather information on the destination airport is not available, or if said information indicates that the destination airport is below applicable minimums, does EU OPS 1 require two alternates in the flight plan. This was not the case for Barcelona, since it had two runways capable of handling CAT III approaches.

[9] According to OPS 1.295 c): An operator must select at least one destination alternate for each IFR flight unless:

1) both:

i) the duration of the planned flight from take-off to landing or, in the event of in-flight re-planning in accordance with OPS 1.255 (d), the remaining flying time to the destination does not exceed six hours, and

ii) two separate runways (see OPS 1.192) are available and usable at the destination aerodrome and the appropriate weather reports or forecasts for the destination aerodrome, or any combination thereof, indicate that for the period from one hour before until one hour after the expected time of arrival at the destination aerodrome, the ceiling will be at least 2,000 ft or circling height + 500 ft, whichever is greater, and the visibility will be at least 5 km.

At 15:53 the pilots were given the last update of the weather forecast for the Barcelona Airport, which called for a visibility of 6,000 m with the possibility of fog appearing around the estimated arrival time, which would reduce visibility to 400 m.

According to the operational flight plan, the Girona Airport had been chosen as the first alternate destination, and this alternate was used when calculating the amount of fuel needed. Three other alternates had also been considered (Valencia, Toulouse and Alicante), resulting in higher requirements in terms of the amount of fuel needed to reach them.

As required by EU OPS 1, the total fuel for the flight took into account the taxi phase (including APU operation), en route (climb, cruise, descent, approach and landing), go-around and diversion to the alternate (Girona) plus a final reserve (30 minute hold over the alternate), as well as contingency fuel intended to account for possible deviations from expected conditions.

The effect of the forecast winds aloft on the planned flight level was taken into account in the relevant phases. The table below shows the contribution of each of these components, along with the total consumption:

Phase	Time (min)	Consumption (kg)
Taxi	10	116
Trip	2:13	4,593
Contingency	5	166
Alternate*	29	1,128
Reserve	30	968
Total		**6,971**

* In the case of Valencia, the fuel needed to use it as the alternate was 1,295 kg.

According to the Operations Manual, the captain can, for justifiable reasons, add extra fuel in addition to the minimum required by regulations.

In this case, the captain decided to fill the tanks with 8 MT, which translated into a predicted takeoff fuel amount of 7,885 kg, as reflected on the load sheet provided to the crew. According to the crew's notes, once the fuel was loaded on, the flow gauges on the airplane indicated a total amount of 8,080 kg.

The airplane left 52 minutes after its scheduled departure time. During the wait, the auxiliary power unit was kept on for about 20 minutes, with an estimated consumption of 80 kg. This meant that when the airplane started taxiing, there was an estimated 8,000 kg of fuel onboard.

1.9.3. *Fuel management during the flight and the associated emergencies*

According to the entries made in the operational flight plan, the crew checked the amount of fuel available five times during the flight. In every case the actual consumption was below that anticipated, primarily because the flight level assigned was higher than planned (FL390 versus FL350). The final check was made above the point called LOMRA, which was situated some 30 minutes before the estimated arrival time and approximately 120 NM away from the Barcelona Airport. The value written down was 3.9 MT available (1.3 MT above the planned minimum). This value is consistent with the data downloaded from the QAR.

The information in the QAR indicated that the fuel available at the time of the diversion to Valencia was 2.5 MT, also consistent with the copilot's statement. When the urgency declaration was made, the QAR showed 2.3 MT, which confirms the information provided by the crew and their assessment that it was very close to the minimum value needed to reach Valencia.

Based on the onboard information, there was 1.82 MT of fuel remaining at the end of the flight. This value was also confirmed using the QAR data.

The airline's Operations Manual contains the procedure to be followed in those cases when the fuel situation onboard is such that no delays can be tolerated once the destination is reached (grouped under the heading "Minimum Fuel"). It explicitly states that this is not, strictly speaking, an emergency situation, but if the situation requires requesting priority from ATS, said circumstance is to be reported using the standard urgency call (PAN PAN).

If, however, in-flight estimates show that the amount of fuel available after landing at the nearest airport will be below the minimum legal reserve, the captain shall declare an emergency using the standard distress call (MAYDAY).

1.9.4. *Reconstruction of the scenario at the TMA-Airport*

The analysis of the radar data from the Barcelona TMA allowed investigators to reconstruct the traffic flow around the airport on the evening of the incident.

Between the time the Shamrock entered the holding pattern (19:35) and the change in configuration (20:26), as many as five aircraft heading to Barcelona and already in the airport's TMA diverted to other airports.

Between 19:56 and 20:29, when EIN868 landed on runway 25L, there were no landings. Only three aircraft attempted to land on 25R during this period, and all had to go around.

Of the 25 aircraft headed for Barcelona that entered the Barcelona TMA between 19:15 and 20:30, 17 managed to land and 8 were diverted.

Within half an hour after the change in configuration, six landings were completed, none requiring a go-around.

1.10. Additional information

1.10.1. *CAT II approaches and their applicability to 25R*

Pursuant to the European law applicable to operations in low visibility conditions[10], each operator must establish aerodrome operating minimums. In the case of precision approaches, said minimums are based on the minimum runway visual range (RVR) and on the decision height (DH) for each operation type (CAT I, II or III).

The decision height applicable to a procedure at a given airport must in any case be higher than the minimum obstacle clearance height published for that procedure and which ensures obstacle clearance as long as the approach is aborted above that height. Once the decision height is reached, if the visibility conditions are such that the pilot, aided by the available lighting systems, has not established a satisfactory visual reference, the landing must be aborted.

In the case of CAT II approaches, the minimum allowable runway visual range depends on the decision height applicable to the procedure, as shown in the table below[11]:

Decision height (Dh)	RVR/Cat A, B or C airplane	RVR/Cat D airplane
100-120 ft	300	300
121-140 ft	400	400
Mayor de 140 ft	450	450

Applying this table to runway 25R at the Barcelona Airport (OCH between 97 and 254 ft, as per the table in Section 1.6.1) yields minimum RVR values of 400 m for medium type jet airplanes under intermediate loading conditions (as was the case of EIN868) and of up to 450 m for heavier airplanes.

In the case of CAT IIIB approaches, the RVR also depends on the capabilities of the airplane's guidance system, with the latest generation systems allowing for a RVR of as

[10] Annex EU-OPS 1 REGULATION (EC) No. 859/2008. Subpart E All Weather Operations (AWO).
[11] Appendix 1 to OPS 1.430, subpart E, of Commission Regulation (EC) No. 859/2008. This appendix is referenced in the LVP procedure of the Barcelona Airport.

little as 75 m and for making approaches with decision heights of under 50 ft or with no decision height (as was the case of EIN868).

In this kind of operation, the crew can start the approach regardless of the reported RVR/visibility, but shall in no case continue with the approach beyond the outer marker or an equivalent position if the reported RVR/visibility is below the applicable minimums. Based on the approach procedures used by Aer Lingus (Appendix II), in the case of runway 25R at Barcelona, this point is located 4 NM away from the threshold at an altitude above the threshold of 1,351 ft.

1.10.2. *Measures taken*

As a result of the internal investigation conducted by AENA, an internal circular was published on 24/04/2012 that indicated that the WRL-LVP configuration could be maintained with landings on runway 25R as long as the RVR was above 450 m. If it dropped below that value or if such a drop were reasonably assured, the configuration had to be changed to WLL-LVP with the CAT III available. The circular was valid until 28/06/2012, on which date it was expected that runway 25R would be upgraded to CAT III, as was the case.

2. ANALYSIS

2.1. Crew's planning and management of the flight

During the flight preparation, the crew noticed the possibility of adverse visibility conditions at the destination airport, which is why the captain decided to add extra fuel atop the minimum required that would enable them to handle any waiting period brought on by the fog they were anticipating. The fact that the destination was an international airport with four operational runways perfectly equipped to handle low visibility conditions up to CAT III meant they foresaw no additional problems.

The flight was uneventful and the crew made fuel checks throughout and verified the weather conditions at the destination and alternate airports. The fact that they were assigned a flight level higher than planned only contributed to the fuel savings, which gave them a greater fuel margin on arrival.

The applicable approach procedures forbade them from conducting landings on the assigned runway with a runway visual range (RVR) below 400 m. At no time during their half hour plus hold were they notified of higher values, and the information recorded by the weather station at the airport confirmed these values. The impossibility of landing was reported repeatedly to the controller both by the crew of EIN868 as well as by other aircraft on hold. The approach controller made this known to the airport tower so its

personnel could reconsider the possibility of changing the runway configuration, but to no avail.

While waiting either for the airport tower to change the runway in use or for visibility conditions to improve, they started to evaluate which of the two nearest alternate airports listed on the operational flight plan (Girona or Valencia) would be better. They requested help in this regard from the airline's operations center via ACARS. The airline's reply was delayed because it could not obtain confirmation on the availability of an adequate ground handling service at the Girona Airport. Apparently, even before receiving the reply, the captain had decided to divert to Valencia, an airport he knew well and with fuel requirements only minimally greater than Girona's.

The crew opted to divert after verifying they had sufficient fuel onboard to reach the new destination and because delaying any longer would have prevented them from reaching it. This circumstance was confirmed by the data downloaded from the QAR.

While the news that visibility conditions in Barcelona were improving a bit gave them a chance to try to land at their destination, it also meant eliminating Valencia as an alternate airport and having to opt for Girona.

This situation, which was not a major disruption from a safety standpoint beyond the uncertainty about the availability of a handling and passenger assistance service, was reported to the tower controller while on final approach, meaning the availability of Girona was not confirmed before the decision was made to attempt to land in Barcelona.

During the final approach, the RVR again dropped below the minimum. The crew prolonged the approach in the hope that conditions would improve before reaching the minimum altitude allowed in the approach procedure (1351 ft), which did not happen. As a result, they interrupted the descent at 1460 ft (according to radioaltimeter data obtained from the QAR).

It was after they missed the approach and requested to divert to Girona that they received word that this airport, the only planned alternate they could reach at that point without risking dropping below the required fuel reserve, was not available and that therefore the safest thing to do would be to land in Barcelona as quickly as possible. Although the fuel remaining was not enough to guarantee their arrival at another airport with an adequate safety margin, it was more than enough to approach and land in Barcelona, as evidenced by the fact that they had 1.8 MT of fuel left after landing, or 800 kg more than the legal minimum reserve.

The airplane could thus have remained airborne an additional half hour before facing a situation that would not have allowed for any delays and that would thus have been covered under the "Minimum fuel" section in the Operations Manual. The crew,

however, opted to make an urgency declaration so that they would be allowed to land on runway 25L. Since the repeated requests to change the runway, both by EI868 and by other crews in a similar situation, went unheeded, continuing to wait would probably only have served to reduce the safety margins and would have possibly resulted in the need to make a distress call due to an actual fuel shortage once the fuel amount fell below the minimum allowable value.

2.2. Action of the ATC services and selection of the active configuration at the airport

2.2.1. *The LVP*

The gradual worsening of visibility conditions at the airport had triggered the activation of the low visibility procedures hours before the incident, during the afternoon shift, meaning that tower personnel had been working for hours in those conditions with a configuration that allowed approaches up to CAT II.

The LVP in effect at the Barcelona tower did not explicitly establish what RVR minimums were necessary to operate under CAT II at each of the airport's runways, nor how these values depended either on the airplane category or on the decision height. The document merely provided generic definitions for the various approach categories based on the minimum decision height limits and RVR for each case (100 ft and 300 m respectively for CAT II). It did contain a reference to the section in the applicable regulatory document (Appendix 1 to OPS 1.430), which does list the aforementioned dependencies and sets the RVR values required, values that, depending on various factors, can go as high as 450 m for CAT II approaches.

When asked, neither that day's tower supervisor nor other supervisory personnel knew the contents of that appendix, nor was there a copy of said appendix in the tower that they could have checked.

Under these conditions, the supervisor thought that the 300 m value contained in the generic definition of CAT II was acceptable for the RVR on approaches of that type under any circumstances. He thus saw no need to change the runway configuration as long as the RVR remained above 300 m, even if the airlines themselves were free to impose more restrictive limits on their own operations.

This belief is explained in part by the incomplete and confusing wording of this part of the procedure. While runway 25R has recovered its CAT III rating, any runway of that category could be temporarily downgraded, for example, if a CAT III required system fails. As a result, it is still essential that this part of the procedure be clearly written. A safety recommendation is thus issued to improve and clarify said procedure.

The deficiencies in the written procedure notwithstanding, the ATC system must ensure that a tower supervisor, as the top official responsible for deciding the configuration of the active runways, is familiar with the regulations involving his own airport's operating minimums. This incident has served to underscore the lack of knowledge in this regard not only on the part of the controller who was acting as supervisor on the day in question, but also on the part of other supervisory personnel who, when consulted by the former, failed to identify the problem. It seems advisable, then, that in addition to the possible improvements made to the applicable procedure, that measures be taken to improve the training of supervisors in this area.

2.2.2. *Human and organizational factors*

As reflected by the recordings of the communications, the impossibility of landing on runway 25R was repeatedly brought to the attention of the ACC by several aircraft, and from there relayed, with varying success, to the tower. The difficult task of completing a landing on the runway in use was further evidenced by the fact that for half an hour, no airplanes tried to land and in the seconds leading up to the urgency call, four airplanes missed their approaches to that runway. The tower also has a radar display that, if necessary, can be used to see the build-up of traffic in the airport's waiting areas and the resulting diversions.

Thus, the information received from the control center and that available directly in the tower, along with the unusual fact that some aircraft were asking the tower directly for explanations, apparently provided sufficient motive for tower personnel to reconsider the adequacy of the active configuration, despite their interpretation of the procedure. The supervisor, however, did not change his decision and maintained the configuration, according to him, in strict compliance with written procedures.

During the repeated calls to ACC, communications were "tense". The "noises" in the messages (made worse by the violation of the memorandum of understanding between the ACC and the tower when holding aircraft were transferred to the tower frequency) could have contributed to making the admittedly repeated communications inefficient in conveying what was really happening: the number of waiting aircraft and the risk that posed. This could have limited the supervisor's awareness of the situation, and could also have disrupted the tower's normal activities[12]. These deficiencies in the

[12] The ACC controllers, pressured by the crews, called the tower multiple times. The ACC supervisor to ask for a frequency so "you can tell them about the runway". Because they were under a lot of pressure: "because it's a burden", "the airplanes are getting to be a pain insisting they want 25 left". Because they did not understand their decision "... and you're not thinking of opening up 25 left at all, right", "nobody understands it", "the airplanes don't understand it either". Because they disparaged the decision: "nonsense is what this is". Using messages to pressure them to change their decision: The PLT1: "we don't know what to tell them anymore... Girona is full, huh? (information that had not been received), well, we'll have to do something with them, I mean they can't stay up there flying".

communication suggest the need to undertake actions that improve the abilities in this area of both tower and ACC controllers.

2.2.3. *Handling of the information on alternates by the ACC*

After going around on the first approach, the crew requested vectors to proceed to Girona, as they had planned. The sector controlling the aircraft at the time and in communication with its crew was T4, whose console is furthest away from post used by the T1 sector controller who, as a general rule, and given his geographic position within the TMA, is charged with gathering information on the Girona Airport.

Upon receiving the request from the crew, the controller informed them, apparently based on what "somebody" had relayed to him, that the airport was full and not accepting more aircraft. The data gathered after the fact on the stands available on the apron at the Girona Airport, however, indicate that at no time were all of the parking stands occupied. Neither the recorded messages sent among the various ACC control posts, nor the communications between the ACC and the Girona tower, nor between the tower and airport operations mention that the airport was either at or about to reach its full capacity.

Problems with the communications were already apparent in the conversations between the Girona tower and airport personnel when the tower, having already received information along these lines fifteen minutes earlier, asked for clarification regarding the meaning of an "autonomous" parking stand. Considering the number of stands that were actually available (around 10, based on information gathered after the fact), it seems that the information relayed from the Girona tower to Barcelona did not include the "non-autonomous" stands.

The control center undoubtedly tried to gather information about the availability of Girona on several occasions before the aircraft missed its approach, but investigators were unable to determine exactly how said information was distributed within the center, and in particular how the wrong information reached the controller responsible for sector T4. Despite the apparent rule of thumb that it is the supervisor who has to handle and distribute the information, the person acting as the supervisor that day did not recall having any knowledge regarding the lack of room at Girona.

Minutes before the control center reported to the aircraft that there was no room in Girona, information to the contrary had been received at both the sector T1 console and at the control center supervisor's console. This apparent contradiction can be explained as resulting from the concern caused in the ACC by the accumulation and massive diversions of airplanes taking place in the TMA that day if, upon arrival at the alternate airports, there had been no room to park the airplanes.

What is known is that the airport had space available to accommodate the Shamrock at all times. In light of the foregoing, it would be desirable to enhance the mechanisms intended to ensure that this type of information, which is of such relevance in this type of scenario, is relayed clearly from the airport to control, and that in the ACC it be channeled through someone who can verify it and convey it to all of the relevant parties.

3. CONCLUSIONS

3.1. Findings

- The airplane took off with approximately one ton of fuel above the minimum required for the planned operation.
- After the landing the amount of fuel onboard was in excess of the required reserve.
- The runway in use for landings at the moment of arrival at the destination was 25R, which supported category II operations the day of the incident. Prior to that (until November 2010) it had been a Cat. III runway.
- While holding above the Calella VOR, the runway visual range (RVR) at the threshold of runway 25R remained below the minimum values authorized for approaches on that runway (CAT II).
- This situation was brought to the attention of ATC services by several aircraft that all had Barcelona as their destination. The airport tower did not modify the configuration.
- The low visibility procedures at the airport did not specifically consider the minimum RVR necessary to land on each of the airport's runways.
- The RVR reported after the deviation to Valencia allowed for landing on runway 25R.
- The RVR reported during the first approach to Barcelona then fell once more below the approved minimums.
- The airplane executed a missed approach at an altitude of 1,500 ft.
- At no time during the day of the incident were all of the parking stands available on the apron at the Girona Airport occupied.
- Once aircraft EIN868 declared an urgency, the Barcelona tower proceeded to change the configuration so as to authorize landings on runway 25L (CAT III).
- No airplanes landed in Barcelona in the half hour before the landing of flight EIN868. In the following half hour six landings were completed.

3.2. Causes

The tower's initial decision to maintain the configuration made it impossible for the aircraft to land at its destination airport.

The supervisor's decision was prompted by the poorly written text of the applicable procedure and could have been influenced by the ACC controllers' failure to adhere to

the memorandum of understanding, the increased workload, communications and work hours.

The prolonged wait, probably exacerbated by the expectations raised in the crews by approach control that the runway would be changed, resulted in decreased fuel margins which, along with the improper handling of the information regarding the alternate airport, made it impossible to deviate to another airport, forcing the crew to make an urgency declaration that would eventually enable them to land at the destination airport.

4. RECOMMENDATIONS

REC 10/13. It is recommended that AENA NA modify the low visibility operating procedures at its airports such that they explicitly include the minimum RVR values required for each of the approach categories (I, II and III) applicable to each of the airports' runways, pursuant to the contents of Appendix 1 to OPS 1.340, subpart E of Commission Regulation (EC) no. 859/2008.

REC 11/13. It is recommended that, during the controllers general training and specifically during the Tower Supervisors training, AENA NA reinforces the aspects of TRM and communication skills.

REC 12/13. It is recommended that AENA NA promote greater adherence to TWR/ACC coordination procedures and promote greater knowledge of the mutual tasks so as to standardize criteria and facilitate the definition of common strategies for handling normal, abnormal and emergency situations.

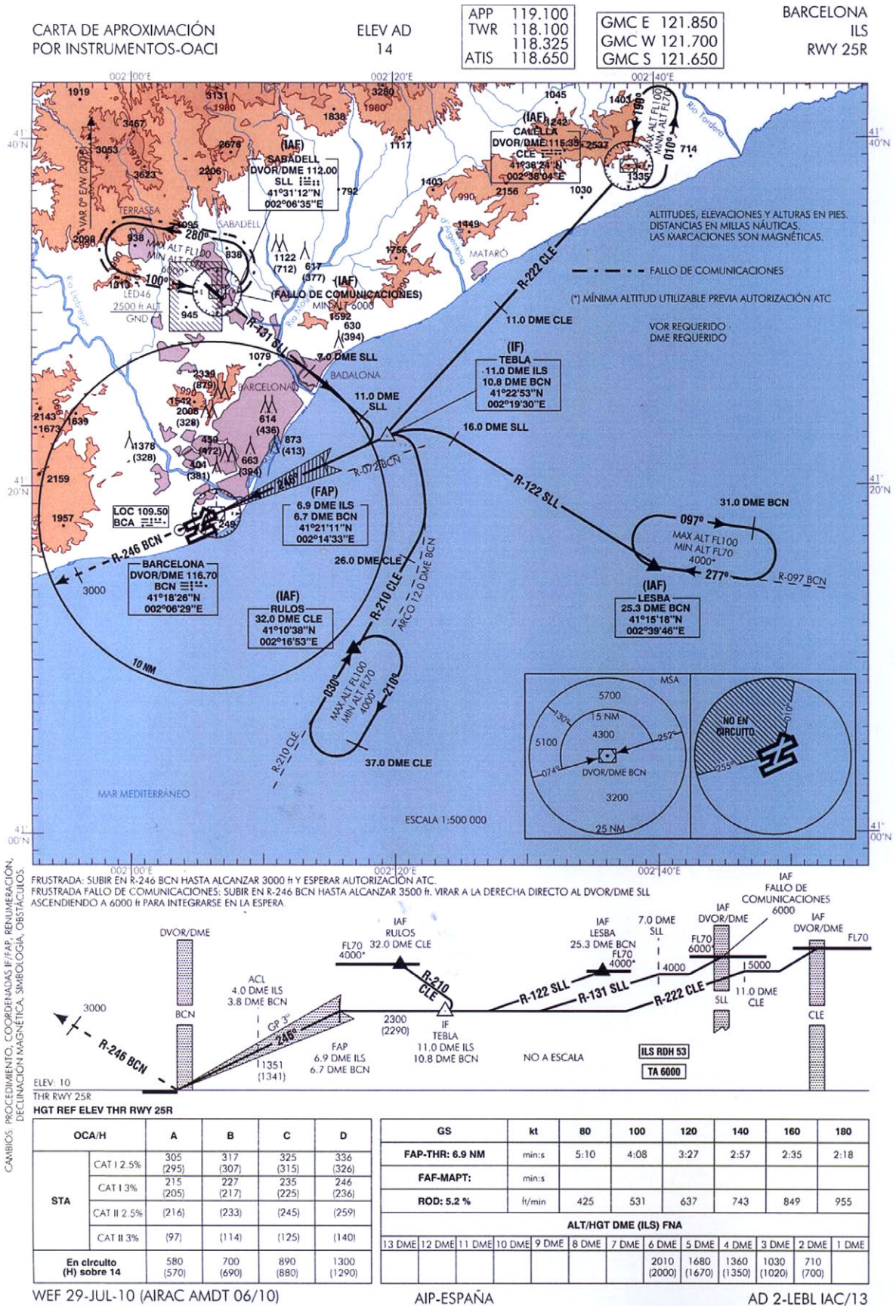
REC 13/13. It is recommended that AENA NA and AENA AD improve the procedures for communications between the Airport Control Center (CECOA) and the ATC services at the Girona Airport by agreeing on the use of common terminology for both parties that clearly identifies the type and number of parking stands available at the airport.

It is recommended that AENA NA define the responsibilities of each sector within the Barcelona TMA as concerns the gathering of information involving possible alternate airports and as concerns the post responsible for centralizing and distributing said information among the different sectors.

APPENDICES

APPENDIX I

ILS approach chart for runway 25R published in AIP in effect on 14/03/2012



CAMBIOS: PROCEDIMIENTO, COORDENADAS IF/FAP, RENUMERACIÓN, DECLINACIÓN MAGNÉTICA, SIMBOLOGÍA, OBSTÁCULOS

HGT REF ELEV THR RWY 25R

OCA/H		A	B	C	D
STA	CAT I 2.5%	305 (295)	317 (307)	325 (315)	336 (326)
	CAT I 3%	215 (205)	227 (217)	235 (225)	246 (236)
	CAT II 2.5%	(216)	(233)	(245)	(259)
	CAT II 3%	(97)	(114)	(125)	(140)
En circuito (H) sobre 14		580 (570)	700 (690)	890 (880)	1300 (1290)

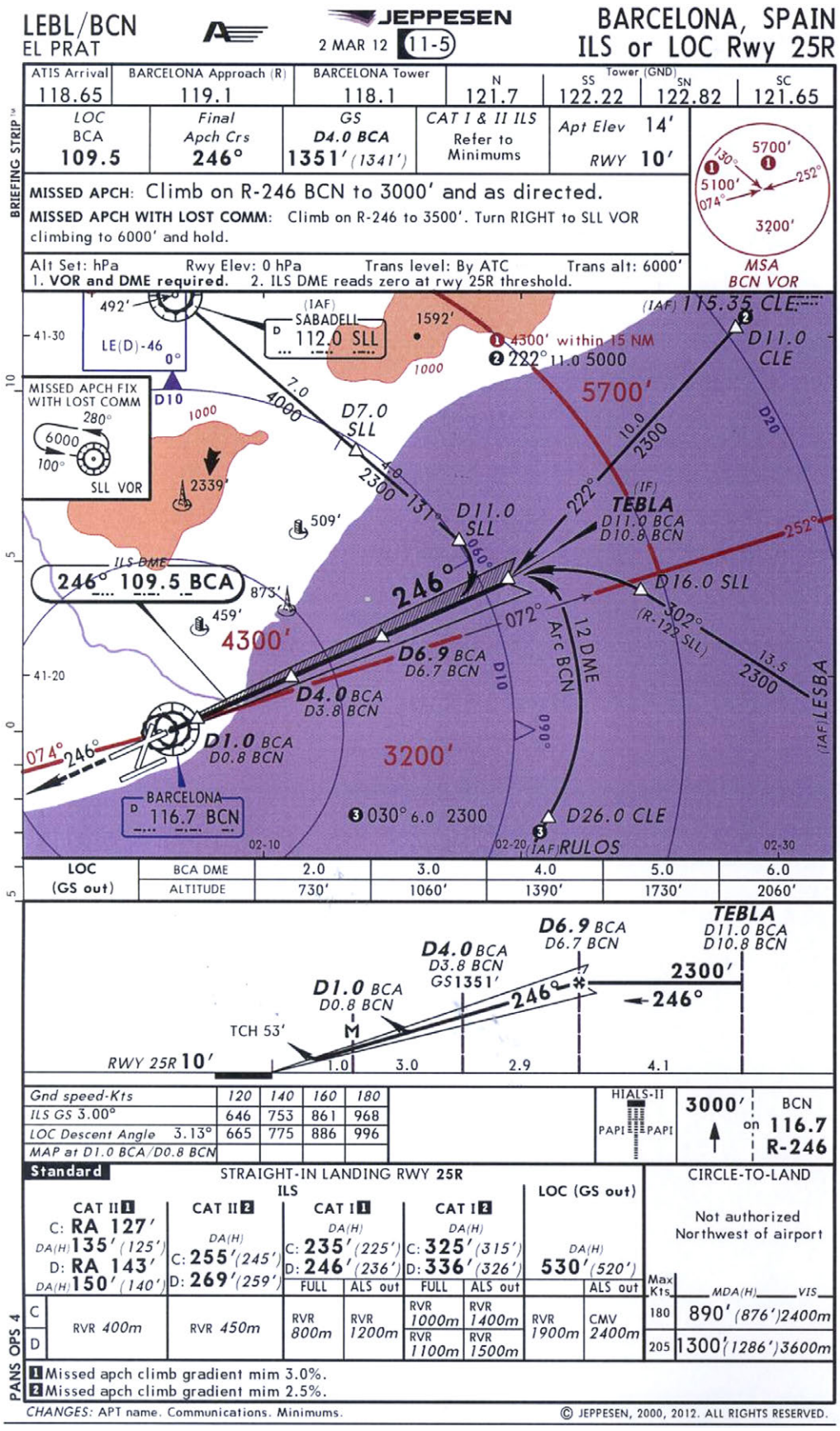
GS	kt	80	100	120	140	160	180
FAP-THR: 6.9 NM	min:s	5:10	4:08	3:27	2:57	2:35	2:18
FAF-MAPT:	min:s						
ROD: 5.2 %	ft/min	425	531	637	743	849	955

ALT/HGT DME (ILS) FNA

13 DME	12 DME	11 DME	10 DME	9 DME	8 DME	7 DME	6 DME	5 DME	4 DME	3 DME	2 DME	1 DME
							2010 (2000)	1680 (1670)	1360 (1350)	1030 (1020)	710 (700)	

APPENDIX II

Operator's ILS approach procedure for runway 25R in effect on 14/03/2012


LEBL/BCN
EL PRAT
JEPPESEN
2 MAR 12 11-5
BARCELONA, SPAIN
ILS or LOC Rwy 25R
ATIS Arrival 118.65
BARCELONA Approach (R) 119.1
BARCELONA Tower 118.1
Tower (GND) N 121.7 SS 122.22 SN 122.82 SC 121.65
LOC BCA 109.5
Final Apch Crs 246°
GS D4.0 BCA 1351' (1341')
CAT I & II ILS Refer to Minimums
Apt Elev 14'
RWY 10'
MISSED APCH: Climb on R-246 BCN to 3000' and as directed.
MISSED APCH WITH LOST COMM: Climb on R-246 to 3500'. Turn RIGHT to SLL VOR climbing to 6000' and hold.
Alt Set: hPa Rwy Elev: 0 hPa Trans level: By ATC Trans alt: 6000'
1. VOR and DME required. 2. ILS DME reads zero at rwy 25R threshold.
5700'
5100'
3200'
MSA BCN VOR
SABADELL 112.0 SLL
MISSED APCH FIX WITH LOST COMM
SLL VOR
246° 109.5 BCA
ILS DME
D7.0 SLL
D11.0 SLL
TEBLA
D11.0 BCA
D10.8 BCN
D11.0 CLE
D16.0 SLL
D6.9 BCA
D6.7 BCN
D4.0 BCA
D3.8 BCN
D1.0 BCA
D0.8 BCN
BARCELONA 116.7 BCN
D26.0 CLE
RULOS
LESBA
4300' within 15 NM
222° 11.0 5000
030° 6.0 2300
12 DME Arc BCN
LOC (GS out)
BCA DME 2.0 3.0 4.0 5.0 6.0
ALTITUDE 730' 1060' 1390' 1730' 2060'
TCH 53'
RWY 25R 10'
Gnd speed-Kts 120 140 160 180
ILS GS 3.00° 646 753 861 968
LOC Descent Angle 3.13° 665 775 886 996
MAP at D1.0 BCA/D0.8 BCN
HIALS-II
PAPI PAPI
3000' on BCN 116.7 R-246
Standard
STRAIGHT-IN LANDING RWY 25R
ILS
CAT II 1 C: RA 127' DA(H) 135' (125') D: RA 143' DA(H) 150' (140')
CAT II 2 DA(H) C: 255' (245') D: 269' (259')
CAT I 1 DA(H) C: 235' (225') D: 246' (236')
CAT I 2 DA(H) C: 325' (315') D: 336' (326')
LOC (GS out) DA(H) 530' (520')
CIRCLE-TO-LAND
Not authorized Northwest of airport
C RVR 400m RVR 450m RVR 800m RVR 1200m RVR 1000m RVR 1400m RVR 1900m CMV 2400m
D RVR 1100m RVR 1500m
Max Kts 180 MDA(H) 890' (876') VIS 2400m
Max Kts 205 MDA(H) 1300' (1286') VIS 3600m
PANS OPS 4
1 Missed apch climb gradient mim 3.0%.
2 Missed apch climb gradient mim 2.5%.
CHANGES: APT name. Communications. Minimums.
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