

行政院及所屬各機關出國報告

(出國類別：其他)

ASC-TRM-01-06-001

## 參加澳洲與紐西蘭飛安調查員協會 — 澳洲區飛安研討會報告

服務機關：行政院飛航安全委員會

出國人職稱：執行長

姓名：戎凱

出國地區：美國

出國期間：民國九十年六月一日至六月四日

報告日期：民國九十年六月二十六日

行政院及所屬各機關出國報告提要 系統識別號

出國報告名稱：參加澳洲與紐西蘭飛安調查員協會澳洲區飛安研討會報告

頁數：\_\_\_\_頁含附件：是

出國計畫主辦機關：行政院飛航安全委員會

聯絡人：鄧嵐嵐

電話：(02) 2547-5200 分機 175

出國人員姓名：戎 凱

服務機關：行政院飛航安全委員會

職稱：執行長

電話：(02) 2547-5200

出國類別：1 考察2 進修3 研究4 實習5 其他

出國期間：民國九十年六月一日至六月四日

出國地區：澳洲

報告日期：民國九十年六月二十六日

分類號/目

關鍵詞：澳洲、紐西蘭、失事調查、飛安、研討會、ISASI

內容摘要：(二百至三百字)

此次參訪澳洲，主要行程有三：

- 一、 本會為加強與國際飛安及失事調查機構之交流及合作，已於民國八十七年於本會成立不久即加入國際飛安調查員協會 (International Society of Air Safety Investigators - ISASI)，為該會之政府機構會員之一。本會亦同年十一月與澳大利亞運輸安全調查局(ATSB)簽署合作備忘錄，並曾和紐西蘭運輸安全委員會(TAIC)互訪，亦與紐西蘭建立良好合作關係。
- 二、 本人應邀參加國際飛安調查員協會紐澳分會之年度會議，並為該年會之主講人(keynote speaker)。會中與該地區之客艙安全工作小組座談，討論如何借新航 SQ00 事故之調查，進而改善飛安。
- 三、 飛安無國界，國際合作及資訊交流為本會工作重點之一。希能借重此類活動改善國內飛安生態，改善國際觀感並提昇國際地位。

本文電子檔已上傳至出國報告資訊網

行政院及所屬各機關出國報告審核表

出國報告名稱: 參加澳洲與紐西蘭飛安調查員協會澳洲區飛安研討會報告

出國計畫主辦機關名稱: 行政院飛航安全委員會

出國人姓名: 戎 凱

職稱: 執行長

服務單位: 行政院飛航安全委員會

出國計畫主辦機關審核意見:

- 1. 依限繳交出報告
- 2. 格式完整
- 3. 內容充實完備
- 4. 建議具參考價值
- 5. 送本機關參考或研辦
- 6. 送上級機關參考
- 7. 退回補正, 原因:
  - (1) 不符原核定出國計畫
  - (2) 以外文撰寫或僅以所蒐集外文資料為內容
  - (3) 內容空洞簡略
  - (4) 未依行政院所屬各機關出國報告規格辦理
  - (5) 未於資訊網登錄提要資料及傳送出國報告電子檔
- 8. 其他處理意見:

層轉機關審核意見:

- 同意主辦機關審核意見
  - 全部  部份 \_\_\_\_\_ (填寫審核意見編號)
- 退回補正, 原因: \_\_\_\_\_ (填寫審核意見編號)
- 其他處理意見:

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## 壹、 參訪行程

六月一日	起程(台北時間)
六月二日	抵澳洲布里斯本(當地時間)，轉機至凱恩斯
六月三日	參加澳洲與紐西蘭飛安調查員協會-澳洲區飛安 研討會
六月四日	返回台北

## 貳、 目 的

本人應紐澳地區飛安調查員協會邀請，於民國九十年六月一日赴澳洲之凱恩斯城參加該協會之年會，並為該會主言人(keynote speaker)。本會於民國八十七年五月成立後即加入國際飛安調查員協會，並將於台北主辦西元 2002 年國際飛安調查員協會年會。國際合作為本位工作重點之一，此次受邀出國參加該會議之主要目的為希望借重此類活動，進而達成改善國際對我國飛安改善之觀察，並提昇我國之國際地位。

## 參、 過 程

本人於九十年六月一日晚上九時四十五分搭長榮班機 BR315 由台北先飛抵澳洲布里斯本(Brisbane)，再轉澳航(Qantas)班機由布里斯本飛抵凱恩斯市(Cairns)。抵凱恩斯時已為六月二日當地時間下午三時。向大會報到後，稍事休息，即參加該年會之晚宴。因行程緊迫首日(六月二日)之演講未能參加。

本人之演講排在第二天早上八時四十五分，講題為「SQ006 Accident Investigation」演講完畢，即參與當天全程節目(見附錄一)，並帶回該年會之光碟一片(見附件一)。年會於六月三日下午五時結束。本人於六月四日清晨五時四十五分搭澳航班機離凱恩斯到布里斯本，再轉搭長榮 BR316 班機由布里斯本回國，於六月四日下午五時五十分返抵國門，完成了為期三天的旅程。

## 肆、 心得與建議

- 一、 紐澳飛安調查員協會為國際飛安調查員協會(ISASI)之地域分會，會員多半為澳航，安捷航空及紐航(Air New Zealand)之飛安工作者(飛安室、駕駛員、機務員、空服員)，及大學教授等組成，是國際飛安調查員協會中最為

活躍的分會之一。年會每年舉行一次，多半在紐澳地區的大都市舉行，為期兩天。明年之年會將在紐西蘭奧克蘭(Auckland)舉行。

二、 此次參加年會約一百人，我國除本人外，另有空軍官校航安班何立己主任及王等庸教官參加，亞洲地區另有日本AAIC的 Mr. Takahashi (高橋)，高橋先生為航管專家，在一星期前本會訪日 AAIC 時會談過。除亞洲四人外，另有加拿大 Bombadier 的 Mr. James Donnelly 參加。其他則清一色紐澳地區的代表。Mr. Donnelly 在他的演講中 (Bombadier's Safety Program)，曾提起民九十年一月十五日立榮航空 Dash8-300 在金門尚義機場之事故，已表現出國際間對各種飛安事故之重視，及飛安無國界之立場。

三、 除了年會之主要演講外，在六月一日並有一客艙安全工作小組(Asia Pacific Cabin Safety Working Group)的會議，此一工作小組成立已十二年，由紐澳三家航空公司之資深空服員組成。該工作小組對新航 006 事故之“生還因素”部分極有興趣。在大會後要求與我座談約一小時，並提出了對空服員制服之燃燒性(Flammability)及亞洲空

服員制服是否在緊急逃生時有所不便提出討論，其敬業之精神，值得我們學習。

- 四、 本人的講題為新航 006 事故之調查過程(見附錄二)。因此事故尚在調查中，故演講之內容多為事實資料中之重要部分，但與會人員對演講之內容興趣頗高，演講完後問題不斷，對機場措施之問題最多。澳洲之雪梨(Sydney)國際機場及紐西蘭的奧克蘭(Auckland)國際機場均將於今年夏季做大規模整修，因此對在工程進行之機場如何確保安全為主要討論題材之一。
- 五、 其他的演講多半亦引用各種飛安事故之調查，其中有一篇由紐西蘭失事調查局 TAIC 的顧問 Dr. Robin Griffiths 講的"Disaster Victim Identification"極為值得我國在生還因素方面參考。
- 六、 凱恩斯位於布理斯本北方約一千公里，已是處於熱帶雨林(rain forest)之地區。六月是澳洲的冬季，凱恩斯的溫度約攝氏二十五度左右，該地日本遊客及多，日航每週有三班由東京直飛該地，當地附近有世界著名的 Barrier Reef 及 Green Island。可惜停留時間不到一天半無時間遊覽。
- 七、 經長榮飛安室何主任安排，在 BR315 由台北飛布理斯本



於中正機場起飛及 BR316 回台北中正機場進場時，均有機會在座艙觀摩。該航機為 MD-11。中正機場起降天氣都還良好。長榮座艙紀律良好，除應有的程序外，完全沒有任何不必要的談話，真正達到 STERILE COCKPIT 的要求了。

八、 此次出國時間雖然匆促，但對紐澳地區飛安工作人員之敬業及主動發掘問題之精神，印象極深，尤其是客艙安全工作小組的模式是值得我們學習的。本人之演講，能激發對跑道侵入(Runway Incursion)事故之重要性，及對本會之了解，也算替我國國際事務上盡了一點力量。

## 附錄一

澳洲與紐西蘭飛安調查員協會澳洲區飛安研討會議程

30may01

*Australian & New Zealand Societies of Air Safety Investigators*

2001 AUSTRALASIAN REGIONAL SEMINAR

*PACIFIC INTERNATIONAL HOTEL, CAIRNS, AUSTRALIA  
FRIDAY 1 JUNE TO SUNDAY 3 JUNE 2001*

**Friday 1 June**

0900 to 1700 Asia Pacific Cabin Safety Working Group  
1500 to 1800 Registration  
1830 to 2030 Welcome reception

**Saturday 2 June**

0630 to 0830 Continental Breakfast (Pool Terrace)  
0800 to 0830 Registration

0900 to 1630 Seminar Opens (Tradewinds Room)  
0900 to 1000 Introductions

Lindsay Naylor, VP ASASI  
Paul Mayes, VP ISASI  
Mr Bob Manning, CEO, Cairns Port Authority

**Seminar Opening**

**Keynote presentation** *An Operators Perspective on the relationship between Regulator and Investigator*

Trevor Jensen, Senior Vice President Operations Air New Zealand-Ansett Group

1000 to 1025 **Coffee Break**

1030 to 1230 *Bombardier Safety Presentation*

James Donnelly, Bombardier

*Investigation - Oxygen Fire onboard Helicopter*

Ron Heitmann, ATSB

*Investigation- Undercarriage failure on Metro*

Ken Mathews, TAIC

1200 to 1325 Lunch (Pool Terrace and Pacific Harbour Room)

1330 to 1500

*Management of Safety with Expedition in the Sydney Olympics Environment*

John Guselli, JCG Aviation Services

*Promoting Safety on an Olympic Scale*

Al Bridges, CASA

1500 to 1525

**Afternoon Tea break**

1530 to 1630

*Confidential Reporting System*

Chris Sullivan, ATSB

*Investigating the Causes of 'VFR into IMC' Accidents:*

David O'Hare and Douglas Owen, Department of Psychology, University of Otago, Dunedin,

**Day 1 Review**

1635 - 1730

**ASASI AGM**

1900 - 1930

Pre-Dinner drinks (Pool Terrace)

1930 - 2200

Dinner (Ball Room)

<b>Sunday 3 June</b>	<b>Seminar Continues</b>	
<b>0630 to 0830</b>	<b><u>Continental Breakfast (Pool Terrace)</u></b>	
<b>0845 to 1000</b>	<b><u>Keynote Presentation (Tradewinds Room)</u></b>	
	<i>Investigation- SQ006, Taipei</i>	Kay Yong, TSC, Taiwan
	<i>Enhancing Safety Through Engineering Analysis</i>	Neville Blyth, ATSB
<b>1000 to 1025</b>	<b>Coffee Break</b>	
<b>1030 to 1230</b>	<i>Kalkara investigation</i>	Robert Pell /Graham Clark AMRL
	<i>Main Rotor Blade Analysis</i>	Sam Webb, ATSB
	<i>Avionics and Electrical Systems and Wiring</i>	Mal Gordon, ATSB
<b>1230 to 1325</b>	<b><u>Lunch (Pool Terrace and Pacific Harbour Room)</u></b>	
<b>1330 to 1445</b>	<b>Debate: Is a Zero Accident Policy Achievable?</b>	<b>Peter Williams (facilitator)</b> <b>Graham Braithwaite</b> <b>Gp Cpt Bill Spears</b> <b>Paul Mayes</b>
<b>1445 to 1515</b>	<b>Afternoon tea break</b>	
<b>1515 to 1630</b>	<i>Accident and Incident Investigation in RNZAF</i>	SqdLdg Russell Kennedy, RNZAF
	<i>Disaster Victim Identification</i>	Dr Robin Griffiths, TAIC
	<i>Asia Pacific Cabin Safety Working Group Report</i>	Dr Graham Braithwaite
	<b>Review and close</b>	Ken Lewis, President ASASI

Reserve paper  
*Analysis of Dash 8 Accident, Palmerston North*

*Dmitri Zotov, Massey University*

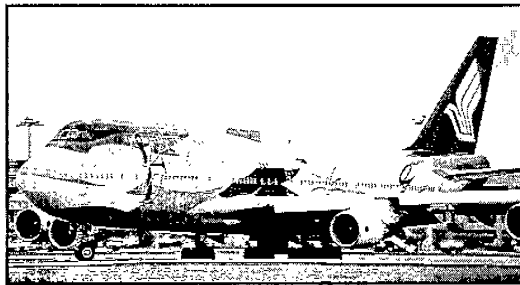
附錄二

專題演講 「SQ006 Accident Investigation」

# SQ006 INVESTIGATION

By  
Kay Yong, Ph.D.  
Aviation Safety Council  
June, 2001

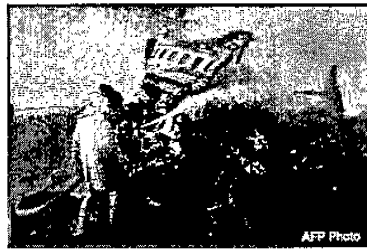
- October 31, 2000, at 2317 Taipei local time
- Singapore Airlines Flight SQ-006, Boeing-747-400
- Chiang-Kai-Shek International Airport to Los Angeles International Airport



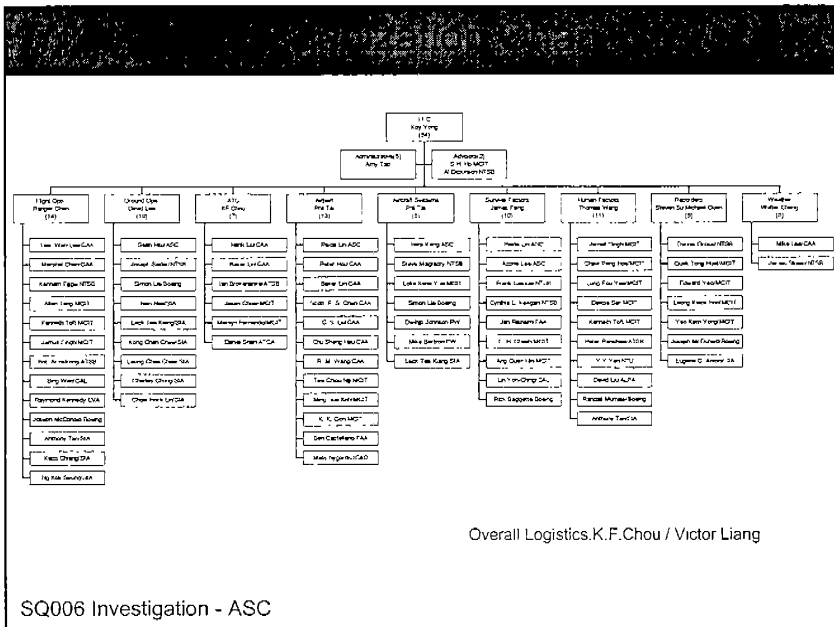
SQ006 Investigation - ASC

# History of the Flight

- Crashed on a partial closed runway during takeoff
- 79 passengers and 4 flight attendants were fatally injured



SQ006 Investigation - ASC



2000	10/31	Date of Accident
	11/04	Flight simulation of SQ006 completed
	11/08	Transcript of CVR completed
	11/13	On-scene investigation completed
	11/15	Wreckage removal
	11/15	On-scene report completed
	11/27	Interview SIA & CAAS
	12/04	Preliminary report published
2001	01/23	Factual data collection completed
	02/23	Factual Report on ASC Website
	03/01	Analysis process commenced
	07/05	Technical Review Meeting
	07/01~08/31	Writing up of draft report
	09/01	Draft report sent to NTSB & MCIT
	Late Nov.	Draft report submitted to ASC Board
	Early Dec.	Final report published

SQ006 Investigation - ASC

## Weather

- Typhoon "Xangsane"
- 360 kilometers south of CKS International Airport
- Maximum wind speed 75 knots gusting 90 knots

## Weather at the Airport

- Wind 020 degrees at 30 knots gusting 61 knots
- Visibility 600 meters
- Clouds broken 200 feet overcast 500 feet
- Heavy rain

SQ006 Investigation - ASC

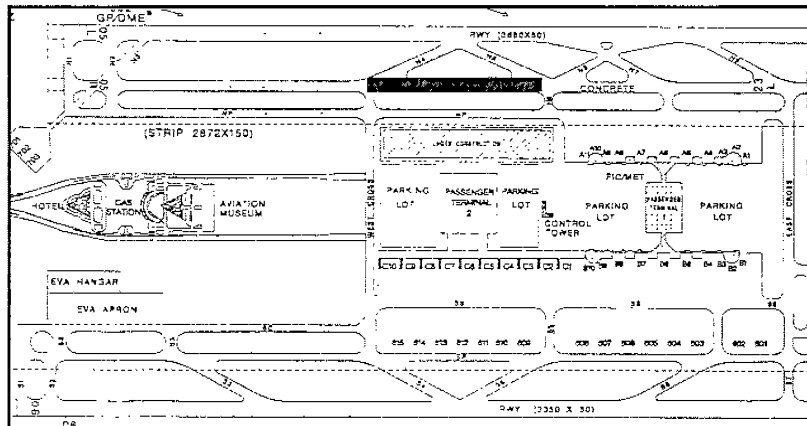


## Airport Construction

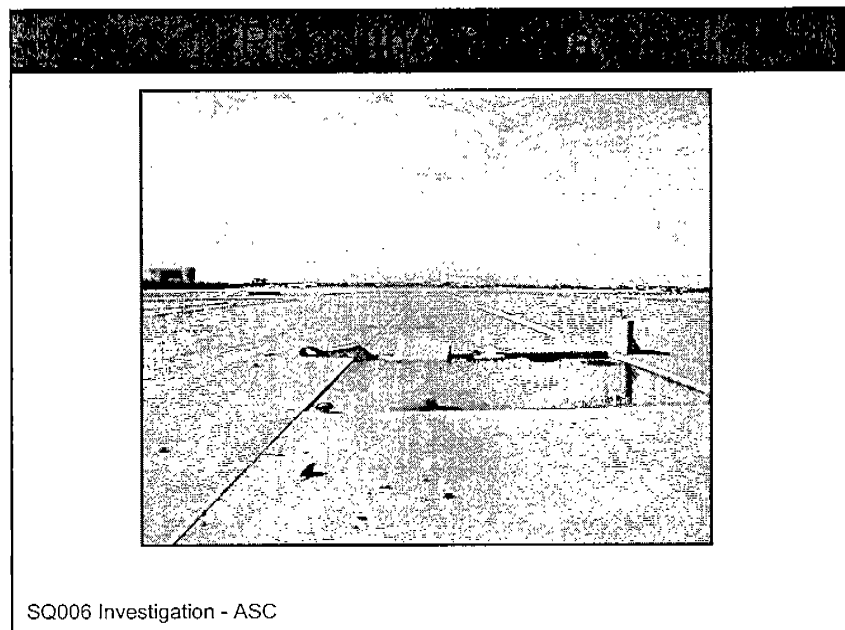
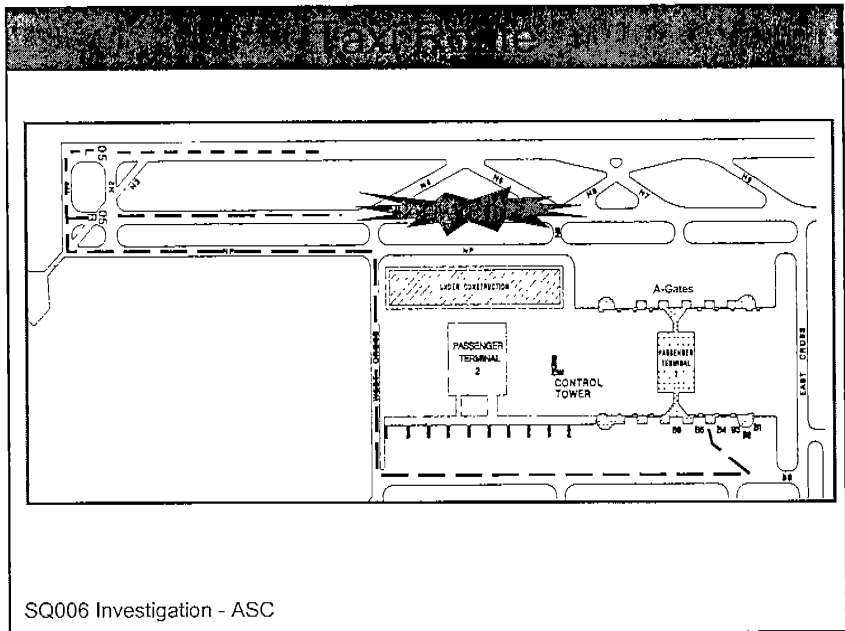
### NOTAM A0606

- August 31, 2000
- Civil Aeronautics Administration (CAA), issued a Notice to Airmen (NOTAM)
- A portion of the Runway 05R between Taxiway N4 and N5 was closed due to work in progress from September 13, 2000, to November 22, 2000.

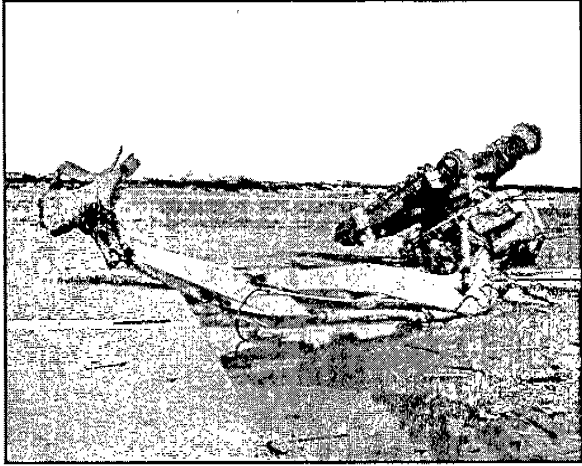
SQ006 Investigation - ASC



SQ006 Investigation - ASC

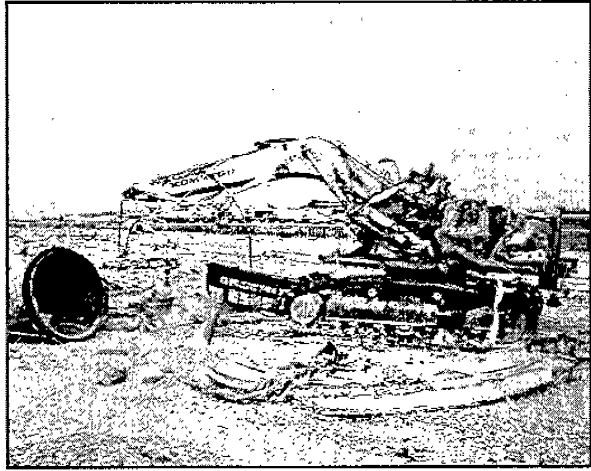


Excavator on the Runway



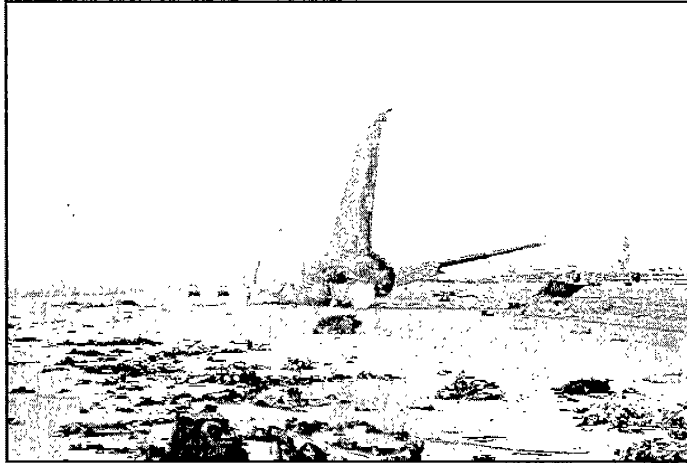
SQ006 Investigation - ASC

Excavator on the Runway

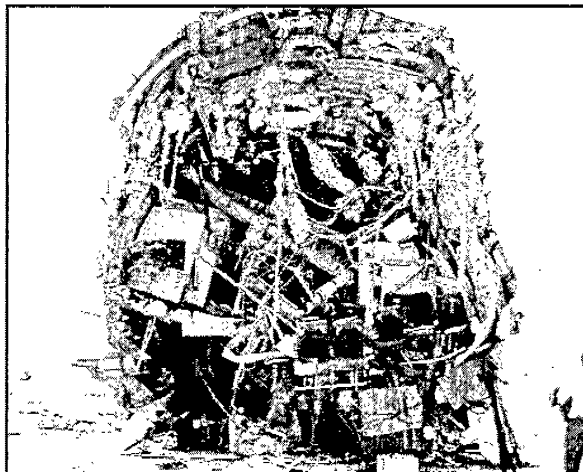


SQ006 Investigation - ASC

Wreckage

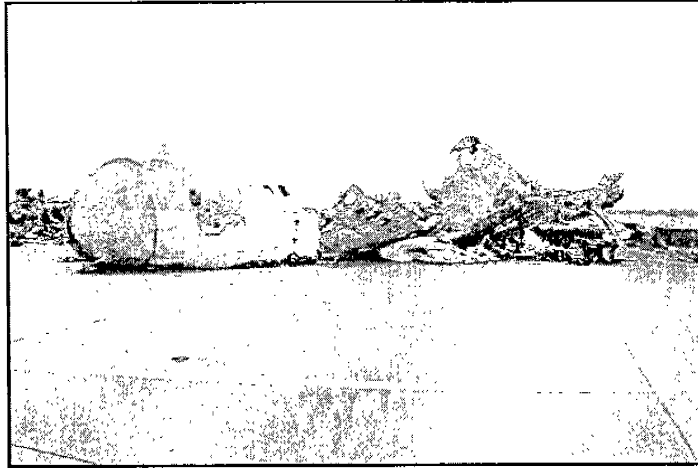


SQ006 Investigation - ASC



SQ006 Investigation - ASC

# Wreckage



SQ006 Investigation - ASC

# Wreckage



SQ006 Investigation - ASC

## Pilots

### **Captain**

Total Flying Hours  
Total Command Hours on B747-400

Male, age 41  
11,235 hrs  
2,017 hrs

### **First Officer**

Total Flying Hours  
Total Command Hours on B747-400

Male, age 36  
2,442 hrs  
552 hrs

### **Relief Pilot**

Total Flying Hours  
Total Hours on B747-400

Male, age 38  
5,508 hrs  
4,518 hrs

SQ006 Investigation - ASC

## Runway Selection

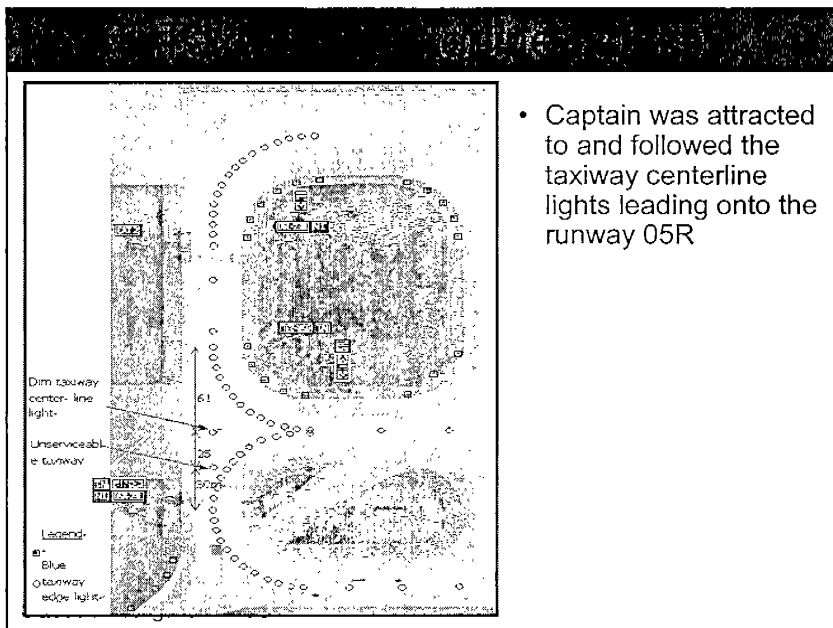
- SIA flights usually use R/W 06
- Captain chose R/W 05L because
  - CAT II category allowed a lower visibility minimum
  - longer and would afford better margins for the prevailing wet runway conditions
- 2-3 years since Captain and Relief Pilot had used R/W 05L. The First Officer said he had not been to TPE for quite some time

SQ006 Investigation - ASC

## Captain's Concern

- Captain was concerned about the strong cross winds and the low visibility.
- He said that if the winds had gone beyond limits he would have postponed the takeoff.
- Captain told himself to be more alert than usual and to be especially aware of the situation.
- He also concerned about the weather would get worse when the Typhoon gets closer.

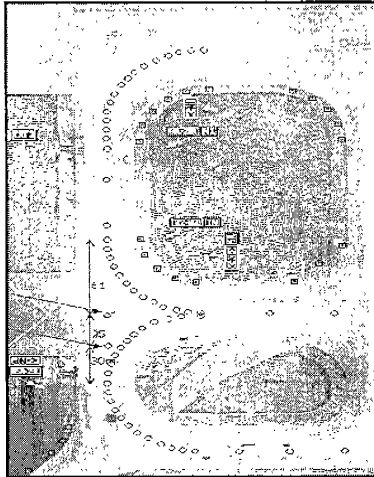
SQ006 Investigation - ASC



## During the Turn

As Captain turned

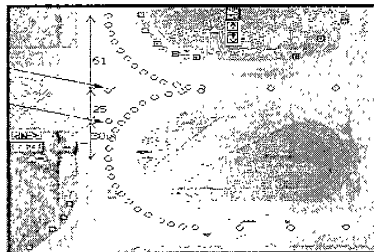
- had a flash view of the piano keys.
- did not notice any further green lights ahead and along taxiway N1.
- did not recall seeing any runway identification signboard or identification markings on the runway.



SQ006 Investigation - ASC

## What the Captain Was Thinking

- During the turn from NP through N1 to RW 05R
  - Captain was taxiing the airplane.
  - The First Officer was engaged in executing the Before Takeoff Checklist items.
  - The Relief Pilot was involved with crosswind calculations.



SQ006 Investigation - ASC



## Lining Up Runway

- As the airplane was lining up, Captain said that
  - could see the centerline light running down the runway
  - 80% sure that he also saw the runway edge lights
  - He later stated in a subsequent interview that he was not as sure about the status of the runway 05R edge lights as in the earlier interviews.
- The First Officer and the Relief Pilot stated that
  - noticed the centerline lights on the runway.
  - did not notice the runway edge lights.
  - did not see any runway identification signboard or markings.

SQ006 Investigation - ASC

- All three pilots were
  - convinced that they were on runway 05L.
  - did not see any objects obstructing the runway in the distance.
  - aware that R/W 05R was closed, but could be used as a taxiway.

SQ006 Investigation - ASC

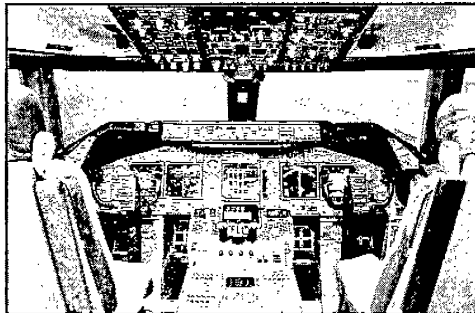
## Runway Edge Lights

- ATC stated that the edge lights of RW 05R were "OFF"
- Witnesses's statements regarding runway edge lights were inconclusive
- 05R runway edge lights wire test results were inconclusive

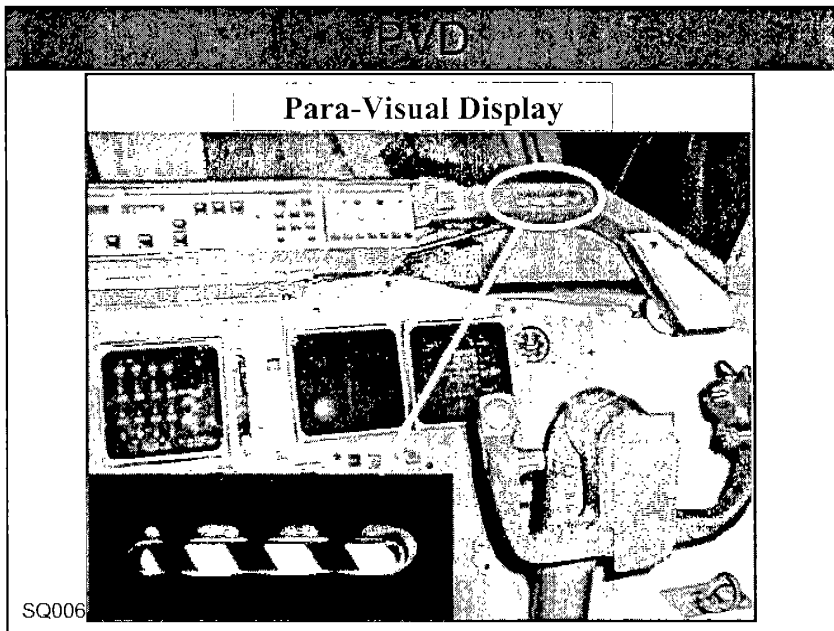


SQ006 Investigation - ASC

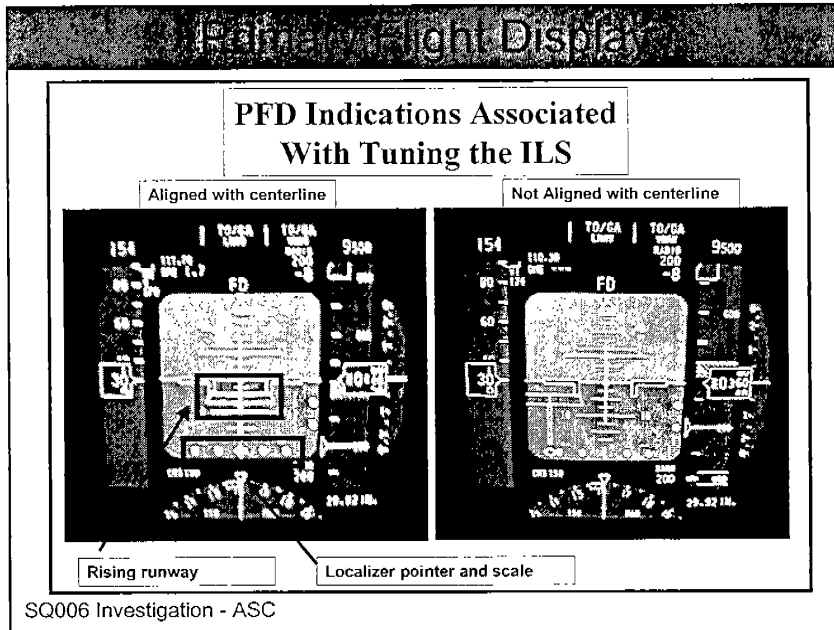
- Information available to the pilots in the cockpit
  - PVD
  - PFD



SQ006 Investigation - ASC



- When airplane was lining up R/W 05R, the PVD did not "unshutter"
  - The crew did not follow up on the reason for the PVD not coming on when the aircraft was lined up on R/W 05R.
  - Captain decided to disregard the PVD because he was visual with the runway.
- SQ006 Investigation - ASC



- The Aerodrome Controller was unable to see the airplane after it passed the intersection of WC and NP.
- CKS airport currently has no technological capability to assist flight crew taxi navigation in low visibility/poor weather conditions.

SQ006 Investigation - ASC

## Primary Emphases of the Investigation

- **Human Factors**
  - Interaction between operators and ATC, Weather, Airport
  - Organizational factors
  
- **Survival Factors**
  - Fire and rescue
  - Evacuation procedure
  - Doors and slides

SQ006 Investigation - ASC

附件一

澳洲與紐西蘭飛安調查員協會澳洲區飛安研討會光碟