TRANSASIA AIRWAYS FLIGHT GE543 AIRCRAFT TYPE A321-131 NATIONALITY MARK AND REGISTRATION NO.B22603 RAMMED INTO A CONSTRUCTION VEHICLE DURING LANDING ROLL IN TAINAN AIRPORT

Executive Summary

On March 21st, 2003, TransAsia airways flight GE 543, aircraft type A321-131, nationality mark and registration no.B22603, was conducting a scheduled passenger flight from Taipei Tsongshan Airport to Tainan Airport. This flight's scheduled departure time was 21:10 Taipei time, and estimated to arrive at Tainan Airport at 2200 hours. However, the flight was delayed due to previous flight duty and departed Tsongshan Airport at 22:01. The aircraft landed at Tainan Airport on right side Runway 36R at exactly 22:34:59, and during landing roll, the aircraft crashed into a construction vehicle that was about to conduct work on the runway.

The aircraft had 2 flight crews, 4 cabin crews, 169 passengers, with the total of 175 people on board. There were no injuries aboard the plane, but the construction vehicle driver suffered a bone fracture that resulted in a hospital stay, and two accompanying members suffered minor injuries. The aircraft was severely damaged, and the construction vehicle with all its equipment was destroyed.

Investigative Findings for Possible Cause of the Accident:

1. Multiple construction coordination meetings were held by the Tainan Air Force Base and CAA before the accident; however, parts of the safety control items were not properly planned and multiple meeting conclusions were not implemented.
2. On the day of the accident, the scheduled landing time of flight GE543 was 22:34, past the 22:30 slot time allowed for civilian aircrafts in the regulations of the agreements, yet the flight requested and received clearance for landing.
3. The Air Force supervisor did not confirm flight status with the duty officer prior to entering into operational area with contractors, and operator control procedures were not implemented.
4. The runway edge lights were on when the Air Force supervisor and the workers entered the runway. However, the work crew thought this was due to light testing that has been in progress for the past two days, so the crew did not confirm with the airport-tower whether there were aircrafts lift off and landing before entering an active runway.
5. No one requested clearance from the tower before entering the runway; therefore, the procedure for requesting clearance before entering operational areas was not carried out.

6. The flight tower while not informed, and did not discover, the intrusion of the construction vehicle into the operation area, cleared flight GE543 for landing, which lead to the aircraft to crashing into the construction vehicle on the runway.

Investigative Findings Related To Risks:

1. Both CAA and Tainan Air Force Base did not clarify the jurisdiction of "Airport Management Unit" in the Aerodrome Construction Safety Regulations during numerous coordination meetings, and did not completely distribute the responsibilities that should be executed by the "Airport Management Unit ".
2. CAA and Tainan Air Force Base did not clarify the sphere of responsibility between the Air Force supervisors and Tainan Airport personnel during night time operations at the coordination meetings.
3. The construction supervisors did not coordinate with CAA to publish NOTAMs, announcing the time and parameter of tire scraps elimination and chink-disposal operation on Runway 36R, as per coordination meeting conclusion.
4. The time workers were allowed into the operational area drafted by the coordination meetings, intersected with civil aviation time slot from the agreement, but the landing/departure procedure for the last scheduled flight was not confirmed.
5. During the day of the accident, the on-site workers of the contractor and the supervisor did not announce the information for night operation. At 21:55 the contractor informed the Air Force supervisor directly regarding the night operation, but neither the Tainan Airport Flight Operations Division nor the Tainan Air Base Operation Section, which maintain aircraft status, was informed. The regulations set by the coordination meetings for night time operation reporting procedure were ineffective.
6. Tainan Air Force Base did not have an effective method for announcing the decisions of the coordination meetings regarding operations notification process, resulting in the supervisor's unawareness of the contractors failing to conform to notification procedures of the coordination meetings conclusions.
7. Supervisors did not actively correct the long term inconformity of the contractors regarding night time operation notification procedures, as is within their responsibility. Supervisors did not notify Tainan Airport Flight Operation Division, which did not conform to operations notification procedure.
8. Since the beginning of night operations, Tainan Airport did not send staff to lead contract workers to the Duty Office to exchange IDs as according to the conclusions of the coordination meetings due to the shortage of manpower and budget.

9. On the day of the accident, the contractor did not follow the coordination meeting decision to conduct pre-duty education, and did not set up mechanism for daily pre-duty education.
10. The contractor did not conduct vehicle safety equipments inspection on the day of the incident. The operating vehicle that got hit had not installed car roof strobe lights, which decreased the chance for airport-tower and aircraft pilots to discover the existence of the construction vehicle.
11. Air Force supervisors and the flight control room personnel did not realize the purpose of reporting to the flight control room, revealing insufficient education and training of reporting procedures to the flight control room at Tainan Air Force Base.
12. CAA and Tainan Air Force Base had different perception of who should request clearance from the tower before the workers entered the site.
13. The coordination meeting conclusions did not include the duty assignment of "request airport-tower for clearance before entering the operation area ".
14. On the day of the accident, the contractor did not follow the coordination meeting conclusions to provide radios to the Air Force supervisors, flight control room, the Flight Operation Division, and the Tainan Air Force Base, and the Tainan Airport personnel did not find anything amiss.
15. The contractors, supervisors, Tainan Air Force Base, and Tainan Airport did not effectively announce the coordination meeting conclusions, which mandates that the contractors should provide radios to on-site operators.
16. On the day of the accident, the construction vehicle driver parked on the runway, and then got off to conduct operations, hereby in clear violation of Aerodrome Construction Safety Regulations.
17. The contractors carried inoperable radios, therefore unable to immediately notify the Air Force supervisor on the runway, the workers, and the airport-tower when they discovered that the airplane was about to land.
18. The workers had not received any radio phraseology and communication procedure trainings, which lowered their communicative efficiency during emergencies.
19. Prior to the accident the contractor did conduct pre-operational educational training for the ongoing "cleaning existed runways and disposal of chinks" operation.
20. When the contractor conducted the monthly "safety and health education and training meeting", the contractor did not require the participation of every individual, as required by the safety and health plan, and did not discuss and improve procedures of the previous meeting.

21. The supervisors did not plan safety education and training related to airport operational safety for on-site workers.
22. The routine training of Tainan Air Force Base and oral explanation for this operation did not effectively convey responsibilities and safety issues to the Air Force supervisors.
23. No units following the contents of the Aerodrome Construction Safety Regulations and planned vehicle operation control, radio operating procedures, and driving safety etc. and related training for the workers.
24. CAA did not have a mechanism set up for education and examination of contractors and supervisors to ensure understanding of "Aerodrome Construction Safety Regulations ".
25. The contractor did not establish a safety protection plan as required by the "Aerodrome Construction Regulations", and conduct internal reviews.
26. The contractor's internal review mechanism and items were not included in the relevant unit's safety regulations and coordination meeting conclusions, and not carried out accordingly, thus affecting the results of the internal review mechanism.
27. The operation supervisors did not set and carry out clear supervising parameters and checklist according to "Aerodrome Construction Safety Regulations", coordination meeting conclusions, and the work contract safety regulations prior to the accident, thus affecting the effectiveness of the internal review mechanism.
28. During the night time operation, the CAA and Tainan Airport did not assign any supervising staff on-site.
29. Tainan Air Force Base did not discover in time the inadequate supervision of the Air Force supervisor, and the fact that the Air Force supervisor was not fully aware of his/her duties regarding safety related knowledge related to airport operations.

Other Investigative Findings:

1. The flight crew members and controllers involved in this accident possessed proper licenses.
2. There were no indications the flight crew or controllers had medical, behavioral, or physical factors which affected the performances of their duties on the day of the incident.
3. There were no indications that activities conducted by the flight crew and the controllers during duty time, rest time, and off-duty time had affected their work performance on the day of the accident.

4. The Council could not confirm whether the two construction vehicles evacuated to the runway edges at the time of the accident had their car roof strobe lights and headlights on while driving and stopping on the runway. Even if the vehicles had their car roof strobe lights and head lights on while moving, the time period between the vehicles entering the runway and the accident was so short, the Tower controllers could not easily have spotted those two vehicles in time.
5. During the accident, the two pilots of flight GE543 could not get a visual on the vehicles without strobe lights on the runway before landing. And since the direction the vehicle was facing was the same as the aircraft, even if the head lights were on it would be difficult to spot the vehicle. The two vehicles on the runway edges were stationary so their car roof strobe lights would be difficult to discern from the runway lights and identified. In addition, the pilots must focus on the aircraft's altitude, speed, and simultaneously maneuver the aircraft, therefore neither pilots realized there was an abnormal object on the runway.
6. On the day of the accident the Air Force supervisor and contractors did not follow the pickup points planned according to the coordination meeting conclusions.
7. The items in the contractor's internal review checklists have not been included in the safety equipment of the "Aerodrome Construction Safety Regulations". I.E. warning lights, flags, and radios etc.
8. The access routes defined by the coordination meeting conclusions were not followed for long periods. The control mechanism defined by the coordination meetings could not effectively confirm if the workers were following pre-planned access routes.
9. Although the entrance/exit routes defined by the coordination meetings were sent to the Tainan Air Force Base Equipment Battery, but the order was not passed on to the base level supervisors.
10. On the day of the accident, the vehicle driver did posses airport driving permit, and the contractor was not aware application was required.
11. Majority of the operation machinery were not painted as recommended by the regulations.
12. TransAsia Airways "Safety and Emergency Response Manual" does have execution points, principle, and related training for unforeseen event management assessment, determining surrounding environment, and emergency situation withdrawal assessment and evaluation.

Improvement Recommendation

Interim Flight Safety Bulletin

This Council published the following accident investigative Interim Flight Bulletin

to CAA and Air Force Command Headquarters on April 10, 2003.

No: ASC-IFSB-03-04-001

Recommendations

1. Publish NOTAMs according to relevant regulations, and remind aircraft users, pilots, airport flight operations personnel, and air traffic controllers regarding work being done within airport operating area.
2. Examine the airport ground operation safety management procedures to ensure air traffic controllers are able to control the status of workers, vehicles, and machinery etc. when entering/existing runways and taxiways.

To Civil Aeronautics Administration, CAA

1. In response to the different management characteristics of combined Civil and Military Airports, strengthening airport work safety regulations require emphasis on items such as: phraseology explanation, flight information procedures, work notification procedure, pre-duty education, safety equipment inspection, control procedure for entering operational area, work area safety operation and situation awareness, emergency contact procedures etc. (ASC-ASR-04-10-01)
2. Confirm personnel responsibilities, operating procedures, and establish inspection mechanism for “Flight Information Operation”, “Work Notification Process”, “Daily Pre-Duty Education “, “Safety Equipment Inspection“ and “Controlling procedure Before Entering Operational area“ prior to conducting work. (ASC-ASR-04-10-02)
3. Implement interior safety regulations, airport work safety regulations, and coordination meeting conclusions and agreement items etc. (ASC-ASR-04-10-03)
4. Clarify and implement supervisory items for airport operations for the CAA, airport staff, and supervisory staff. (ASC-ASR-04-10-04)
5. Strengthen safety training for work safety controllers and implement supervising mechanism. (ASC-ASR-04-10-05)
6. Expound suitable regulations, specify the definitions of job responsibilities, and clarify duty assignment when convening work coordination meetings. (ASC-ASR-04-10-06)
7. Establish regulations and relevant trainings for cabin crew when conducting emergency evaluations. (ASC-ASR-04-10-07).

To Air Force General Headquarters

1. In response to the different management characteristics of combined Civil and Military Airports, strengthening airport work safety regulations require emphasis on items such as: phraseology explanation, flight information procedures, work notification procedure, pre-duty education, safety equipment inspection, control

procedure for entering operational area, work area safety operation and situation awareness, emergency contact procedures etc. (ASC-ASR-04-10-08)

2. Confirm personnel responsibilities, operating procedures, and establish inspection mechanism for “Flight Information Operation”, “Work Notification Process”, “Daily Pre-Duty Education “, “Safety Equipment Inspection“ and “Controlling procedure Before Entering Operational area“ prior to conducting work. ASC-ASR-04-10-02)
3. Implement interior safety regulations, airport work safety regulations, and coordination meeting conclusions and coordination manual items etc. (ASC-ASR-04-10-10)
4. Strengthen safety knowledge, management ability, and related supervisory mechanism for controllers. (ASC-ASR-04-10-11)
5. Expound suitable regulations, specify the definitions of job responsibilities, and clarify duty assignment when convening work coordination meetings. (ASC-ASR-04-10-12)

To Ministry of Transportation

All combination Civilian and Military Airports should jointly deliberate with the Department of Defense a unified commanding unit and airport operations strategy to prevent “runway intrusions”. (ASC-ASR-04-10-13)

To Department of Defense

All combination Civilian and Military Airports should jointly deliberate with the Department of Defense a unified commanding unit and airport operations strategy to prevent “runway intrusions”. (ASC-ASR-04-10-14)