



RÉPUBLIQUE
FRANÇAISE

*Liberté
Égalité
Fraternité*



Activity report

2024



BEA
La sécurité, ensemble.

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A MESSAGE FROM THE DIRECTOR

After several years described as excellent at global level for air transport safety, accidents in commercial aviation unfortunately took a heavy toll in 2024. Indeed, eight accidents resulting in the fatal injury of 289 people were recorded worldwide.

As far as general aviation safety in France is concerned, the picture is fortunately more positive: the figures for fatal accidents and injuries, in all aircraft categories, are among the lowest of the last decade. Moreover, as far as the microlight activity is concerned, these figures are clearly the lowest of this period. One fatal injury was also recorded in aerial work operations.

In this context, the BEA opened 95 investigations in 2024, i.e. a reduction of around 20%, compared with the previous year. However, the number of foreign investigations for which the BEA appoints an accredited representative increased up to 249. This figure included a relatively high proportion of major investigations, to which the BEA contributed substantially.

Thanks to the commitment of all its staff, the BEA continued its efforts to reduce the number of investigations in progress and to be able to publish investigation reports more quickly. Its conclusions may include safety lessons or recommendations, with the constant objective of improving safety.

To this end, the BEA looked at how to adapt its investigation policy and diversified its communication channels to reach operational staff in a more direct and efficient way. For example, its website now includes safety lessons and safety digests, and its YouTube channel now offers videos aimed at operators' safety managers. The BEA also reinforced its technical resources and started reorganising some of its laboratories to improve efficiency and increase its analysis capabilities.



I would like to extend my warmest thanks to all the BEA staff, from every profession, and to Field Investigators, for their constant commitment to preventing accidents and serious incidents in the future. They make this objective a reality by showing excellence in their actions and by carrying out their duties in the interests of safety.

I hope you enjoy reading this report.

Pierre-Yves Huerre,
BEA Director

BEA





01

Overview of accidents,
investigations initiated in 2024
by the BEA

General context

The obligations of the Member States of the European Union in terms of Civil Aviation safety investigations are defined in European Regulation No. 996/2010 of the European Parliament and of the Council on the investigation and prevention of accidents and incidents in civil aviation.

The general principle of this regulation is that every accident or serious incident in the field of civil aviation shall be the subject of a safety investigation in the Member State in which the accident or serious incident occurred. This requirement applies to all manned and unmanned (drones) aircraft, except those listed in Annex I of Regulation (EU) No. 2018/1139 (the aircraft listed in this Annex are, in particular: microlights, amateur-built aircraft, "historic" aircraft, etc.).

Exemptions are however provided: "the responsible safety investigation authority may decide, taking into account the expected lessons to be drawn for the improvement of aviation safety, not to initiate a safety investigation when an accident or serious incident concerns an unmanned aircraft for which a certificate or declaration is not required [...] or concerns a manned aircraft with a maximum take-off mass less than or equal to 2 250 kg, and where no person has been fatally or severely injured."

Furthermore, Annex 13 of the International Civil Aviation Organization (ICAO) specifies that, when a safety investigation is



Accident to the Robin
DR400 registered
F-BUSU on 27 May 2023
at Laloubère, report
published in March 2024.

conducted by a State (usually the State of Occurrence), the State of the Operator, the State of Registry and the State of Design/Manufacture of the aircraft involved are invited to take part in the investigation by appointing an accredited representative (ACCREP).

In France, the BEA is the authority responsible for safety investigations. Up to the end of 2024, its procedures stipulated that, in addition to the investigations it had an obligation to conduct in accordance with the European regulations, it also investigated the following events, when its resources allowed:

- > reported incidents, which were of particular interest for safety;
- > fatal accidents involving aircraft listed in Annex I of Regulation (EU) No. 2018/1139;

- > accidents involving aircraft weighing less than 2,250 kg, including those where no person was fatally or severely injured;
- > serious incidents and accidents involving drones, including those for which a declaration or a certificate was not required, when these resulted in substantial consequences for other aircraft or for third parties on the ground.

These criteria were assessed at the time of notification. Subsequent developments, in particular the death of an occupant of an aircraft covered by Annex I of European Regulation No. 2018/1139 in the following days, generally did not lead to a reconsideration of the initial decision, mainly because the factual information required for the investigation had not been collected or preserved.

1.2

Accident data and investigations opened

The BEA receives several thousand notifications every year, mainly by telephone and/or e-mail.

The incoming flow of these notifications is processed as follows:

- The operational duty investigator carries out an initial filtering process to select the events likely to meet the criteria for opening an investigation, which are then presented at the daily review.

- During this review, the events selected are studied collectively by investigators and the management team to decide on their classification (accident, serious incident or incident) and their treatment (investigation, collection of additional information, recording in a database or closure without further action).

At the end of this process, in 2024, the BEA processed or classified nearly 1,200 occurrences during the daily reviews, a volume comparable to that of previous years.

1.2.1 Accidents in France in 2024

The data in the table below mainly comes from two sources:

- investigations conducted by the BEA;
- information provided by Field Investigators with respect to "Annex I" aircraft accidents that are not the subject of a BEA investigation.

Accident to the Schleicher ASK21 registered F-CHIN on 10 April 2023 at Sarreguemines, report published in August 2024.



Accidents¹ in France in 2024

COMMERCIAL AIR TRANSPORT



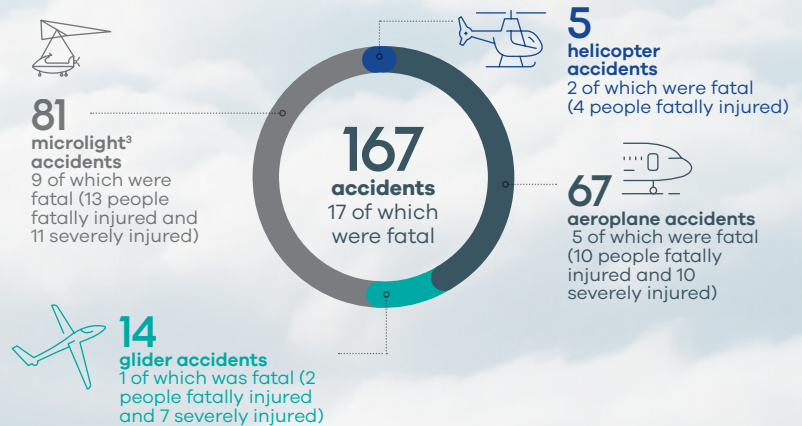
AERIAL WORK / SPECIALISED ACTIVITY²



177
accidents in 2024
18 of which were fatal

30
people fatally
injured in 2024
and 31 severely
injured

GENERAL AVIATION



Note: no accident involving a drone was reported to the BEA in 2024.

The number of accidents recorded in France in 2024 decreased compared with those recorded in previous years (-16%, compared with 2023). The reduction is even more noticeable when considering the number of fatal accidents (-45%) and the number of victims (-42%); however, these year-on-year variations should be interpreted with caution, as they relate to small numbers.

Note: It should be noted that several accidents observed in 2024 occurred in circumstances which suggest that their consequences could have been more severe. This was the case in particular for two mid-air collisions which resulted in substantial damage to the various aircraft involved, but in which none of the 15 people on board were injured.

1. The number of accidents recorded may differ from the number of damaged aircraft or aircraft involved in accidents, in particular because an accident may involve several aircraft.
2. Accidents occurring during the aerial activities listed under GM1 SPO.GEN.005 associated with Regulation (EU) No. 965/2012 are counted under the "Aerial work/Specialised activity" heading even if the flights involved do not formally meet the requirements of PART SPO of this Regulation.
3. Local microlight flights for remuneration are included in the "General aviation" category.

More information about accidents in France in 2024

COMMERCIAL AIR TRANSPORT

Aeroplanes

For aeroplanes operated within a context of commercial air transport, two accidents were recorded:

- > Ground collision between the Airbus A330 registered [C-GTSJ](#) operated by Air Transat while taxiing on a taxiway, and the stopped Airbus A330 registered [F-HHUG](#) operated by Corsair, on 11 September at Paris-Charles de Gaulle. This was the only accident involving a high-capacity aircraft operated in commercial air transport in France in 2024. The accident only resulted in material damage.
- > Accident to the Aero L-39C Albatros registered ES-TLU (aeroplane operated under a commercial air transport certificate) on 22 June at La Roche-sur-Yon: landing with the landing gear retracted, during a thrill-seeking flight to the passenger. The pilot was severely injured. In accordance with its procedures, the BEA did not open an investigation into this non-fatal accident involving an aircraft covered by Annex I of Regulation (EU) No. 2018/1139.

Helicopters

For helicopters operated in commercial air transport, two accidents were recorded:

- > Mid-air collision between the Airbus EC155 registered [F-HEGT](#) operated by Hélicoptère Sécurité and the Nord 1203 registered [F-AYVV](#) on 8 February at Cozy. The aeroplane was substantially damaged during the collision, and the helicopter suffered light damage to the tip of two of the five main rotor blades and the fenestron fairing. Both aircraft managed to land and none of the ten people involved were injured

(two pilots and six passengers in the helicopter, and two people in the light aircraft).

- > Accident to the Airbus H145 registered [F-HSOC](#) on 23 November at Montanel as part of a Helicopter Emergency Medical Service (HEMS) flight: during its landing on an unprepared surface, the tail rotor hit an obstacle. The accident only resulted in material damage.

Balloons

For balloons operated within a context of commercial flights, the accident to the Kubicek BB51 registered [F-HRLY](#), on 2 March at Sallanches, was the only accident recorded. This was a hard landing, in unexpected strengthening wind conditions. Despite the safety position taught by the pilot and implemented at his request, a passenger suffered a broken foot.

Microlights

The BEA is not always able to determine the commercial nature of a microlight flight based on the preliminary information it receives when an accident occurs. In the absence of an investigation into non-fatal accidents, the information may remain unknown to the BEA.

In 2024, the BEA became aware of two accidents involving microlights operated in the context of commercial sightseeing flights, one of which was fatal (accident to the Shark identified [22LE](#) operated by Trégor ULM on 23 June at Saint-Pol-de-Léon, resulting in the fatal injury of both occupants).

SPECIALISED ACTIVITY / AERIAL WORK

For aircraft operated in the context of a specialised activity or aerial work, the following accidents were recorded:

- > One fatal accident: collision of the Fouga Magister registered [F-AZPZ](#) with the surface of the sea during an air show on 16 August near Bormes-les-Mimosas.
- > Two non-fatal accidents involving aeroplanes, during parachute dropping flights. The first occurred to the Cessna 182 registered [D-ELXC](#) on 19 July near Vichy-Charmeil, and the second occurred to the Cessna 208 registered [F-HVPC](#) on 1 August at Vannes.
- > One non-fatal accident involving an amateur-built aeroplane, which occurred on landing at the end of a glider towing flight (this accident was not investigated).
- > One non-fatal helicopter accident: collision of the [F-BXPF](#) with the surface of the water during a mosquito eradication flight on 3 May at Bages pond: the pilot, alone on board, was not injured.

1.2.2 Investigations opened by the BEA in 2024

The BEA opened **95 investigations** in 2024. This is the lowest number recorded in recent years. As an indication, the average number of investigations opened each year over the period 2020-2024 is 120.

Investigations opened by the BEA in 2024, by types of operation



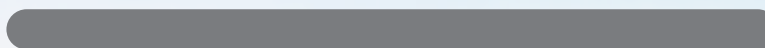
80

accidents

compared with 119 in 2023



4 Commercial air transport



71 General aviation



5 Aerial work / Specialised activity



10

serious incidents

compared with 3 in 2023



6 Commercial air transport

4 General aviation

0 Aerial work / Specialised activity



5

incidents

compared with 2 in 2023



5 Commercial air transport

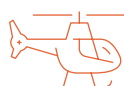
0 General aviation

0 Aerial work / Specialised activity

The number of investigations opened by the BEA indicated above is significantly lower than the number of accidents, due in particular to the fact that "Annex I" non-fatal aircraft accidents are only investigated in certain specific cases.

Investigations opened, by main categories of aircraft

The BEA opened eight investigations into safety events involving aeroplanes weighing more than 5,700 kg: in addition to the above-mentioned collision while taxiing at Paris-Charles de Gaulle ([see paragraph 1.2.1](#)), two serious incidents and five incidents were recorded (see below).



	Fixed-wing aircraft		Rotary-wing aircraft		Drones	Other	Total
	< 5,700 kg Light aeroplanes, gliders and fixed-wing microlights	≥ 5,700 kg High-capacity aeroplanes	< 3,180 kg Light and ultralight helicopters, gyroplanes	≥ 3,180 kg High-capacity helicopters			
Accidents	70	1	5	2	0	2	80
Serious incidents	7	2	0	0	0	1	10
Incidents	0	5	0	0	0	0	5
Total	77	8	5	2	0	3	95

(bottom and top)
 Accident to the Piper
 PA30 registered F-BPIR
 on 4 December 2023 at
 Villejuif, report published
 in November 2024.



More information about opened and delegated investigations

In 2024, the BEA agreed to be delegated an investigation by the Swiss investigation authority (STSB). This investigation related to the accident to the Airbus AS350 B3 registered [HB-ZES](#) on 14 February at Sierre.

More information about coordination with the BEA-É

The BEA regularly coordinates with the BEA-É (Bureau Enquêtes Accidents pour la sécurité de l'aéronautique d'État - State Aviation Accident Investigation Bureau). This coordination covers in particular:

- > events likely to apply to both authorities;

- > events where one authority has to provide technical assistance to the other;
- > actions for cross-training purposes.

For example, in 2024, the BEA integrated a BEA-É investigator into the team investigating the above-mentioned accident to [F-AZPZ](#).

The BEA was also involved in three BEA-É investigations (providing two technical assistance services and one accredited representative for a stakeholder in the civil sector).

More information about investigations into incidents and serious incidents



The number of investigations opened into incidents or serious incidents in 2024 is 15 (compared with 5 in 2023).

Serious incidents within a context of air transport

The following investigations were opened into serious incidents in the field of commercial air transport:

- > Serious incident to the Boeing 737 registered [JT-VKL](#), operated by Air Algérie, and to the Boeing 757 registered [EC-NYM](#), operated by Gestair, on 11 September at Marseille-Provence: clearance given to the 737 to land on runway 31R, then occupied by the 757 awaiting take-off clearance.

- > Serious incident to the ATR 72-600 registered [F-OZKN](#) on 20 December at Ouvéa-Ouloup: the fuselage struck the runway on landing.
- > Serious incident to the Pilatus PC12 registered [F-ONGX](#), operated by St Barth Executive, and to the Britten Norman BN2A registered [PJ-SXM](#), operated by SXM Airways, on 28 December at Saint-Barthélemy: loss of separation between both aeroplanes on approach.
- > Serious incident to the Pilatus PC12 registered [N668TW](#) operated by Tradewind Aviation on 16 January at Saint-Barthélemy: collision with the vegetation on final approach for runway 10.
- > Serious incident to the Cessna 172 R registered [F-HSNO](#) operated by Alpines Airlines on 7 March at Courchevel: take-off from Courchevel mountain airfield's runway occupied by a snow plough.
- > Serious incident to the Kubicek BB142 registered [F-HVIO](#) operated by Montgolfière Sensation on 30 April at Les Rosiers-sur-Loire: collision of the basket with a power line during an aborted landing.

Serious incidents within a context of general aviation

The following investigations were opened into serious incidents within a context of general aviation:

- > Serious incident to the Robin DR400 registered [F-GUXI](#) on 20 January at Saint-Cyr-l'École: on final approach to runway 11L, the aeroplane struck a lorry travelling on a motorway.



Accident to the Robin DR400 registered F-GGJS on 19 May 2023 at Cosne-sur-Loire, report published in March 2024.

- > Serious incident to the Mooney M20J registered [F-HGPR](#) on 6 August at La Rochelle: loss of control during an aborted landing on runway 27.
- > Serious incident to the Robin HR100-250TR registered [F-HALC](#) on 22 January at Montpellier-Méditerranée: retraction of LH main landing gear during landing run.
- > Serious incident to the DR400 registered [F-GYAC](#) on 6 March at Nantes-Atlantique: unexpected engine start during propeller manual rotation by the pilot.

Incidents classified as non-serious, for which the BEA opened an investigation

The BEA opened five investigations into incidents classified as non-serious: all these incidents related to aircraft operated within a context of commercial air transport:

- > Incident to the Embraer ERJ170 registered [F-HBXI](#) operated by HOP! on 11 May at Toulouse: landing with a landing gear unlocked indication.
- > Incident to the Embraer ERJ190 registered [F-HBLJ](#) operated by

HOP! on 5 June at Marseille: loss of separation of the aeroplane on go-around, with a microlight

- > Incident to the Airbus A320-200N registered [EI-NSF](#) operated by Aer Lingus on 20 September en route: radio and transponder failure en route.
- > Incident to the ATR 72-600 registered [F-HBCM](#) operated by Chailair on 21 September at Caen-Carpiquet: take-off with an incorrect centre of gravity.
- > Incident to the Embraer EMB550 registered [G-HARG](#) operated by Centreline on 7 October at Paris-Le Bourget: partial electrical failure during the approach.

More information about different investigation categories managed by the BEA

The BEA adapts its investigative resources and the type of report issued based on the perceived level of risk, the envisaged lessons to be learned and the target public. On this basis, until 2024, the BEA established three categories for investigations and associated reports, based on the criteria detailed below.

The following table shows the breakdown of the investigations opened by the BEA in 2024 based on investigation categories.

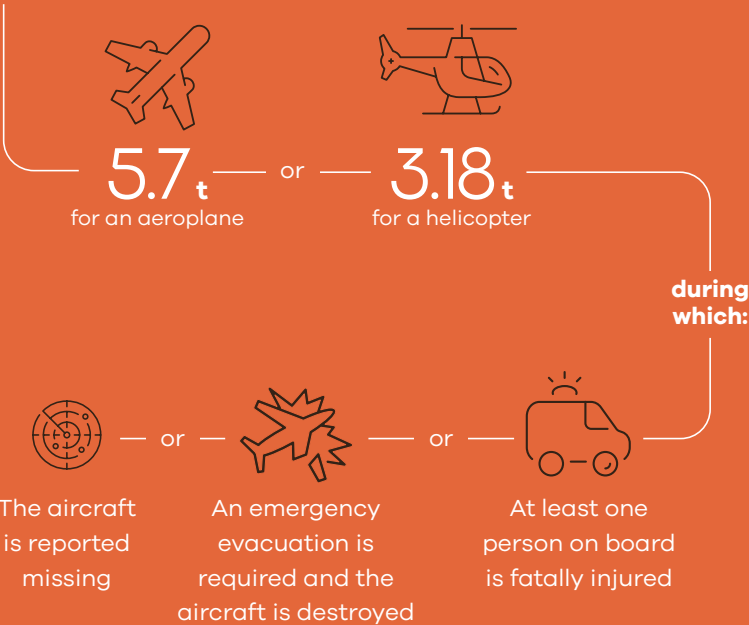


The reduction in the total number of investigations opened in 2024 compared with 2023 is largely due to the reduction in the number of category 3 investigations (-51%).

This substantial reduction must in turn be related to the reduction in the number of accidents observed in general aviation. As mentioned above, these year-on-year reductions must be treated with caution, as they relate to small numbers.

Classification criteria for investigations led by the BEA

> **Category 1 investigation:** investigation requiring several areas of organisational and/or systemic analysis and which leads to the writing of a report using the full structure proposed by ICAO Annex 13. Category 1 investigations generally give rise to safety recommendations. They are “major” investigations into accidents involving an aircraft operated under an air operator’s certificate with a maximum certified take-off weight of more than:



> **Category 2 investigation:** this category is for investigations where the areas of in-depth examination and analysis are limited, giving rise to a “simplified report”: the structure of these reports may differ from the template provided in ICAO Annex 13 in order to adapt to the circumstances of the occurrence and the priorities of the investigation. These investigations apply for all types of operations. They primarily aim to provide operational feedback, but can also lead to the issuing of safety recommendations.

> **Category 3 investigation:** “Desktop” investigation. During these investigations, information is mainly obtained through statements from the parties directly involved. This information is not generally validated by the BEA, and there is no development of an analysis, conclusions or lessons. With this investigation category, the BEA wants above all, to ensure that personal experience is shared throughout the community in question. This investigation category is generally reserved for light aircraft and types of occurrences which, based on past experience, do not lead to serious bodily injury.

1.2.3 Investigations opened by a foreign body and officially notified to the BEA

Foreign investigations opened in 2024 about which the BEA has been officially notified

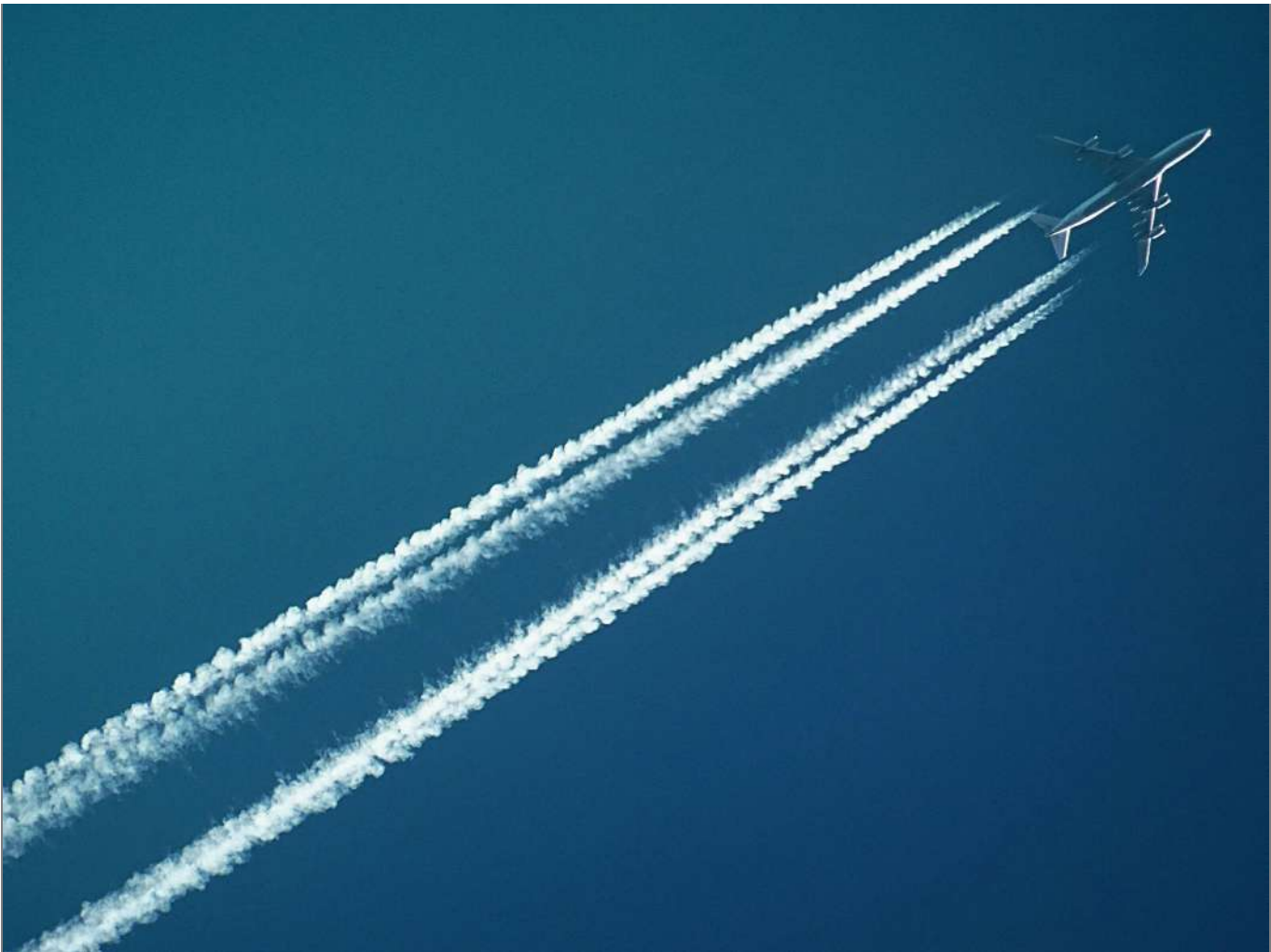
	Commercial air transport	General aviation	Aerial work	State aircraft	Other or undetermined	Total	Reminder of total in 2023
Accidents	43	41	11	8	14	117	109
Serious incidents	92	6	1	1	3	103	90
Incidents	26	0	1	1	1	29	30
Total	161	47	13	10	18	249	229
Reminder of total in 2023	132	38	14	6	39	229	

The number of occurrences for which, in compliance with the criteria of ICAO Annex 13, a foreign authority opened an investigation and notified the BEA, increased by 9% in 2024, compared with 2023. In this respect, the year 2024 is in line with the average figures recorded during the activity resumption years following the COVID-19 health crisis.

The success of the French industry means that accredited representation plays a major role in the activity and operation of the BEA.

For several years now, the BEA has adapted the allocation of its resources to foreign investigations based on the stakes associated

with the reason for the proposed accredited representation. The classification criteria for foreign investigations for which the BEA appoints an accredited representative (ACCREP) are described below.



Classification criteria for investigations opened by a foreign body and notified to the BEA

> Category 1 accredited representations:

These concern accidents or incidents to aeroplanes with a maximum take-off weight of more than 5.7 t where:

- at least one person on board is fatally injured (excluding injuries from natural causes), or
- an emergency evacuation is carried out and the aircraft is destroyed, or the aircraft is reported missing,

Or accidents and incidents to helicopters of more than 3.18 t where:

- at least one person on board is fatally injured (excluding injuries from natural causes), or
- an emergency evacuation is carried out and the aircraft is destroyed, or the aircraft is reported missing.

> Category 3 accredited representations:

These concern accidents and incidents to aeroplanes of French design of less than 2.25 t:

- where the BEA, in theory, does not provide any added value during the investigation,

- with no clear link with the reason for accreditation,
- for which there is no specific request from the authority in charge,
- which would be the subject of BEA Category 3 investigations,
- which are listed in Annex 1,

Or accidents and incidents to aeroplanes of French design of more than 2.25 t:

- where the BEA, in theory, does not provide any added value during the investigation,
- with no clear link with the reason for accreditation,
- for which, in theory, there are no benefits or stakes for the manufacturer and/or the BEA,
- which would not give rise to the opening of a BEA investigation in France,
- for which there is no specific request from the authority in charge,
- for which there is no justified request from the manufacturer,

Or accidents and incidents to helicopters:

- with no victims,
- for which there is no specific request from the authority in charge,
- with no clear link with the reason for accreditation,
- for which there is no justified request from the manufacturer,

Or accidents or incidents involving aircraft equipped with engines of French design or manufacture:

- if no component manufactured by the French manufacturer contributed to the occurrence,
- with no clear link with the reason for accreditation,
- for which there is no justified request from the engine manufacturer.

> Category 2 accredited representations:

These concern aircraft accidents and incidents that do not meet the criteria of category 1 and 3 ACCREP.

The participation of the ACCREP is:

- > active for category 1 ACCREP cases (major event);
- > active depending on the needs of the foreign authority for category 2 ACCREP cases;
- > on standby, pending a request from the foreign authority for category 3 ACCREP cases: this category mainly includes events that occurred to aircraft of French design, for which no safety issues directly related to design characteristics have been identified at first sight.

The following table shows the breakdown of the accredited representations of the BEA in 2024 based on commitment levels (ACCREP categories).

Breakdown of the number of ACCREP in 2024, by category:



2024 was marked by five category 1 ACCREPs. These concerned the following accidents:

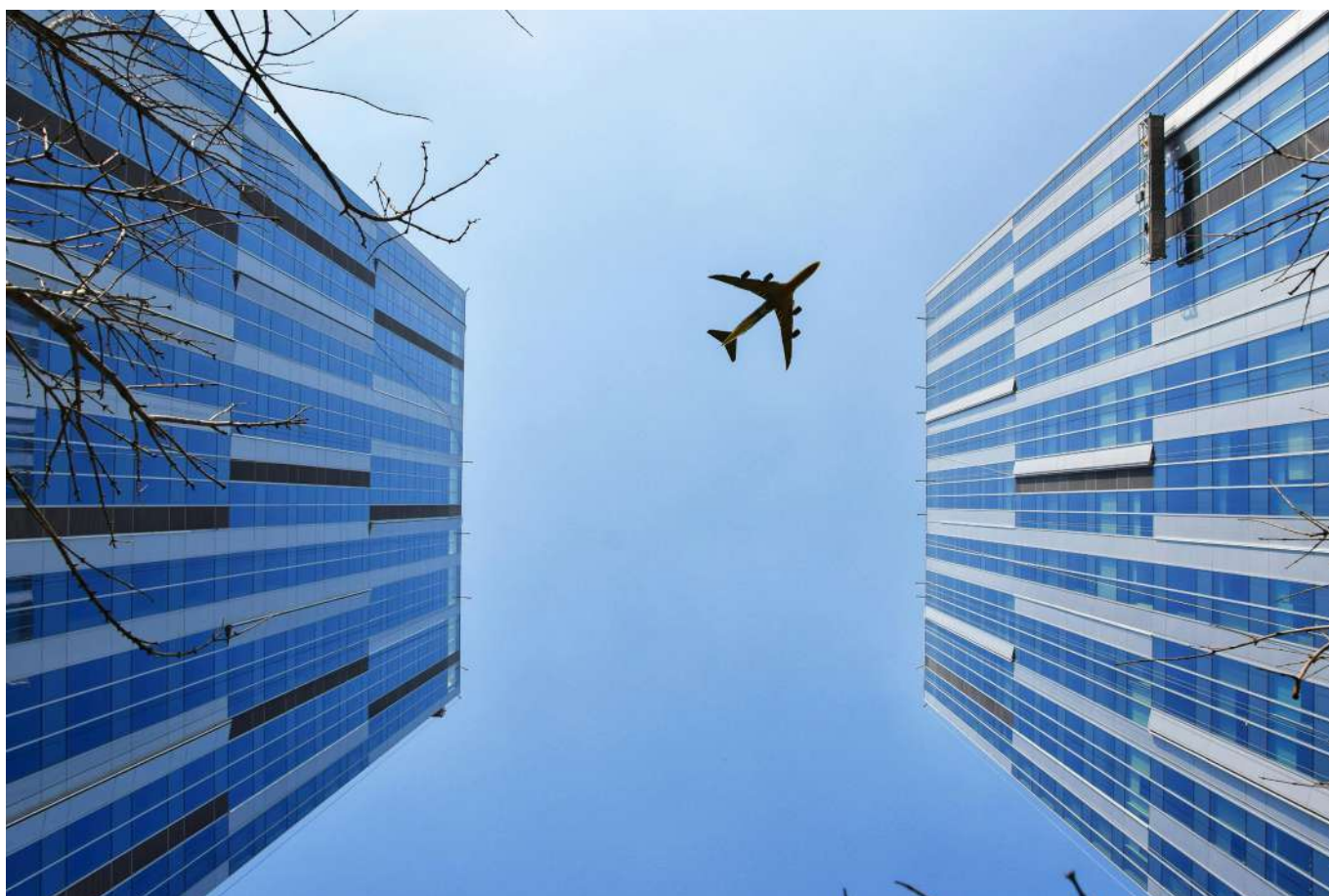
- > Accident to the landing Airbus A350-900 registered [JA13XJ](#) operated by Japan Airlines and to the De Havilland DHC8 registered [JA722A](#) on 2 January at Tokyo-Haneda (Japan): collision between an A350 on landing and a DHC8 lined up on the runway. Four BEA investigators were dispatched to the accident site, accompanied by Airbus and EASA technical advisers. The BEA and Airbus also received investigators from the Japanese authority during the year.
- > Accident to the ATR 72-500 registered [PS-VPB](#) operated by VoePass on 9 August at Vinhedo (Brazil): loss of control en route and collision with the ground of an ATR72. Five BEA investigators were dispatched to the site, accompanied by ATR and EASA technical advisers. The BEA also received the Brazilian

investigation team for the read-out of the recorders and several computers.

- > Accident to the ATR 42-500 registered [PK-YSP](#) operated by Trigana Air Service on 9 September at Stevanus-Rumbewas (Indonesia): runway veer-off of an ATR42. Two BEA investigators went to the headquarters of the Indonesian investigation authority (KNKT), accompanied by the manufacturer's technical advisers.
- > Accident to the Airbus AS332L1 registered [N368EV](#) on 22 November near Menidee (Australia): collision with the ground of an AS332, possibly following a technical failure. Two BEA investigators, accompanied by an Airbus technical adviser, went to the headquarters of the Australian investigation authority (ATSB) at a later stage for a first examination of the items of interest pending their dispatch to France.
- > Accident to the Boeing 737-800

registered [HL8088](#) operated by Jeju Air on 29 December at Muan (South Korea): collision of a 737 with an obstacle at the end of the runway following an emergency landing with the landing gears retracted. A protocol with the United States investigation authority (NTSB) stipulates that, by default, the accredited representation for CFM56 engines (of French-American design and manufacture) is ensured by the accredited representative of the State of manufacture of the aeroplane. However, based on the initial information gathered and the identification of the best means to examine the engine components, the BEA decided, in coordination with its Korean and American counterparts, to appoint an accredited representative.

The distribution between categories of ACCREP cases can change depending on the requests of foreign safety investigation authorities.



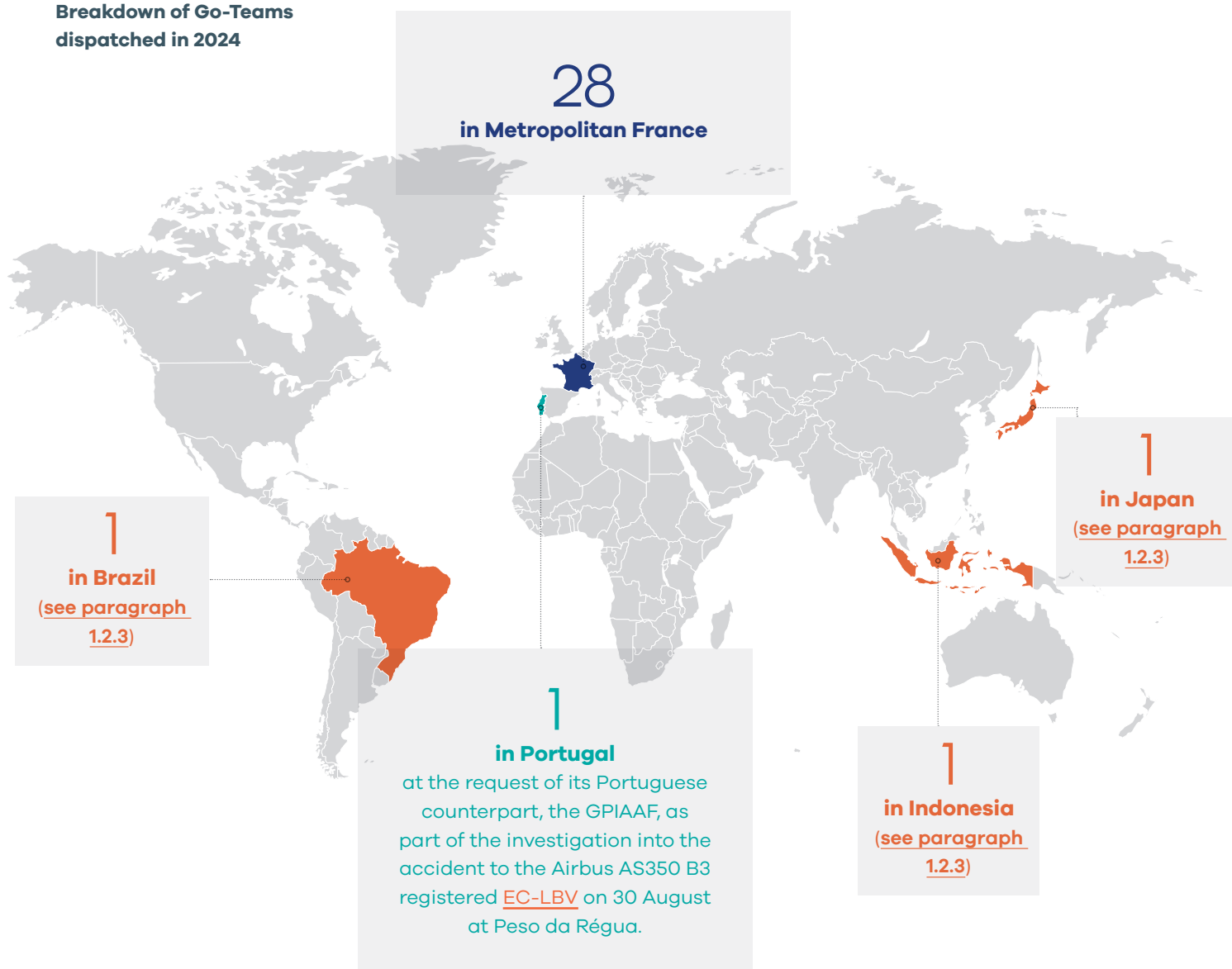
1.2.4 Go-Teams

In the case of a particularly important occurrence (in France or abroad), the BEA sends a team of investigators to the site without delay. The size and composition of this "Go-Team" are defined on a case-by-case basis.



32
Go-Teams
dispatched in 2024

Breakdown of Go-Teams dispatched in 2024



When there is an interval between the notification date and the dispatch of the investigators, such as the dispatch to Australia (see paragraph 1.2.3), it is not counted as a Go-Team.

1.2.5 Field Investigators

The BEA uses the services of Field Investigators, who are French civil aviation authority (DGAC) staff, mostly posted at the headquarters of the different Inter-Regional divisions, or in the French civil aviation safety directorate (DSAC) Delegations, and in overseas services. Some Field Investigators also come from the French Air Navigation Service Provider (DSNA).

These Field Investigators are trained by the BEA and have been approved by the BEA Director in accordance with the provisions of the Code of Transport.

On request by the BEA and under its authority, they carry out the initial investigation actions (often on site) immediately after the accident and exclusively on French territory. They are mainly called on for general aviation occurrences, but sometimes they are also called on for commercial air transport occurrences, particularly in overseas territories.

According to the occurrence, BEA investigators will join them on-site, or not. In all cases, the rest of the investigation is carried out by BEA investigators. One hundred and thirty-eight Field Investigators are currently available.

Maintaining the number and skills of Field Investigators is a major challenge for the BEA in order to ensure rapid and effective operations France-wide and all year round.

Nearly 40 operations by Field Investigators were recorded in 2024.

Experiment with the FFA

In anticipation of the discontinuation of category 3 investigations in 2025, an experiment was conducted in 2024 in collaboration with the French Aeronautical Federation (FFA).

In this context, the FFA formed a team of four people from the Safety Commission, who took the "Basic Investigation Techniques" training provided by the BEA and were granted the "Field Investigator" status by the BEA Director for the duration of the experiment.

When the BEA staff on duty was informed of an accident involving an FFA-affiliated flying club aeroplane and meeting the criteria for category 3 investigations, the staff coordinated with the FFA's dedicated team. A Field Investigator from the FFA could then take charge of gathering information from the involved stakeholders and drafting a report, applying the format historically used by the BEA. This draft report was then validated by an experienced BEA investigator before being published on the BEA's website.

Not only did this experiment reinforce the FFA's Safety Commission in its intention and ability to implement a simplified investigation methodology, but it also led it to define an appropriate procedure to treat category 3 accidents when the BEA confirms discontinuing investigations in this category, in 2025.



02

Investigations closed
reports published in 2024

2.1

Investigations closed and investigation reports published

European Regulation No. 996/2010 specifies that each safety investigation must be concluded with a report in a format suitable for the type of occurrence. As described in [paragraph 1.2.2](#), the BEA has defined three investigation categories.

In 2024, the BEA closed 119 investigations and published as many final reports, broken down as shown in the following table.



119
final reports
published

Number of reports published by the BEA in 2024

	Category 1	Category 2	Category 3	Total
Commercial air transport	1	11	0	12
<i>including reports with safety recommendations</i>	1	2	0	3
Aerial work / Specialised activity	0	5	4	9
<i>including reports with safety recommendations</i>	0	0	0	0
General aviation	0	69	29	98
<i>including reports with safety recommendations</i>	0	5	0	5
Total	1	85	33	119
<i>including reports with safety recommendations</i>	1	7	0	8

Note: in some safety investigations, defining the type of operation turned out to be difficult. This was the case, for example, with the accident to the Piper PA28 registered [F-HDYN](#) on 8 July 2023 at Lognes-Emerainville.

Breakdown by report format

Category 1 investigations generally give rise to ICAO format reports. Category 2 investigations are the subject of simplified investigation reports or ICAO format reports whilst category 3 investigation reports are systematically published directly on the BEA website and are generally limited to the elements gathered.

2
ICAO
reports

33
Simplified investigation
reports limited
to statements

84
Simplified investigation
reports with analysis
and conclusion

2.2

More information about the BEA's production and performance

2.2.1 More information about the year of the investigations closed and the stock of investigations

The BEA published 119 final reports in 2024 (compared with 144 in 2023 and 129 in 2022).

The following table indicates, for each category, the year of the investigations closed in 2024.

A total of 91 investigations were open on 31 December 2024, down 22% on the previous year. Of these investigations, 26 were more than one year old (compared with 37 in 2023 and 34 in 2022). The following table indicates, for each category, the age of these investigations.

Year investigations were opened for all reports published by the BEA in 2024



Number of years since the BEA investigations were opened, on 31 December 2024

	Category 1	Category 2	Category 3	Total
less than one year	0	60	5	65
one to two years	0	19	0	19
more than two years	1	6	0	7
Total	1	85	5	91



Accident to the Cessna 206 registered 9H-MDJ on 19 December 2022 at Roura, report published in July 2024.

2.2.2 More information about the “investigations closed in less than one year” performance indicator

Regulation (EU) No. 996/2010 specifies that an investigation report should be published rapidly and, if possible, within 12 months of the date of the occurrence. For the BEA, this duration of 12 months for each investigation is thus a general objective and a monitoring indicator. This indicator is defined as the percentage of investigations closed within one year among the investigations opened the previous year.

In 2024, the global result of this indicator was 73%, which is the best result achieved by the BEA.

It can be seen that if a distinction is made between investigation categories (as defined in [paragraph 1.2.2](#)), the indicator varies substantially, as shown in the following table: the volume of factual items of information to be obtained, the time spent collecting and then analysing this information, the need to conduct complementary and potentially time-consuming work, and the duration of validation and consultation processes, may widely vary depending on these investigation categories. In addition, issuing recommendations (naturally

more frequent for category 2 investigations, and especially for category 1) is - except in the case of urgent recommendations - a demanding process with various validation phases, which may substantially extend the duration of investigations.

Breakdown of the “investigations closed in less than one year” indicator

	Category 1	Category 2	Category 3	Total
Investigations opened in 2024	0	72	51	123
Closed in less than one year	-	39	51	90
2024 indicator	-	54%	100%	73%

The BEA has set itself the target of closing 80% of its investigations in less than one year. More precisely, this target is broken down as follows:

- > 100% of category 3 investigation reports should be published in less than one year;
- > 70% of category 2 investigation reports should be published in less than one year.

In addition, the BEA has set itself the target of closing all category 2 investigations within two years (for information, on 31 December 2024, the number of category 2 investigations open for longer than two years was six, compared with seven at the end of the previous two periods).

Note: as of 1 January 2025, the BEA will implement a new investigation policy. This implies the discontinuation of systematic investigations into accidents which, until 2024, gave rise to a category 3 investigation. From 2025, this will result in the removal of the associated sub-indicator. One of the BEA's objectives is to redispach its resources to investigations that are expected to better improve safety. In particular, the BEA aims to increase the number of investigations into commercial air transport incidents. By removing the sub-indicator relating to category 3 investigations, the overall indicator will be downgraded from 2025. The BEA will adjust the target accordingly, so that it corresponds approximately to the sub-indicator for category 2 investigations.

2.2.3 Analysis of the BEA's activity in 2024

Generally, the BEA's activity for a given year largely depends on the number of investigations involving high-capacity aeroplanes operated within the context of commercial air transport, opened in previous years. Due to the often-high number of areas of analysis, and the depth of these analyses, these investigations mobilise a lot of cross-functional resources for long periods of time.

In 2024, the BEA simultaneously managed to:

- > improve the production of investigation reports on recent occurrences, as reflected in the performance indicator result ([see paragraph 2.2.2](#));
- > reduce the stock of old investigations ([see paragraph 2.2.1](#)).

This twofold dynamic and the ensuing outcomes reinforce the BEA's ability to serenely absorb the opening & management of a long, large-scale investigation, where necessary. These positive outcomes were achieved despite the high number of investigations opened by the BEA into occurrences involving aircraft operated for commercial air transport ([see paragraph 1.2.2](#)) and the number of category 1 ACCREPs appointed during the year ([see paragraph 1.2.3](#)). The following factors contributed to these achievements:

- > the continuous improvement of the BEA's investigation methods and processes;
- > the recruitment of new investigators in 2023 and 2024, and the delivery of training courses which enabled them to

take up their duties quickly and efficiently;

- > the absence of a major investigation in France for many years;
- > the number and nature of investigations opened in 2023, which accounted for most of the 2024 production.

Even though the BEA takes provisions to handle the incoming flow of investigations, its overall production remains subject to the possible occurrence of a major event in France, or to the accumulation of large-scale events abroad for which the BEA would act as an accredited representative. Faced with this possibility, the BEA prepared a continuity plan in order to anticipate the need for temporary changes to its activities and operation.



03

General considerations
on air safety
in France in 2024

3.1

Commercial air transport

3.1.1 Safety promotion

In 2024, the BEA created new pages on its website for operators of commercial air transport aeroplanes, and in particular for people responsible for flight safety. These pages provide these users with a new access mode based on topics. Here are the first four topics developed:

- > management of the aeroplane's energy;
- > turbulence;
- > losses of separation, in flight or on the runway;
- > altimeter setting errors.

To illustrate these topics, the BEA relies not only on the investigations it has conducted in recent years, but also on a number of investigations conducted by its counterparts, during which it acted as an accredited representative. This point is also part of an initiative to make better use of the accredited representation activity, which constantly mobilises many of the BEA's resources.

Also in 2024, the BEA started to add summary sheets to its published investigation reports (into commercial air transport occurrences) so that flight safety managers can quickly identify the key topics highlighted by the BEA.

To explain these variations and give coordination with flight safety managers a new boost, the BEA prepared a forum with them at the end of 2024, that it held in early 2025. During this one-day forum, the BEA received some sixty people representing twenty-two operators.

3.1.2 Commercial air transport accidents

The only accident involving a high-capacity aircraft operated for commercial air transport that occurred in France in 2024 was the collision between [C-GTSJ](#) and [F-HHUG](#) (see paragraph 1.2.1). The accident only resulted in material damage.

Moreover, the BEA is the accredited representative for two investigations into accidents occurred in 2024 that involve French commercial air transport operators:

- > Accident to the Airbus A350-900 registered [F-HTYH](#) operated by Air France on 21 January at Toronto (Canada): tailstrike with the runway during an aborted landing.
- > Accident to the Airbus A330-200 registered [F-GZCL](#) operated by Air France on 31 May in N'Djamena (Chad): movement of the parked aeroplane under the effect of the wind and collision with a service vehicle.

3.1.3 Commercial air transport incidents and serious incidents

Of the main incidents and serious incidents involving aircraft operated in commercial air transport, of particular note is the incident to [7T-VKL](#), the pilot of which was given clearance to land by the controller on a runway occupied by [EC-NYM](#), on 11 September at Marseille-Provence (see paragraph 1.2.2). This event raises a number of questions, including: to maintain air traffic controllers' situational awareness?

- > Which systems are used to detect and recover from this type of situation?
- > How does the DSNA manage the incursion risk?

This type of event echoes the reflections undertaken internationally, including in Europe, following the runway collisions at Lima (Peru), on 18 November 2022, and at Tokyo-Haneda, on 2 January 2024 (see paragraph 1.2.3).



3.2

General aviation

3.2.1 Overview of fatal accidents for general aviation - All types of aircraft categories

2024 was marked by a much lower number of fatal accidents and victims in general aviation than the figures observed in previous years. This result represents a break with the relative stability seen between 2020 and 2023.

It appears that the number of flights recorded by flying clubs fell sharply in 2024, implying less exposure. Moreover, these variations relate to small numbers and may therefore be subject to statistical changes. In this respect, considering their circumstances or the material damage observed, several accidents that occurred in 2024 suggest that much more severe physical consequences could have been recorded. These accidents included the following:

- > Mid-air collision between [F-HEGT](#) and [F-AYVV](#) on 8 February 2024 at Cozy ([see paragraph 1.2.1](#)).

- > Mid-air collision between the Robin DR400 registered [F-GLDN](#) and a microlight on 29 November near Lunéville.
- > Accident to the Cessna C340 registered [N340GJ](#) on 2 December at Pernand-Vergelesses.

The fall in the number of fatal accidents can be seen in particular with aeroplanes ([see paragraph 3.2.2](#)) and microlights ([see paragraph 3.2.3](#)). It is 50% for each of these two aircraft categories. Since 2020, the number of fatal glider and helicopter accidents has remained between one and two: two fatal helicopter accidents and one fatal glider accident were recorded:

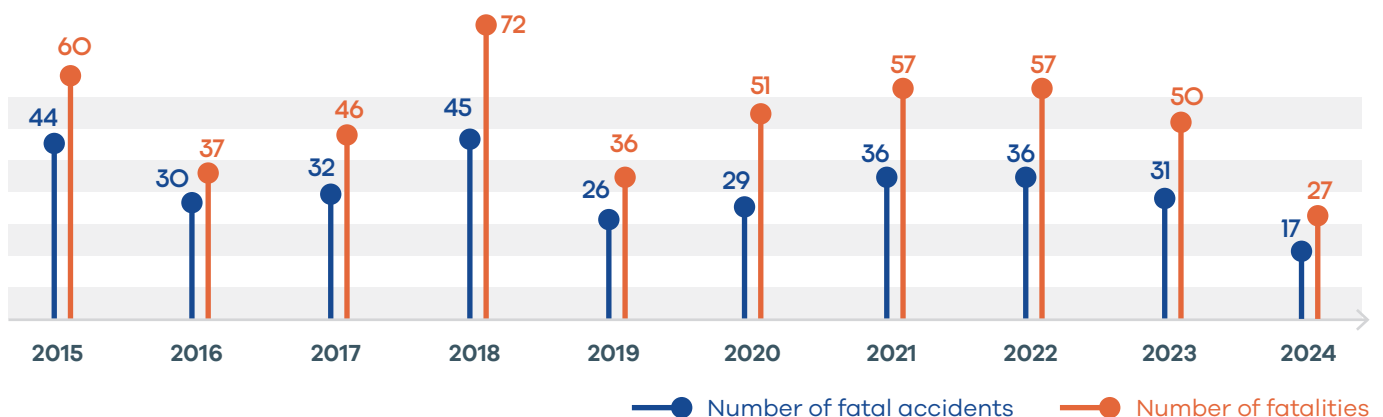
- > Collision of the Robinson R22 registered [F-GJYB](#) with the surface of the water, shortly after take-off, on 11 January at Cannes.

- > Collision of the Bell 505 registered [T7-VIT](#) with the ground, on 26 June at Saint-Raphaël.
- > Collision of the Schempp Hirth Nimbus 4DLM registered [D-KXXY](#) with the terrain, on 10 July at Vars.

It can be noted that no fatal accident involving a balloon has been recorded in France since 2019 (for all types of operations).

For several years, at the start of each year, the BEA publishes [a summary of the safety lessons arising from the reports published the previous year, by aircraft category](#), for general aviation. These summaries provide qualitative information that usefully supplement the preliminary information that may be provided within the context of this activity report.

Variation in fatal general aviation accidents (all aircraft categories) over the 2015-2024 period





Accident to the
Robin DR400
registered F-GSBN
on 14 June 2024
at Chartres.

3.2.2 Overview of fatal accidents for general aviation - Aeroplanes

With five fatal accidents resulting in the deaths of ten people, 2024 was one of the three less lethal years of the last decade as regards aviation accidents involving aeroplanes.

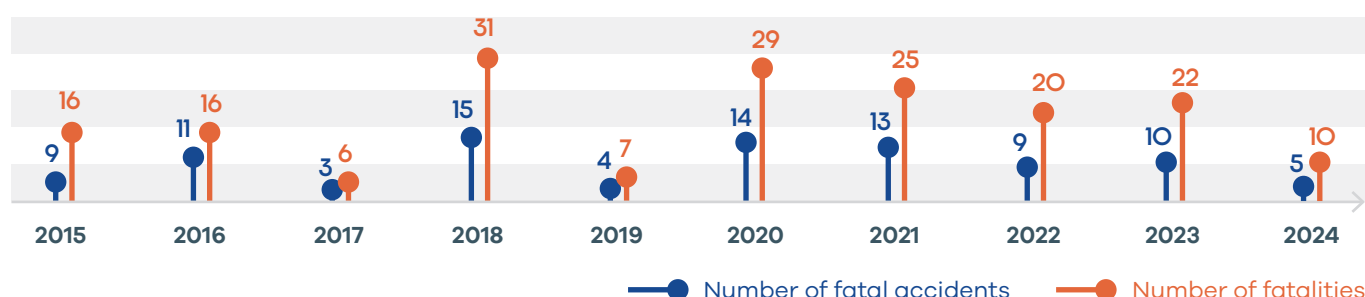
The small number of accidents in this category and the preliminary data collected on them for now do not enable us to identify common topics.

The following information was reported:

- > At least one accident occurred following a reduction in engine power shortly after take-off: although the circumstances of the accident appeared to be favourable for the pilot to survive, the latter, who was alone on board, did not have his seatbelt fastened and died.

- > One accident occurred shortly after take-off in adverse weather conditions.
- > Accident to the Bristell B23 registered [OE-AMK](#) on 9 May at Challes-les-Eaux: once again, this accident highlights the risks associated with coactivity at some aerodromes: the pilot took off while a glider was being winched, he lost control of the aeroplane after the latter struck the winch cable.

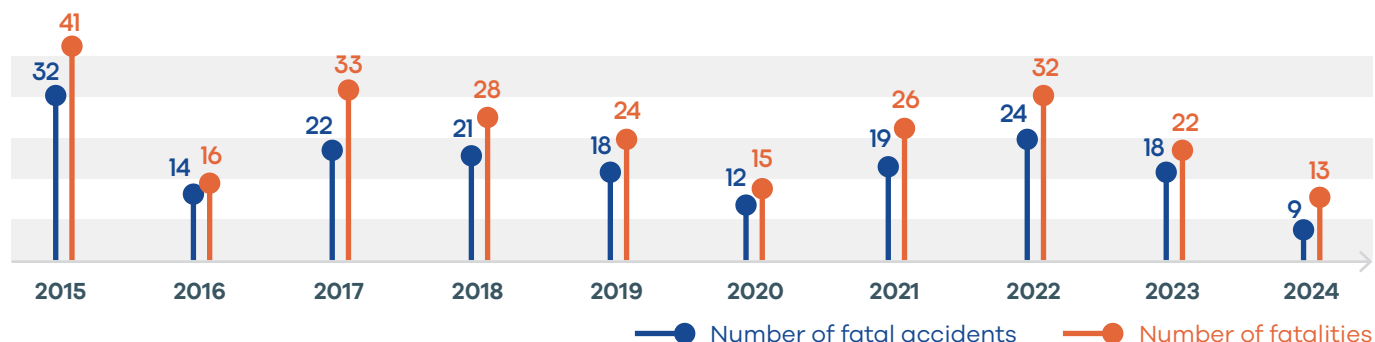
Variation in fatal general aviation accidents (aeroplanes only) over the 2015-2024 period



3.2.3 Overview of fatal accidents for general aviation - Microlights

The number of fatal microlight accidents recorded in 2024 was the lowest in the last decade.

Variation in fatal general aviation accidents (microlights only) over the 2015-2024 period



Only two classes of microlights were involved in fatal accidents in 2024:

- > class 1 (paramotor), for which three fatal accidents⁴ were recorded;
- > class 3 (fixed-wing), for which six fatal accidents were recorded.

These accidents included in particular:

- > one accident during a sightseeing flight for remuneration in adverse weather conditions;
- > the failure in flight of an amateur-built microlight.

Finally, it should be noted that for half of the fatal microlight accidents, the information already gathered tends to indicate a loss of control on the part of the pilot.



Accident to the Cessna 210 registered N5767J in a field near Colmar on 25 July 2024

4. The BEA did not open an investigation into two fatal paramotor accidents that occurred in 2024.

04

**Safety
recommendations**

4.]

General context

ICAO Annex 13 (13th edition, July 2024) defines a safety recommendation as "a proposal of an accident investigation authority based on information derived from an investigation. The intended purpose of a safety recommendation is the prevention of accidents or incidents [...]. It, in no case, has the purpose of creating a presumption of blame or liability for an accident or incident". In addition to safety recommendations arising from accident and incident investigations, safety recommendations may result from diverse sources, including safety studies.

The BEA sends its recommendations to a variety of recipients, such as authorities, manufacturers, operators or air navigation service providers. They must relate to the actions to be taken to prevent occurrences likely to arise in similar circumstances.

Follow-up of safety recommendations

The provisions of European Regulation (EU) No. 996/2010 require, for Member States, that recipients of safety recommendations acknowledge receipt and inform

the issuing authority, responsible for investigations, of the measures taken (or under consideration, where applicable), of the deadline required to implement them, and, if no measure is taken, of the reasons for not taking measures.

The recipient's response must be addressed to the issuing authority within 90 days of receipt of the Safety Recommendation letter.

The issuing investigation authority is obliged to inform the recipient of its opinion on the response received within 60 days of receipt of the response.

In addition to these regulatory obligations, the BEA follows up each recommendation, which may lead to discussions with the recipient, until the decision to close the file is taken. The time between issuing a recommendation and closure of its follow-up file varies, ranging from a few months to several years. Depending on the situation, the follow-up file may be closed on a note of agreement or disagreement with the recipient.

Recommendations issued by European Union Member States, as well as those issued by non-EU States to an EU entity, are recorded and followed up via a European platform called SRIS2 (Safety Recommendation Information System 2) available at <https://sris.aviationreporting.eu/safety-recommendations>.





4.2

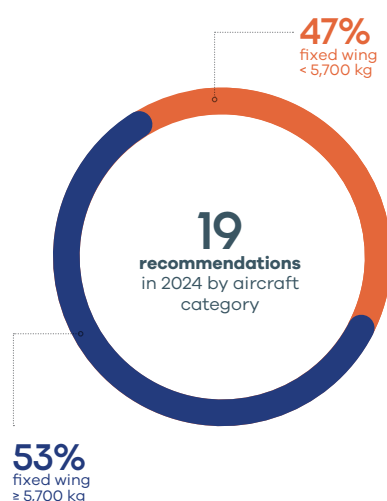
Safety recommendations issued



Breakdown by aircraft category

These recommendations were issued as part of eight investigations into accidents or incidents. The breakdown by category of aircraft involved is as follows:

Aircraft category	Safety recommendations issued
Fixed-wing < 5,700 kg	9
Fixed-wing ≥ 5,700 kg	10
Rotary wing < 3,180 kg	0
Rotary wing ≥ 3,180 kg	0
Drones	0
Other	0

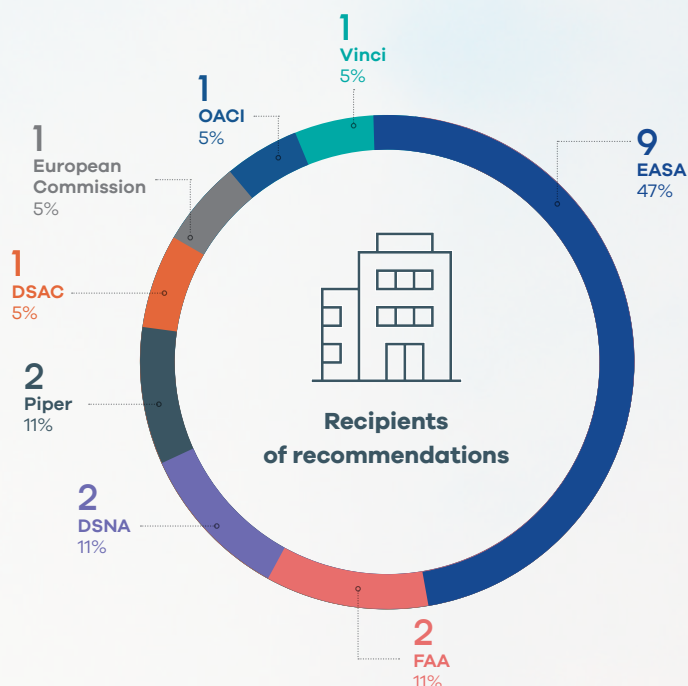


Breakdown by recipient

Eight entities received safety recommendations.

EASA received nine of these recommendations, representing 47% of the total number of recommendations issued by the BEA in 2024.

Note: For each recipient, the pie chart gives the total number of recommendations issued by the BEA.



Breakdown by type of operation

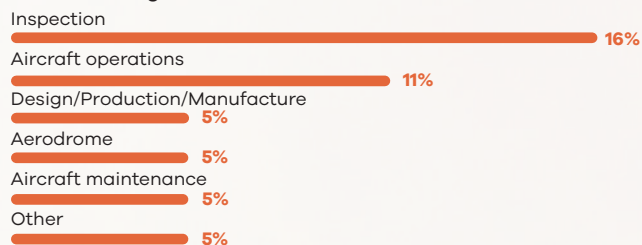
The breakdown by type of operation is as follows:

- > ten recommendations were issued in the context of investigations into aircraft used in commercial operations;
- > nine recommendations were issued in the context of investigations into aircraft used in non-commercial operations;
- > no recommendations were issued in the context of investigations into aircraft operated in aerial work.

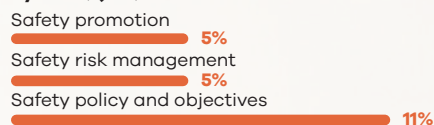
Breakdown of recommendations by topic

The safety recommendations issued relate to 13 topics.

Procedures/Regulations



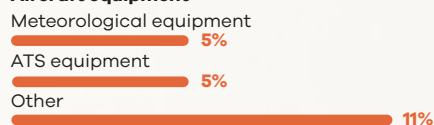
Safety Management System (SMS)/Quality Management System (QMS)



Staff



Aircraft equipment





Review of BEA investigation reports published in 2024 including safety recommendations

Eight reports published in 2024 contained safety recommendations.
They concerned the following occurrences:

COMMERCIAL OPERATIONS

Registration	Occurrences	Recommendation title
<u>F-GLNH</u>	Hardness in elevator control and jamming of elevator trim en route DSAC (FRAN-2024-001) FAA (FRAN-2024-002) EASA (FRAN-2024-003)	The BEA recommends that: > the DSAC ensure that the risk of icing jamming the longitudinal control system is suitably taken into account in the safety management systems of Beech 1900 French operators and that, based on the analysis carried out, the corresponding appropriate measures are implemented with the crews; > the FAA review the analysis of in-service events related to in-flight cases of ice totally or partially jamming controls on the Beech 1900 and ensure that Textron Aviation propose appropriate corrective measures; > EASA ensure that the manufacturer and the FAA are well informed of the occurrences in Europe involving European operators, including the occurrences identified in this report, that it is informed of the analysis made of these occurrences, of the actions taken by the manufacturer and the FAA, and that it draw the consequences in the event of no measures or insufficient measures being taken.
<u>9H-EMU</u>	Transmission of incorrect altimeter setting (QNH) by air traffic service, near-collision with ground during satellite approach procedure with barometric vertical guidance ICAO (FRAN-2024-006) European Commission (FRAN-2024-007) EASA (FRAN-2024-008) (FRAN-2024-009) DSNA (FRAN-2024-010) (FRAN-2024-011)	The BEA recommends that: > ICAO, in collaboration with the manufacturers, authorities and operators, carry out an overall reassessment of the CFIT risk and the associated mitigation measures, in connection with the threat of an incorrect altimeter setting for Baro-VNAV approach operations. These measures could consist of updating the standards and recommended practices and associated documents and defining incentives, or even stipulations, to ensure the development of new safety barriers or the improvement of existing ones; > the European Commission, in collaboration with EASA, analyse and reassess the risks associated with the changes induced by the IR-PBN regulation 2018/1048 and in particular those linked to the use of an incorrect altimeter setting during a barometric approach, and take appropriate measures to maintain the targeted level of safety of final approach operations in Europe in 2030; > EASA require that air traffic control units can systematically detect an incorrect altimeter setting, in particular in the towers and approach units and define the associated phraseology for the air traffic controllers;

- > EASA, in coordination with the FAA and RTCA, study the revision of the Minimum Operational Performance Specifications (MOPS) applicable to TAWS for Premature Descent Alerts (PDA), in order to take into account at least a standard 3° vertical profile offset by around 280 ft to the published vertical profile, representing an error of 10 hPa on a barometric approach;
- > the DSNA ensure that, at national level, the continuation training of air traffic controllers guarantees that they master the emergency procedure relating to a MSAW alert;
- > the DSNA introduce methods or tools for the objective assessment of air traffic controllers' on-the-job work for the purpose of improving the safety management system.

F-GZHA

Late flare, hard bounced landing, in instruction

Vinci
(FRAN-2024-019)

The BEA recommends that:

- > the airport operator, Vinci, in coordination with the AIS, include the non-conformities identified for the approach and runway in the AIP.

NON-COMMERCIAL OPERATIONS

Registration

Occurrences

Recommendation title

F-HHOP

Rupture of left flap control, loss of control during approach, collision with ground

EASA
(FRAN-2024-004)
(FRAN-2024-005)

The BEA recommends that:

- > EASA ensure that Issoire Aviation carry out the relevant examinations of the collected screws, and analyses of the results in order to determine whether or not the risk of failure persists, and impose new preventive measures if these prove necessary;
- > EASA ensure that Issoire Aviation develop a robust solution for the installation of an ELT and its accessories on board APMs and that this solution is also implemented on the aeroplanes already in service.

HB-PNP

In-flight fire, emergency landing

PIPER
(FRAN-2024-015)
(FRAN-2024-016)

EASA
(FRAN-2024-017)

The BEA recommends that:

- > Piper implement a maintenance procedure to ensure that the diode device insulating washers on aeroplanes equipped with such a device perform their insulating role throughout their life cycle;
- > Piper assess the need to replace the ABS cover with another system made of a material that limits the risk of a fire spreading;
- > EASA, in coordination with the FAA, ensure that the risk of fire following a short-circuit at the diode device attaching points is controlled by aircraft manufacturers using a diode device similar to that on HB-PNP.

N9190X

Stall on short final, hard landing, during a passenger transport flight for remuneration

EASA
(FRAN-2024-014)

The BEA recommends that:

- > EASA establish regulatory requirements in order to guarantee the safety of passengers carried on-demand for remuneration outside commercial air transport operations (Part CAT of European regulation AIR OPS).

F-0000

Failure of an aileron control cable fitting in climb

FAA
(FRAN-2024-012)

EASA
(FRAN-2024-013)

The BEA recommends that:

- > the FAA identify all aeroplane types likely to be equipped with flight control cable attach fittings made of AISI 303 Se stainless steel and, for those, impose appropriate corrective actions;
- > EASA identify all aeroplane types operated by the Member States likely to be equipped with flight control cable attach fittings made of AISI 303 Se stainless steel and, for those, impose appropriate corrective actions, where appropriate in coordination with primary certification authorities.

F-CVAS

Engine failure during self-launch take-off, loss of control in initial climb, collision with ground

EASA
(FRAN-2024-018)

The BEA recommends that:

- > EASA, in coordination with the manufacturers, Schempp Hirth and Rotax, clarify the situation and status of aircraft and engines whose type certificates are still valid, but for which spare parts are no longer available.



4.3

Follow-up of safety recommendations

Follow-up of recommendations issued in 2024

As regards the follow-up to the 19 recommendations issued by the BEA in 2024:

- > two recommendations received a response from the recipient, with a "favourable" opinion from the BEA, and their follow-up files were closed;
- > two recommendations received a response from the recipient, with a "favourable" opinion from the BEA, but their follow-up files were kept open to know about the progress status of the measures taken by the recipient;
- > seven recommendations received a response from the

recipient indicating that action was underway, for which the BEA reserved its opinion and kept the follow-up file open;

- > on the date this report was drafted, eight recommendations had not received a response from the recipient.

Note: for recommendations issued at the end of 2024, the deadline for the recipient to respond, set at three months, may not have expired on the date this report was drafted.

Follow-up of recommendations issued before 2024

In 2024, the BEA also received responses and inputs from the recipients concerning 31 safety recommendations it had issued in the previous years. As regards the follow-up to these recommendations:

- > four recommendations received a "favourable" opinion from the BEA, and their follow-up files were closed;
- > eight recommendations received a "favourable" opinion from the BEA, but their follow-up files were kept open to be able to monitor the progress of the measures taken;
- > ten recommendations received a reserved opinion from the BEA and their follow-up files were kept open, pending actions to be taken;
- > one recommendation received an "unfavourable" opinion from the BEA, and their follow-up files were closed;
- > eight recommendations had previously received a "favourable" opinion from the BEA, and their follow-up files had already been closed (the "favourable" opinion

was maintained for all of these recommendations and their follow-up files were not reopened).

[Accident to the Socata TB10 registered F-GJXO on 4 March 2024 at Béziers, report published in June 2024.](#)



It should be noted that three of these responses concerned the recommendations made to EASA as part of the "[Oxygen fire in cockpit study](#)" safety study published in 2023. Their follow-up files are still open.

05

**Activities
of the laboratory**
(Engineering department)

5.1

Overview of Engineering department activity in 2024

The Engineering department's role is to carry out various types of examinations to provide the objective information required for investigations. It comprises two sections:

- > the Flight recorders and avionic systems section (PESA), which examines various electronic systems (onboard recorders, avionics systems, ATM recording systems, electronic equipment carried onboard or used on the ground, smartphones, cameras) to retrieve all usable data and analyse it for investigative purposes;
- > the Structure, equipment and engines section (PSEM), which examines the wreckages or parts of wreckages, aircraft parts (engines, propellers, equipment, etc.) and fluids (fuels, oils, hydraulic fluids)

to establish the factual data required for investigations.

The examinations performed by the Engineering department may be carried out:

- > as part of investigations conducted by the BEA;
- > as part of investigations conducted by foreign investigation authorities, for which the BEA appointed an ACCREP ([see paragraph 1.1](#));
- > as part of investigations conducted by foreign investigation authorities, for which the BEA did not appoint an ACCREP: the BEA then acts as a technical assistance provider for the third-party country.

In 2024, a total of 535 examinations of all types were conducted, representing an increase in



535

examinations conducted in 2024

activity of more than 20% compared with the previous year. The vast majority of these examinations are carried out by the Engineering department investigators, but some are carried out in external (private or public) partner centres under their supervision: this is the case, for example, with fuel and oil analyses, as well as with the examinations carried out on specific equipment or computers.



Work by PESA (flight recorders and avionic systems section)

5.2.1 Flight recorders

In 2024, 22 Cockpit Voice Recorders (CVR), 32 Flight Data Recorders (FDR) and nine Cockpit Voice and Flight Data Recorders (CVFDR) were read out at the BEA, representing a total of 63 recordings. Fourteen additional recordings retrieved from maintenance recorders (QAR/DAR) were also read out.

A large proportion of these recordings concern investigations conducted by foreign investigation authorities.

	BEA investigation	BEA ACCREP	Technical assistance	Total
CVR recordings read out at the BEA	4	14	4	22
FDR recordings read out at the BEA	4	27	1	32
CVFDR* recordings read out at the BEA	7	2	0	9

*CVFDRs are recorders containing CVR and FDR data, also known as combined recorders.

5.2.2 Avionics systems, video recordings, laptops and smartphones

In 2024, the Avionics lab read out 166 computers⁵ and carried out work on photo and video recordings as well as on laptops and smartphones, totalling 250 examinations (compared with 165 in 2023, 186 in 2022, 173 in 2021 and 161 in 2020).

	BEA investigation	BEA ACCREP	Technical assistance	Total
Computers	95	46	25	166
Laptops/smartphones	63	0	0	63
Photo/video recordings	17	4	0	21

5.2.3 ATM⁶ recordings

In 2024, 52 events led to work on ATM data, based on radar data or air traffic control exchanges, including 7 examinations of data from Live Tracking systems of the Flight Radar 24 type. This type of work mainly relates to investigations conducted by the BEA.

ATM work by type of investigation can be broken down as follows:

	BEA investigation	BEA ACCREP	Technical assistance	Total
Number of events	50	2	0	52

5. The term “computer” groups various types of avionics and Global Navigation Satellite System (GNSS) equipment.
6. Air Traffic Management

5.3

Work by PSEM (Structure, equipment and engines section)

In 2024, the PSEM carried out 156 examinations (compared with 138 in 2023). These examinations are principally carried out at accident sites and at the BEA's premises, or sometimes at its partners' premises (public bodies, private laboratories, manufacturers).

The examinations carried out can be broken down as follows:

	BEA investigation	BEA ACCREP	Technical assistance	Total
Wreckage examinations	58	6	0	64
Engine and propeller examinations	9	3	0	12
Fluid examinations	7	1	0	8
Equipment examinations	47	25	0	72

5.4

Engineering department development work

For many years now, the two sections (PESA & PSEM) of the Engineering department have been involved in development work aimed at adapting to the new technologies of aircraft in service and their equipment, as well as improving the quality and speed of examinations and analyses.

This work is often carried out internally by the department's investigators, some of whom have experience in research and development. This work may also be carried out in collaboration with research bodies or manufacturers. It should be noted that each year, the BEA welcomes a number of trainee students, who find it an ideal place to put into practice the theoretical skills they have acquired during their studies.

5.4.1 Development work by PESA (Flight recorders and avionics systems section)

The section's development work in 2024 mainly related to the following areas:

- > improvement of data retrieval capabilities;
- > improvement and extension of data decoding capabilities;
- > 3D environment acquisition capability (measurements taken at a site or on a wreckage, enabling a 3D view to be reconstructed);
- > transcription automation for audio recordings.

Data retrieval capabilities

A significant proportion of development investment is devoted to expanding the skills and resources associated with data retrieval work. In 2024, work particularly focused on retrieving data from smartphones and damaged memory cards:

- > As regards smartphones, the lab is constantly developing techniques for dismantling damaged phones and understanding their

architecture, as well as methods for removing, testing and repairing motherboards;

- > As regards retrieving data from damaged memory boards, the BEA equipped itself with a laser machine and a chemical "decapping" machine used to cut the coating of a memory component to gain access to the silicon chip or perform precision operations on an electronic board.



In addition, the BEA's laboratory purchased new-generation cameras (CVC and AIRS-400 models, installed in particular on the Airbus helicopter fleet) so as to develop its capacity to read them in the event of an accident, even if severe damage occurred. Further developments will be made in the near future to establish all the associated working methods.

Data decoding

New software for decoding data from the various systems read out at the BEA is now available: this software takes into account all the types of files and decoding methods encountered (onboard maintenance systems, onboard computers, control electronics, etc.) and completes the database for these different data formats. It should be noted that, unlike flight recorders which use a relatively standardised data format, the systems examined at the avionics laboratory are very varied, requiring a capacity to process a large number of file formats and many logics converting data into engineering information.

The following actions are also noteworthy:

- Ongoing work has been carried out to develop the capacities to process DataLink data from flight recorders or access providers: the section now has a tool for decoding and integrating DataLink messages into the transcriptions produced by the audio laboratory;

- an application was developed to dynamically display parameter graphs based on recorded data: until now, the parameter graphs required for the investigations could only be displayed by a specialist using specific software at the BEA's laboratory. Following data validation work carried out by the laboratory, the new module means that all investigators can now handle all the graph displays by themselves, without having to rely on the availability of a specialist. This tool is useful not only for BEA investigators, but also when providing assistance to a foreign country: once the work has been carried out in France, foreign investigators can continue to analyse the data and display it according to the needs of their investigation.

3D images (see image above)

The BEA purchased a Leica 3D laser scanner used to acquire a 3D environment of a site or a wreckage: the technique consists in taking measurements with the device from several measuring stations (the characteristics of the device are as follows: frequency: 680,000 measurements per second - the average time to take measurements for each point is around forty seconds; range around ten to twenty metres; accuracy: four millimetres for a distance of ten metres). The measurements taken from the various measuring stations are then combined into a single file.

The data is then processed to reconstruct a 3D view of the site or wreckage. Live tests have been very satisfactory and suggest that this type of resource can be used on a regular basis.

Transcription automation

Following on from the work begun internally on this topic in previous years, in 2024 the BEA submitted an application to the French National Research Agency (ANR), in conjunction with State and university partners, for funding for a development project in the field of transcription automation for CVR recordings: this application was accepted by the ANR and work began in 2025 for a period of just over three years. The project is called "ANR/AID Astrid BLERIOT". The BEA is the coordinator, and its partners are the French Defence Procurement Agency (DGA) and the IRIT and LISIC research laboratories. It will provide an opportunity to look in greater depth at issues relating to the separation of superimposed speech and speech intelligibility, which are central to the more general approach of automating transcription work.

5.4.2 Development work by PSEM (Structure, equipment and engines section)

The section's development work in 2024 mainly consists of the "General Aviation & Electrification" project, the main aim of which is to acquire in-depth technical expertise in the field of electrical power supply and electric propulsion. This project includes a number of objectives:

- > drawing up a summary of investigations already conducted in the field of electrical power supply in general aviation: this analysis will provide an overview of the research and work carried out to date;
- > acquiring in-depth expertise in electrical power supply: this includes not only establishing latest developments in the field, but also generating new technical knowledge, in particular by carrying out specific tests that will broaden our understanding of the subject;

- > creating a network of experts and external laboratories to provide support for specific examinations relating to electrical power supply;
- > identifying the stages of a process relevant to the investigation of an electrical power system or an electrical propulsion system and drafting investigation processes specific to electrical power supply. These processes will provide a standardised methodology, ensuring a consistent and reliable approach for all future investigations.

The electrification-specific risks at the accident site will also have to be identified in order to propose solutions for the protection of investigators, in the form of emergency instructions.

Specific protective equipment will be purchased by the BEA to adapt to these technologies.

The project also includes preparing and proposing internal training material, which will enable the knowledge acquired to be disseminated and skills to be strengthened at the BEA, by providing ongoing training for the teams involved in investigations.



06

International activities

training actions and
institutional relationships

The BEA undertakes many activities on the European and international scenes: communication activities through its participation in international conferences, the setting up of cooperation agreements with foreign investigation authorities, organising training seminars in France and abroad and participating in Working Groups in European and international organisations (in particular the European Union, ECAC and ICAO).

6.1

Communication activities in the professional field

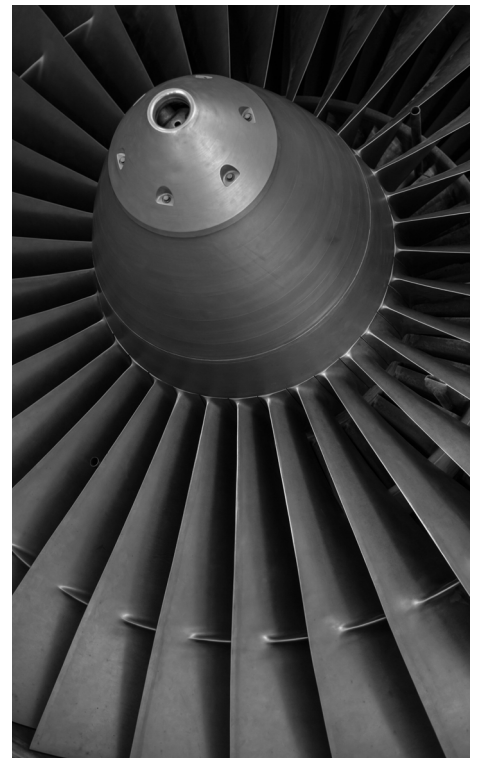
The BEA regularly participates in conferences and expert meetings. This allows the BEA not only to spread safety messages from investigations that it has led or participated in, but also to make its investigation expertise more widely known internationally. This sharing of lessons drawn from investigations and the keeping of close contact with its counterparts are essential for the success of its work during investigations abroad.

The most noteworthy international conferences and meetings attended by the BEA in 2024 were:

- > The GA-ASI (General Aviation Air Safety Investigators): at this seminar for international general aviation investigators, held in Wichita (USA), a BEA investigator presented an investigation topic on the following subject: "failure of the nose landing gear just after taking off, management of the

- failure in flight, landing with the nose landing gear retracted".
- > The ISASI (International Society of Air Safety Investigators): this year's annual ISASI seminar was held in Lisbon (Portugal). This event was held in conjunction with ESASI (European Society of Air Safety Investigators): four BEA staff members attended the seminar, in particular to present the following work:

- > recent developments to prevent aircraft disappearing in ocean areas;
- > near collision with the ground, narrowly avoided, due to incorrect QNH setting during a BaroVNAV approach.



6.2

Collaboration with foreign investigation organisations

Through its experience and know-how, the BEA is recognised as one of the most important safety investigation authorities. As such, it is regularly consulted by many States for assistance relating to the correct implementation of the standards and practices recommended by the ICAO.

It is in this context that it regularly signs Declarations of Intent for Cooperation in investigations into civil aviation accidents, with

foreign investigation authorities: in total, 63 Declarations of Intent for Cooperation are currently in force, three of which were signed in 2024:

- > one Declaration concerning Albania superseded a previous agreement, which became obsolete when the Albanian investigation authority became independent;
- > two Declarations with the investigation authorities in Austria and Kazakhstan.

In particular, these cooperation agreements propose assistance, within the bounds of reasonable limits, in case of a major investigation. One of the main outcomes of this cooperation is the provision of technical assistance by the Engineering department (this technical assistance activity is described in [paragraph 5](#)).

6.3

Participation in the work of international organisations

6.3.1 ICAO

The BEA plays an active role in several of the ICAO's groups of experts.

The BEA chairs the **Accident Investigation Group Panel (AIGP)**, a group of experts which is mandated to study amendments to Annex 13 and to investigation manuals. The plenary session of the AIGP was held face-to-face in 2024 on the ICAO's premises in Montreal.

In addition, several Working Groups (WGs) exist within the AIGP: the activity of these groups was conducted as usual in 2024, largely through videoconference meetings, the working method adopted for this activity some time back.

Among the Working Groups in which the BEA is particularly engaged, we can mention the following:

- **WG24**, which was created following the accident of flight PS752 in Tehran on 8 January 2020, to examine the provisions of Annex 13 in the event of an accident linked to an act of unlawful interference and/or in the event of a conflict of interest in the investigation process, when such investigation is conducted by a State responsible, for example, for a missile launch.
- **WG20**, which is responsible for analysing the reasons why some investigation authorities do not make all final investigation reports public after accidents involving commercial air transport aeroplanes.

- **WG14**, which is responsible for proposing standards for Annex 13 and for the ICAO investigator's manual, for drafting SRGC⁷.

- **WG25**, which deals with providing information to air accident victims and their families.

- **WG23**, which helps the ICAO to revise Document 9946 on regional authority investigation organisations (RAIOs) to include other ICMS⁸.

With this in mind, the group distributed a survey to all ICAO States in order to examine the involvement of States in all types of cooperative investigations into aircraft accidents, to identify the types of existing investigation cooperation mechanisms, their strengths and

7. Safety Recommendations of Global Concern

8. Investigation Cooperation Mechanisms

their challenges, and to assess the level of implementation, as well as to gather the opinions of States on the way in which Document 9946 can be improved to incorporate the different types of ICMs.

The BEA chairs WG14, WG20 and WG25.

- The **Flight Recorder Specific Working Group (FLIREC-SWG)**: this group of experts is responsible for proposing amendments to ICAO Annex 6, particularly with respect to the carrying of flight recorders, the location of aeroplanes in distress and the retrieval of flight data. It held its plenary session by video conference in 2024.

- The **Occurrence Validation Study Group (OVSG)**: this group reviews accidents and incidents which occurred the previous year to establish statistics per occurrence category and develop the database of accidents and incidents used by the ICAO to establish general statistics regarding global aviation safety.

In addition, the ICAO's regional offices organise meetings or *workshops* for regional investigators. France is involved in facilitating cooperation between investigators in the South Pacific and Asia (**APAC-AIG**) and North and Central America (**NACC-AIG**) regions, which include overseas departments and territories. One BEA representative actively participated in "remote" meetings held in 2024.

6.3.2 European union

Regulation (EU) No. 996/2010 created the ENCASIA (European Network of Civil Aviation Safety Investigation Authorities) network to coordinate the work and share the experiences of the various investigation authorities in the European Union (as well as the members of the European Economic Area (EEA)).

In the context of ENCASIA's work, the BEA remains a key player in the various permanent Working Groups. The BEA is very involved in the following Working Groups:

- **WG3 (Promotion of mutual support between all European investigation authorities)**, the main aim of which is to guarantee that all air transport accidents, wherever they occur throughout Europe, are the subject of a suitable investigation and that lessons are learned and shared to avoid any repeat occurrences. The ENCASIA Mutual Support System (EMSS) provides one example of the BEA's extensive involvement in a medium to long-term project.

- **WG5 (Peer Reviews)**: European Regulation No. 996/2010 stipulates that the ENCASIA shall implement a Peer Review programme for all European Union Member State safety investigation authorities.

Within this context, the Working Group was established in 2014 to define an initial framework and launch a review programme. This programme was carried out over six years, after which time a decision was made to implement a second review phase, aimed more particularly at assessing the capacity of different States to conduct investigations into major commercial air transport accidents.

A new framework was therefore defined by WG5, and a phase-two review programme was developed: during 2024, three review panels were set up, to review a total of six States (two States per panel). Each of the three panels had five members or observers, including a member of the BEA. The BEA member of one of these panels was also the coordinator.

- **WG6 (Safety Recommendations)**: this group is heavily involved in developing the new version of the European ECCAIRS repository,

which notably comprises a module concerning safety recommendations ([see paragraph 4](#)): the monitoring of these developments is deemed particularly important by the ENCASIA to ensure the sustained availability of safety lessons (details concerning the work of this group are given in [paragraph 4](#)). A *workshop* was held in Cologne regarding SRGCs (a concept defined by the ICAO). This event brought together more than 50 people to harmonise the methodology for drawing up recommendations.

6.3.3 European Civil Aviation Conference (ECAC)

The Group of Investigation Authorities (ACC), bringing together the 44 Member States of the ECAC, is a forum for sharing feedback. It enables the BEA to give an update on its investigations in progress to its European counterparts. Two meetings were held in 2024, the first in Stavanger (Norway), in May, and the second by video conference, in November. These meetings were an opportunity for the BEA to present various aspects of its investigations, ranging from the BEA's experience with victims' families to the work of the Global Aeronautical Distress Safety System (GADSS). In addition, the BEA also presented the activities of the AIGP ([see paragraphs 6.3.1 and 6.3.2 above](#)).

6.3.4 European Aviation Safety Agency (EASA)

EASA's role is to ensure safety and environmental protection in civil aviation in Europe. Every year, it organises many events (seminars, meetings, etc.) in which the BEA regularly participates. For 2024, these included:

- The annual AESA-CASIA meeting between the European Safety Investigation Authorities (SIAs) and EASA, aiming to improve the coordination of safety investigations, discuss the events of the past year, review the follow-up of safety recommendations issued by the investigation authorities, and circulate information from EASA to the European SIAs.
- A specific high-level meeting between the BEA and EASA to address specific issues raised during safety investigations.
- The ECCAIRS Steering Committee, whose role is to validate developments to the ECCAIRS 2.0 repository, used by Member State investigation authorities and civil aviation authorities (this event is organised each year by the European Commission).
- The annual meeting between EASA and the U.S. Federal Aviation Administration (FAA).
- The EU-China partnership project: with the European Commission initiating a partnership in the field of civil aviation between the European Union and China (APP), EASA is monitoring and coordinating this project. The project encompasses a number of subjects, including that associated with investigations into accidents and incidents, and focuses on further discussions involving the Chinese investigation authority

11 April 2024 Partnership meeting between the BEA, represented by Pierre-Yves Huerre (Director) on the right, with Philippe Plantin de Hugues (International Affairs), on the left, and EUROCAE, represented by Ms Anna von Groote (Director General).



(CAAC), European investigation authorities, EASA, and European and Chinese manufacturers and operators in the field of investigations into aircraft accidents and incidents. Some challenges were identified, especially cultural differences that can hamper the smooth running of safety investigations.

In 2024, this project included the visit of a BEA delegation to Chengdu (China) from 15 to 23 June. During this visit, the BEA's delegation, along with another ENCASIA investigator, provided training for investigators coming from different Chinese regions. This training gave rise to open and fruitful discussions aimed at further involving European accredited representatives in safety investigations conducted in China.

6.3.5 EUROCAE⁹

EUROCAE is a European organisation that publishes reference documents on specifications for onboard systems. EUROCAE works in close coordination with the RTCA, its American counterpart, in many fields. EUROCAE and RTCA¹⁰ documents are written by representatives of the aeronautical community. The BEA actively takes part in a number of Working Groups which held their

meetings by video-conference or face-to-face at the EUROCAE headquarters in Saint-Denis in 2024. We note in particular WG118, created in 2020, which reviewed specifications concerning flight recorders (ED-112A) and light flight recorders (ED-155) and started developing new specifications for the recordings of UAS¹¹ and RPAS¹², as well as specifications for data transmission systems of flight recorders.



9. European Organisation for Civil Aviation Equipment

10. Radio Technical Committee for Aeronautics

11. Unmanned Aircraft System

12. Remotely Piloted Aircraft System

6.4

Investigator training organised by the BEA and BEA participation in ENAC training



The investigator training organised by the BEA generally comprises each year:

- Two identical two-week training sessions covering "Basic Investigation Techniques": these courses are mainly intended for investigators recently recruited by the BEA and for Field Investigators. Two places are systematically reserved in each session for the air transport gendarmes (GTA) and, subject to availability, places are offered to French-speaking foreign investigators. Investigators working for the Togolose and Chadian investigation authorities attended the March 2024 training course, and one investigator working for the Senegalese investigation authority attended the October 2024 training course.

- One advanced training course for commercial air transport investigators: this two-week, phase 3A course is intended for experienced investigators. Sixteen participants attended this training in November 2024:

- two BEA investigators;
- eight investigators from foreign countries (Israel, Thailand, Uzbekistan, Germany, Gabon, Albania and Dominica);

- one BEA-E investigator;
- five industry (Airbus, ATR) and airline operator (KLM, Aviation Sans Frontières, CMA-CGM) investigators.

In common with the previous sessions, the marked variety of participants gave rise to some particularly fruitful discussions, enhancing the training experience for all of the investigators.

The Phase 3A training course is co-organised with the École Nationale de l'Aviation Civile (ENAC), with which the BEA signed a framework agreement, stipulating that specific agreements can be signed to define joint actions. Phase 3A training is the subject of specific agreement No. 1 regarding the "collaboration to be set up for commercial air transport training".

It should be noted that under the framework agreement, participants other than BEA investigators now pay for this training.

Furthermore, each year, the BEA participates in different training courses provided at the ENAC in the form of safety investigation information modules:

- > ENAC Engineers' course (IENAC-major OPS-2nd year): two half-days per year.
- > ENAC Engineers' course through apprenticeship (IENAC-APPR-2nd year) two half-days per year.
- > Control Engineers' course (MCTA - Air Traffic Control and Management): two half-days per year;
- > Senior Technicians' course (GSEA): two half-days per year;
- > MS-MSA Master (Safety Management in Aviation): one day per year;
- > MS-AM Master (Airport Management): one half-day per year;
- > MS-ASAA Master (Aviation Safety/Aircraft Airworthiness): one half-day per year.
- > NAVIG training course (Aircraft Airworthiness): one half-day per year.

All of these courses were delivered face-to-face in 2024.



Institutional relationships

Work to ensure coordination between the BEA and the Civil Defence Services in the scope of aviation accidents

The context

The coordination between the BEA and the State services, established by the preliminary BEA-DGSCGC agreement of 30 April 2014, entered an operational phase from the Interdepartmental Letter INTK1701919J of 30 January 2017. This development led to the amendment and updating of the preliminary BEA-DGSCGC agreement on 18 May 2021.

The first part of this coordination involved amending a large number of the DSOA and DSO-SATER plans. In addition to direct relations between the prefectures and the BEA, this activity strengthened relations between the national authorities and organisations, the ARCC-Lyon, the DSNA/SAR department, the DGSCGC and the BEA. This initial effort to amend the plans gradually gave way to an updating work.



For several years now, relations between the prefectures and the BEA have been strengthened by conducting aeronautical exercises, mainly in aerodrome zones or zones adjacent to aerodromes, as a result of the amendment and updating of plans. One indication that the authorities involved are getting to know each other better was the organisation of a combined DSOA-PPI exercise by the

Bastia

prefecture in 2024. This exercise provided a wealth of lessons that can be extrapolated given the proximity of many aerodromes and Seveso sites.

Finally, the BEA continued its contribution to capitalising on and sharing experience in terms of civil defence emergency response, through the SAR RETEX Working Group, and by taking part in the annual interdepartmental SAR meeting.

Meaning of abbreviations and acronyms:

DGSCGC:	French general directorate for civil defence and crisis management
ORSEC:	Civil defence emergency management
DSOA:	Specific ORSEC airport provisions
DSO-SATER:	Specific ORSEC provisions devoted to air-land rescue
SAMAR:	Air-sea rescue
DSNA-SAR:	Search And Rescue department of the French air navigation service provider
RIM-SAR:	Interdepartmental Search And Rescue meeting
ARCC:	Aeronautical Rescue Coordination Centre
PPI:	Specific emergency plan (at a Seveso site, for example)



07

Information
and communication actions

E-book devoted to the 75 years of the BEA

In November 2024, the BEA published a book entitled *"BEA : plus de 75 ans au service de la sécurité aérienne"* (BEA: 75+ years devoted to air safety). Initiated in 2016, this tripartite project was conducted by the BEA, the GIACRE (group of retired civil aviation executives) and the DGAC's Remembrance Mission. The Working Group that steered the project was led by Sébastien Barthe for the BEA, Jean-François Grassineau (who died in 2022), Bernard Adès and Jean-François Vivier for the GIACRE, as well as Ariane Gilotte for the DGAC's Remembrance Mission with the collaboration of Jean-Philippe Arslanian (BEA).

The editorial line of the book was less about offering a "hagiography"

of the BEA than about evoking the various issues it has faced all along its history. In view of the period covered, a non-chronological thematic approach was adopted, combining the past and present of the BEA.

The book deliberately does not go into detail about the major accidents already covered in other work, but focuses in particular on the lesser-known aspects, such as its creation, its journey towards independence and the constant development of its resources and skills.

As part of this project, the BEA was also keen to show how it was perceived by its partners (institutions, counterparts, manufacturers) and how it

investigation process (e.g. the development of human factors) or in the society (e.g. taking account of victims' families).

The book is available in French version and electronic format in a new section entitled *"Histoire du BEA"* (History of the BEA) [or directly here](#).

The publication of this book is also an opportunity for the BEA to better promote its history and its tangible and intangible heritage. The section of the website entitled *"Histoire du BEA"* will be regularly updated with new content to extend this historical work.



1946
2024

BEA

Plus de 75 ans au service
de la sécurité aérienne*

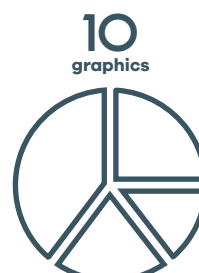
*BEA: 75+ years devoted to air safety



184
photos



208
pages



10
graphics



25
interviews with key
witnesses
including 4 former
BEA Directors



46
steering
committee
meetings
between 2016
and 2024



10
chapters



15
QR codes giving direct
access to dedicated pages
on the BEA website
for each event (investigation
reports, media library,
technical studies, etc.)

Bureau d'Enquêtes et d'Analyses

Au-dessus du Groenland,
l'Airbus A380 Paris-Los Angeles AF66 perd une partie de moteur

L'enquête qui a suivi l'accident d'un Airbus d'Air France au-dessus du Groenland en septembre 2017, a montré les difficultés de retrouver les éléments de l'avion dans des conditions désertiques extrêmes. Bien qu'il n'ait fait heureusement aucune victime, cet événement a été classé accident en raison de son caractère exceptionnel. Les conclusions de l'analyse ont aussi permis de mettre en évidence un phénomène mal maîtrisé en métallurgie.



Le samedi 30 septembre 2017, l'Airbus A380-881 immatriculé F-HPUE d'Air France décolle de Paris vers Los Angeles, avec 497 passagers et 24 membres d'équipage. Alors qu'il est en croisière à 37 000 ft au-dessus du Groenland, une déflagration retentit. La partie avant du moteur numéro 4 (le moteur extérieur sur l'aile droite) s'est détachée en vol. L'équipage se déroule et atterrit sur l'aéroport de Goose Bay, à l'est du Canada. Les jours suivants, un hélicoptère d'Air Greenland en mission scientifique dans la région parvient à retrouver plusieurs pièces du moteur.

L'Airbus A380 après son atterrissage à Goose Bay. Au premier plan, le moteur 4 dont la soufflante s'est arrachée en plein vol.



Les premiers examens visuels des enquêteurs laissent supposer une défaillance de l'axe supportant la partie avant du moteur accidenté.



Bureau d'Enquêtes et d'Analyses

Chapitre 6 L'aviation générale



Les accidents et incidents d'aviation générale constituent, en nombre, une grande partie de l'activité du BEA. Les causes de ces événements se révèlent souvent redondantes et ont conduit à la mise en place de systèmes de retour d'expérience afin de sensibiliser les pratiquants. Malheureusement, le nombre d'accidents garde un niveau constant. Les événements constatés par le BEA ne révèlent que peu d'éléments originaux, susceptibles d'améliorer le niveau de sécurité de l'aviation générale. Ceci explique pourquoi, les enquêtes aboutissent souvent à des recommandations répétées.

Accident de l'Embraer EMB505 immatriculé 9H-FAM exploité par Luxwing survenu le 8 février 2021 à Paris-Le Bourget (Seine-Saint-Denis).



Bureau d'Enquêtes et d'Analyses

Chapitre 9

Le BEA et la coopération internationale



Bureau d'Enquêtes et d'Analyses

Les chefs et directeurs* du BEA depuis 1972

En 1951, le BEA, dirigé par Maurice Belorème, fait partie au sein de l'IGAC de la section de la Sécurité Aérienne alors présidée par Marcel Gira. Maurice Belorème est un aviateur célèbre pour avoir effectué, avec Deudonné Costes, la première traversée d'est en ouest de l'océan Atlantique Nord, recruté par le SIGAC à la Libération, il a depuis effectué de nombreuses enquêtes. Maurice Belorème ne sera pas remplacé lors de sa retraite en 1981 et cette situation va perdurer jusqu'en juillet 1972.

1972 à 1980	Paul Guillevie	
1980 à 1986	Jean-Pierre Bonny	
1986 à 1990	Robert Davidson	
1990 à 2009	Paul-Louis Arstanien	Ingénieur général des Ports et Chaussées (Aviation Civile), polytechnicien. Après avoir été employé à la DGAC et au cabinet du ministre des Transports, il a rejoint le BEA en 1991.
2009 à 2013	Jean-Paul Troadec	Ingénieur général des Ports, des Eaux et des Forêts, polytechnicien. Il a occupé diverses fonctions au sein de la DGAC avant d'exercer quelques temps à l'EPST, autorité nationale de sécurité ferroviaire.
2014 à 2023	Rémi Jouty	Ingénieur général des Ports, des Eaux et des Forêts et polytechnicien, dirige le 1 ^{er} après avoir été adjoint du directeur de la Sécurité aérienne et dirige le département Investigations du BEA d'octobre 2008 à fin décembre 2008.
Depuis 2024	Pierre-Yves Huerre	Ingénieur général des Ports, des Eaux et des Forêts, il a été notamment Chef du Ser Navigation Aérienne Nord, Sous-directeur Planification Stratégie Paris, Directeur d Sécurité de l'aviation civile Ouest et Chef de la Mission de l'aviation légère et général des hélicoptères auprès du Directeur Général de la DGAC.



Les directeurs du BEA de 1990 à aujourd'hui : de gauche à droite, Jean-Paul Troadec, Pierre-Yves Huerre, Rémi Jouty et Paul-Louis Arstanien.

7.2

Promoting the BEA's mission to the aviation community



The BEA is developing its public awareness operations. For example, staff members took part in the 2024 aeronautical careers day in Andernos-les-Bains on 6 April, alongside 37 other participants from the ecosystem (private companies, armed forces, State bodies, schools, etc.).

The BEA is also continuing its participation in the work of the National Air and Space Museum of France located at Le Bourget, regarding its project for a new exhibition hangar dedicated to civil aviation - whether commercial aviation, light aviation or aerial sport - from 1945 onwards. This hangar will be built opposite the BEA headquarters.



7.3

Social media

After opening its YouTube channel in 2015 and its Twitter feed (now X) in 2017, in 2024 the BEA extended its social media presence to Threads, Mastodon and BlueSky. More than 32,000 people now subscribe to these different channels which, in line with our mission, provide the public with information about the BEA's activities.



The BEA is also continuing to develop and publish educational videos on line as part of its “Lessons learned” series, with a fourth video dedicated to the [serious incident to 9H-EMU on 23 May 2022 at Paris-Charles de Gaulle airport](#) (see paragraph 4.2).



7.4 Relations with the families of victims

In compliance with European Regulation No. 996/2010, before publishing its findings, the BEA sends the investigation report to families of victims who have requested to receive a copy. In the case of a particularly complex report, or when required by the circumstances, the BEA can also offer to hold a meeting with the family to present the investigation and its findings before they are published.

In 2024, two meetings were therefore organised with the families of victims of general aviation accidents that occurred respectively in 2020 and in 2023.

7.5 Translation policy

Since 2020, all of the BEA's publications have been translated into English. This optimises the visibility of publications (technical reports, final investigation reports, recommendations, etc.) and extends their international reach. Whilst most reports are translated in-house, some are outsourced depending on the workload of the in-house translator.

In 2024, 110 investigation reports of the 119 published were translated (27 translations of investigation reports that were published in French in previous years must be added to this number). It should be noted that four reports, containing safety recommendations from the BEA, were published simultaneously in French and in English.

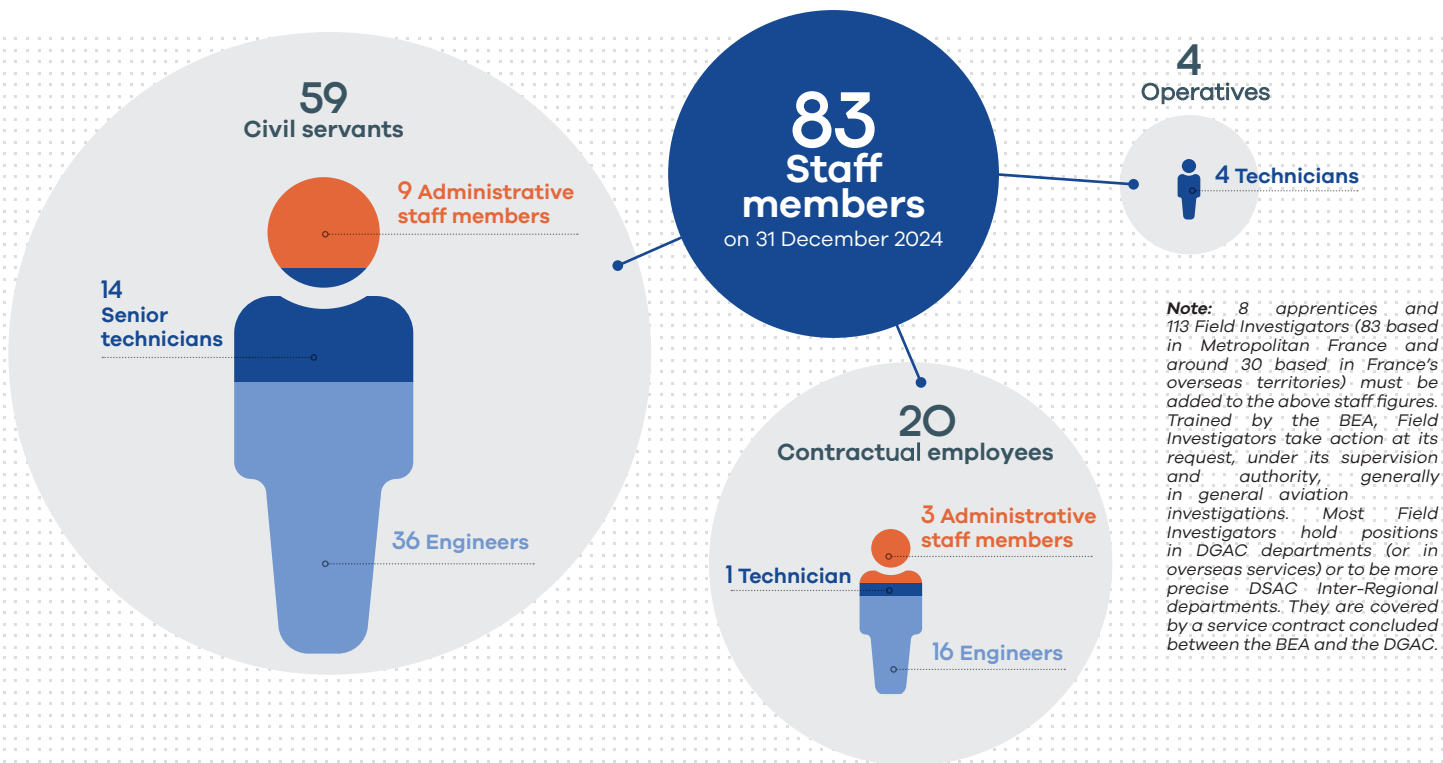


Human resources
& finances

8.1 Staff

8.1.1 Staff on 31 December 2024

As of 31 December 2024, the BEA had 83 members of staff divided as follows:



The geographical breakdown of Field Investigators is as follows:

Overseas:

- > DAC-NC: 7;
- > DSAC-AG: 5;
- > DSAC-OL: 8;
- > Saint-Pierre-et-Miquelon: 1;
- > SEAC-PF: 9;

Metropolitan France:

- > DSAC-CE: 10;
- > DSAC-N: 13;
- > DSAC-NE: 10;
- > DSAC-O: 9;
- > DSAC-S: 14 (including 3 DSNA staff members);
- > DSAC-SE: 13;
- > DSAC-SO: 14.

8.1.2 Regional branches

The majority of the BEA's staff work at the Bourget premises, but 11 are based at the different regional branches (staffing on 31 December):



Regional branches enable the BEA to ensure a better-distributed presence in Metropolitan France and specifically:

- > in regions where there is a high level of recreational general aviation activity;
- > near the main aeronautical industrial sites.

They are housed in premises made available by the DSAC as part of the service contract between the BEA and the DGAC (already mentioned in [paragraph 8.1.1](#)).

8.1.3 Personnel training

The BEA spends on average 10% of its annual operating budget on professional training in order to guarantee a high level of skills for its personnel in various areas, vital for its activity.

The 2024 training programme had therefore been defined based on an initial budget of €250,000 in commitment authorisations (CA) and payment appropriations (PA).

In the end, the budget committed amounted to €187,000 in CA, and the budget used amounted to €184,000 in PA: these figures are down on the previous years. The annual training plan was implemented on a nominal basis, with two notable exceptions:

- > one training course for a group of investigators planned at an aeronautical manufacturer's site was postponed due to a quote that was considered to be too high;
- > one type rating on Airbus aeroplanes for an investigator, estimated at €30,000, was postponed until 2025.



€187K
of budget allocated
for professional training
in CA in 2024

These postponed events explain the difference between the initial estimates and the budgets actually committed and used.

It should be noted that flight is the largest training expenditure area at the BEA (followed by training in investigation techniques). The purpose of the flight training programme is to enable staff who are type rated on passenger planes to periodically undertake commercial air transport flights as a co-pilot, so as to give the staff members major experience in flying, which is necessary for carrying out some complex investigations and thus strengthen the credibility of the BEA in the eyes of air operators



€184K
of PA used
for professional training
in 2024

involved in different accidents. For example, within the framework of an agreement signed with an airline, a staff member had the possibility to fly one week per month as co-pilot on the A320. Moreover, several staff members took theoretical and practical training courses (theory part of the Airline Transport Pilot Licence (ATPL), Commercial Pilot Licence (CPL), Single-Engine (IR/SE) or Multi-Engine (IR/ME) Instrument Rating, Multi-Crew Cooperation (MCC), etc.) to acquire the licences and ratings that will eventually enable them to benefit from similar agreements.

8.1.4 Working from home

The BEA introduced the concept of working from home a few years ago within the framework of agreements between certain staff and HR. The practice became a lot more common in 2020 and 2021 due to the health situation and the recurrence of lockdown and mandatory or recommended working-from-home periods.

The results of working from home at the BEA since the end of the COVID-19 measures are positive overall. It is proving to be a performance driver as well as a factor in attracting and retaining staff. The challenges in terms of data security and management remain tough, but the benefits in terms of productivity,

employee well-being and ecological impact are undeniable.

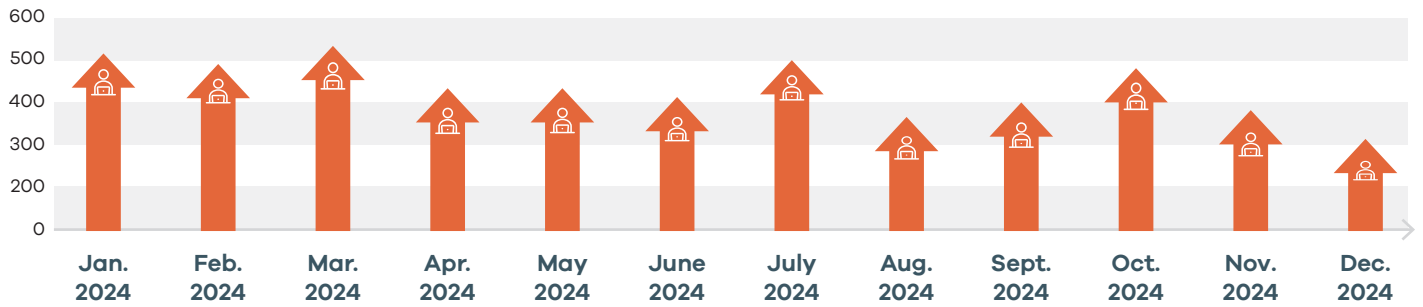
In 2024, all BEA staff could at least partially work from home, and actually did it.

The total number of working-from-home days in 2024 was more than 5,213, which represented an average of nearly 63 days per member of staff (compared with 73 in 2023).

The following graph shows the monthly trend in the total number of days worked from home for all staff in 2024. The data of this graph must be interpreted with caution (for example, the fact that staff often take holidays through the summer or over the festive period, translates

to a decrease in the number of days worked from home). As for the previous year, the data shows a downward trend throughout the year. Compared with 2023, we can see that the number of working-from-home days in 2024 decreased by almost 11%, and that the monthly working-from-home amplitude varied less than the previous year (200 days, compared with 500 days in 2023).

Number of working-from-home days



8.1.5 Apprentices and sandwich students

The BEA took on eight apprentices in 2024 (staffing on 31 December 2024), five of whom were assigned to Support functions (Human Resources section, Financial Resources section and Logistics, Safety and Environment section), and three to core functions (Communication department and

Investigation Data Management and Read-Out section). It should be noted that, until 2023, the BEA sandwich students were assigned exclusively to Support functions.

The number of apprentices and the diversity of the structures taking on them today illustrate the strong

commitment of all our departments to training and developing students' skills. Intergenerational dialogue benefits everyone by encouraging the transmission of knowledge through specific tasks carried out by the BEA staff.

8.1.6 Work shadowing and Internships

In 2024, the BEA took on 42 young people as part of internship or work shadowing (students or middle-and-high-school pupils). These young people included the following:

- > 28 pupils from general and technological classes (middle (year10) and high (year11) school) were received by the cabinet, for a period ranging from one to two weeks, as part of shadow programs in the workplace. As in 2023, the BEA was very active and heavily involved in receiving these young people as part of the government's compulsory internship programme;
- > 11 students preparing degree to master degree diplomas were received for longer periods (ranging from several weeks to a few months) and assigned to Core functions (Investigation and Engineering departments).

- > 3 students were also taken on for periods of a few weeks and assigned to Support functions (Human Resources, Logistics, Safety and Environment, and IT).

Internships and work shadowing benefit not only the people taken on, but also the BEA: pupils and students are generally trained in the latest academic or technological methods (digital, AI, etc.), and can therefore contribute fresh ideas and creative solutions. They sometimes master emerging tools or fields (data analysis, sustainable development) that are often useful in modernising the BEA's methods and processes. Trainees boost energy, innovation and prepare for the future of administrative functions.

Finally, an internship often enables promising profiles to be assessed in a real-life situation, facilitating their future integration without the risk of a poor match, as was the case in 2024 with an engineering intern, who was subsequently recruited by the Flight recorders and avionic systems section of the Engineering department.

8.2 Budget

8.2.1 Resources

The BEA budget was set in the 2024 initial finance law at €4.01 million in commitment authorisations (CA) and €3.91 million in payment appropriations (PA). Resources were cut by €0.16 million in CA and PA by decree dated 21 February 2024, and by €0.15 million in CA by the [French end-of-management finance law no. 2024-1167 of 6 December 2024](#) (French page).

In addition, resources were supplemented by:

- > carry over of CA appropriated in 2024: €0.901 million;
- > carry over of product allocations from 2023 to 2024: €0.057 million in CA and PA;
- > derived product allocations in 2024: €0.026 million in CA and PA;

- > carry over of ENCASIA contributions: €0.16 million from the European Commission in CA and PA;
- > internal transfer to programme 614: €0.051 million in CA.

In the end, the budget available for the year was therefore:

- > €4.89 million in CA;
- > €3.98 million in PA;

8.2.2 Expenditure for the period

Expenditure for the period is broken down in the table below:

	CA (€)	PA (€)
Operation		
General support (*)	€1,760,088	€1,553,305
Travel	€541,132	€543,896
Communication, documentation and hospitality	€68,322	€62,831
Training	€186,630	€183,657
Information Technology	€251,972	€156,449
Fuel, sundries and studies	€170,522	€197,106
Sundries (taxes, fees, extraordinary expenses, etc.)	€3,009	€1,786
TOTAL Operating costs	€2,981,675	€2,699,030
Investment		
Capital assets	€948,771	€885,490
TOTAL Investment costs	€948,771	€885,490
TOTAL	€3,930,446	€3,584,520

The BEA's total consumption was therefore:

- > €3.93 million in CA;
- > €3.58 million in PA.

The BEA budget used almost all of its operating appropriations (98.85% in CA and 98.35% in PA), but showed an underspend in CA and PA for investment: this underspend is mainly due to the Scanning Electron Microscope (SEM) procurement project, which was postponed following the reprogramming of a number of BEA investment operations.

(*) General support items include fluids (excluding fuel), leasing, provision of services, cleaning of premises, equipment maintenance, building maintenance, phone subscriptions and postage, as well as tangible assets that come under the "Investment" budget.

Operating expenses

The operating expenses for 2024 were €2.982 million in CA and €2.699 million in PA.

For 2024, the following was observed:

- > Sharp increase in a number of items: "services", "building maintenance" and "cleaning of premises";
- > Decrease in a number of items: "rentals" (-25% in CA), "public relations expenses" (-15% in CA) and "equipment maintenance" (-10%).

Services

In terms of services, the budget used in 2024 was €856,524 in CA and €816,701 in PA, representing an increase of 29.5% in CA and 36.5% in PA. The main reasons for these increases are:

- > the sharp increase in security costs (+9.75%);
- > the purchase of costs for licences to the Engineering department;
- > new IT security projects (ISSP).

The costs related to temporary staff requirements are also included under this heading.

Building maintenance

In terms of building maintenance, the budget used in 2024 was €416,215 in CA and €337,695 in PA. These amounts are around six times higher than those for 2023, due in particular to the cost of the contract to replace the windows, as well as the renovations on the first floor (Investigation offices, Calibration laboratory and General Secretariat), including painting, insulating the glass roof and laying new resilient floor coverings.

The BEA also had to deal with major waterproofing problems in its building, which required the

replacement of a large part of the gutters, the complete waterproofing of the roof and work on the rainwater downpipes, some of which had become blocked. These operations could be carried out before the heavy autumn rains, which prevented any major damage.

Cleaning of premises

For 2024, the initial value of the UGAP contract for cleaning the premises was €58,577. As a result of the new surface areas added to the Materials laboratory and inflation, it has been €74,995 since 1 March 2024, representing an increase of 28%.

Fluids and electricity

The fluid costs rose by around 15% between 2023 and 2024. This increase is mainly due to the doubling of the price of the electricity subscription and inflation.

To reduce its energy costs, the BEA is taking part in the "CUBE État" competition (an energy-saving competition reserved for government departments: the aim is to achieve the best results based on the principles of moderation in the use of energy and efficiency in buildings). With this in mind, it has already replaced the windows and is continuing to bring the building up to standard as part of a multi-year work programme.

Travel

The "travel expenses" item is generally the BEA's largest item of operating expenditure: these expenses are closely linked to operational activity and the volume of work on investigations abroad.

In 2024, the budget used on this item was €541,131 in CA and €543,896 in PA, representing an increase of around 18% in CA and PA: in particular, the year was marked by

two major accidents leading to "Go-Teams" travelling urgently to Japan and Brazil ([see paragraph 12.3](#)).

It should be noted, however, that the figures mentioned include €57,908 which was taken from the ENCASIA contributions (see below): if this amount is subtracted, the increase in travel costs for the BEA's own requirements in 2024 is approximately 5% in CA and 6% in PA.

Professional training

In terms of professional training, the budget used in 2024 was €186,630 in CA and €183,657 in PA, representing a decrease of 18.7% in CA and 13% in PA.

The annual training plan was implemented on a nominal basis, with two exceptions:

- > one training course for a group of investigators planned at an aeronautical manufacturer's site, which was postponed due to a quote that was considered to be too high;
- > one type rating on Airbus aeroplanes estimated at €30,000, which was postponed until 2025.

These two postponed training courses explain the appropriations' underspend and the decrease in expenditure over the year.

Investment expenses

The investment expenses for 2024 were €0.95 million in CA and €0.89 million in PA.

In the course of 2024, the BEA decided to transfer the appropriations initially planned for the purchase of a SEM to other investment operations, including in particular the data securing project (IT recovery plan for the Aix-en-Provence site), which was initially scheduled for 2025.

This change resulted in better use of appropriations in CA from 2024. The appropriations planned in CA for investment as part of the 2025 finance bill should enable the SEM to be purchased.

Investment operations carried out in 2024 mainly consisted in:

- > securing IT data: remote storage of BEA's data in its Aix-en-Provence site;
- > rewiring the computer network and installing a broadband Wi-Fi connection;

- > purchasing a decapping (laser-cutting) machine, complemented by a chemical decapping machine;
- > purchasing a test/control bench for electric motors;
- > purchasing equipment for the PESA (oven, 3D scanner, AIRS-400 camera);
- > replacing the wreckage transport vehicle;
- > purchasing an electric liaison vehicle;

- > installing air conditioning in the BEA's conference room (Concorde room);
- > refurbishing and harmonising audiovisual equipment in meeting rooms.

It should be noted that the data securing and the network/Wi-Fi wiring projects launched in 2024 should be completed in the first half of 2025 and that the new wreckage transport vehicle should be delivered in mid-2025 (it shall then be equipped to meet operational requirements).

8.3

ENCASIA contributions

The ENCASIA network, established in accordance with European Regulation (EU) No. 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents, groups together the European investigation authorities. It is tasked in particular with preparing suggestions and advising the Union institutions on all aspects of the drafting and implementation of Union policies and rules pertaining to safety investigations and the prevention of accidents and incidents. It therefore organises seminars and training for its members, which it finances by European subsidies.

On 8 March 2023, the ENCASIA signed a management delegation agreement with the BEA for the latter to manage the administrative and financial matters of the network.

In April 2023, the BEA opened the ministerial contributions 93, No. 1-1-00911, "Participation of the European Union in the management of the European Network of Civil Aviation Safety Investigation Authorities (ENCASIA) by the Bureau d'Enquêtes et d'Analyses (BEA)". On 19 December 2023, it received a subsidy of €160,000 from the European Commission, to be used to cover actions associated with the two-year work programme. In February 2024,

it received the €14,670 remaining on the account of the ENCASIA's non-profit association.

In 2024, the network organised two major events:

- > a workshop/training session on safety recommendations in Cologne in January, at a cost of €30,725.43;
- > peer reviews carried out in October and November in six Member States, at a cost of €27,182.95.

8.4

Transport of wreckage

The BEA independently ensures the transport, from the accident sites to Le Bourget premises, of all general aviation wreckage or parts of wreckage requiring further examination as part of investigations.

The transport logistics chain is therefore an integral part of the department's operational activity. It

is implemented in particular by the BEA's Transport unit, which carried out the following operations in 2024:

- > 37 journeys;
- > approximately 68,000 km travelled, 56,000 km of which with a single transport vehicle, and 12,000 km of which with a vehicle/trailer combination.

In total, the BEA's transport vehicle

covered around 540,000 km in ten years. It is due to be replaced in 2025.

In addition, in 2024, the Transport unit set up a process for recycling and recovering wreckage. In collaboration with Paprec Déconstruction Métal, around 5 t of wreckage (Ulm, certified aircraft, helicopters and engines) have already been processed.



Creation of the PLSE (Logistics, Safety and Environment section) within the BEA General Secretariat

The PLSE was created within the General Secretariat in January 2024, with the aim of optimising the operations of the Logistics division, the Transport unit and the Occupational Risk Prevention service so as to contribute to the BEA's investigations in a more efficient way. The section fosters coordination and communication between the various departments that make up the BEA, facilitating cross-functional actions between the Support functions and the investigation activity, which is one of the pillars of the strategic plan. It has a staff of six: the head of the section (who is also the prevention assistant), an agent responsible for transporting wreckage, two agents from the Logistics division and two risk prevention sandwich students.

As part of the energy transition process and in a context of ever-scarcer resources, the creation of this section aims to involve the BEA in a process of sustainable change in technical resources, habits and behaviour, adapted to the specific context of its activity. Daily actions and projects to promote energy efficiency and combat waste are proposed, implemented and developed.

The BEA, in partnership with the DGAC's Sustainable public service (SPE) mission and with the National Airport Engineering Service (SNIA), decided to participate in the "CUBE État" competition with the aim of achieving maximum energy savings by mobilising the services occupying the premises¹. A training course on the climate fresk, conducted in coordination with the HR section and the Investigations department, was a great success with staff. Additional charging stations were installed. Major renovation work was carried out, including changing the windows, as well as insulating and waterproofing part of the roof. The renovation of the walls and floors also helped to improve the quality of working life for staff at Le Bourget premises.

The PLSE, in coordination with the Structure, equipment and engines section (PSEM) and in partnership with PAPREC, also facilitates the handling of aircraft wreckage at accident sites and assists in monitoring their destruction and possible upcycling at the end of the investigation, following administrative authorisation.

The section's occupational risk prevention missions contribute to maintaining the safety and physical and mental health of all BEA staff members, whether they are on site or travelling. These missions, which focus on advice and assistance, are conducted in collaboration with the DGAC's occupational health practitioner and social worker, the Ministry's occupational health and safety inspector, as well as the BEA's Support functions and investigation staff. The prevention missions are based on meeting regulations, updating the Single occupational risk assessment document (DUERP), defining the resulting action plans, monitoring and implementing these actions, ensuring briefings and on-site risk feedback, organising and monitoring Personal Protective Equipment (PPE) committees and other Working Groups, monitoring work on psychosocial risks, as well as on improving methods and all practical and operational measures contributing to continuous improvement in health, safety and working conditions.

Finally, safety issues were also reassessed, given the sensitive activities carried out by the BEA and the global context of ever-growing concern in terms of threats. As an example, the Logistics division of the section fully supervised the upgrading of the infrastructure for the BEA's security camera system.

1. <https://www.cube-etat.fr/> (French page)



Work of note by the IT section

In addition to traditional IT support tasks (network management, server management, security administration, hardware and software installation, user assistance, equipment management, etc.), the IT section proposes a long-term strategy to take account of the BEA's changing needs and developments in technology.

This strategy is monitored by an Information Systems Strategy Committee, which met for the first time in 2024.

In this context, the following major projects were launched in 2024:

- > drawing up of an Information Systems Security Policy (ISSP);
- > network project: complete renewal of the wired and Wi-Fi networks at Le Bourget premises (in progress);
- > fibre-optic connection of the BEA's regional offices with Le Bourget premises, completed in 2024;
- > project to back up data on a remote site, with the aim of achieving complete redundancy (nearly completed);
- > review of software used at the BEA: this review will result in software licence rationalisation and thus cost reduction.



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