



Landing on a Closed Taxiway

Saudi ARAMCO Boeing B737-800, Registration N803XA

Wejh Domestic Airport (OEWJ) Kingdom of Saudi Arabia

Case Study: AIG/2 Jeddah, 13 September 2022



Flight Routing





Bird's eye view of OEWJ





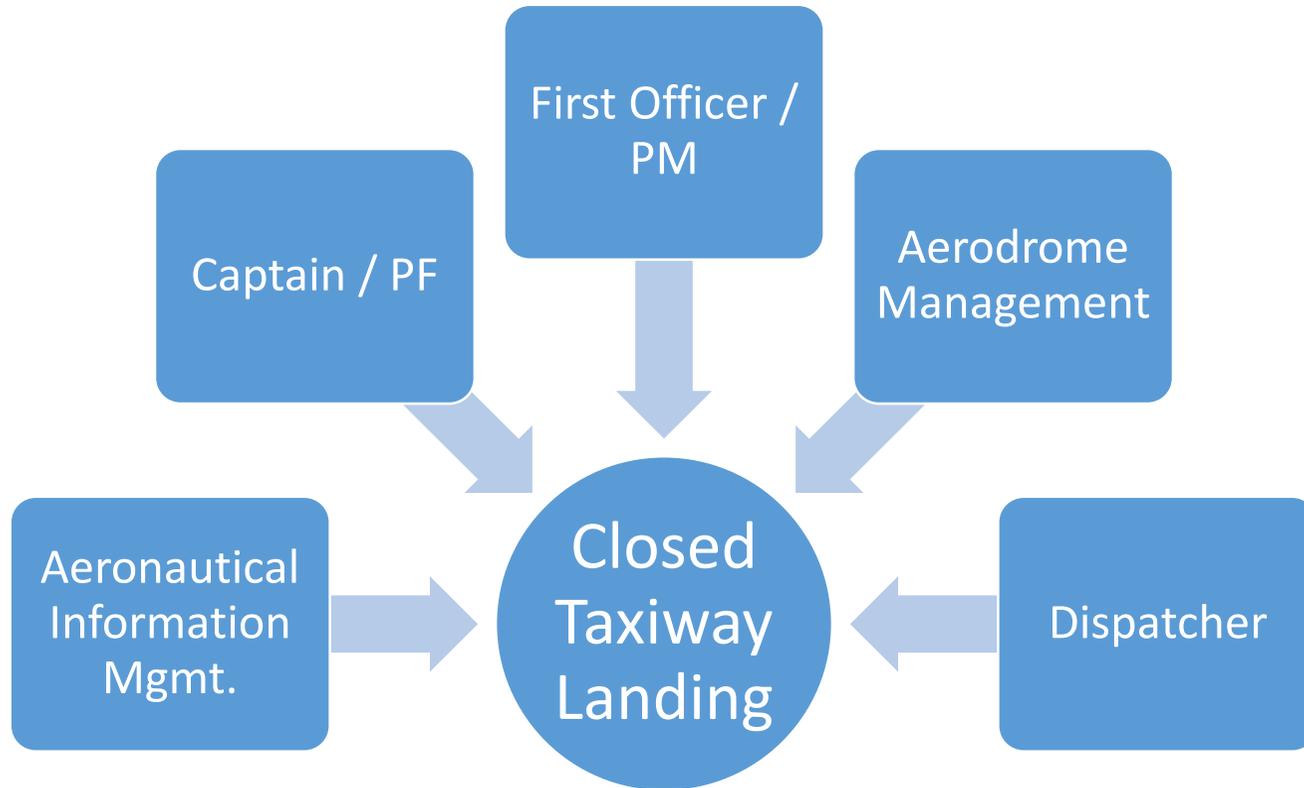
Landing During
Construction



post
Construction
Landing



Main Players of the Event





Sequence of Events by Phase of Flight

	Phase	Significant Remark
1	Pre-Flight Briefing	NOTAMS referred to but not discussed
2	Cockpit Preparation	CDU entries with NOTAM cancelled RNAV Approach
3	Taxi-Out	Uneventful
4	Takeoff	Uneventful
5	Climb	Uneventful
6	Cruise	Uneventful
7	Top of Descent	Confused and erroneous Crew coordination
8	Approach	Stable approach following a cancelled procedure
9	Landing	Late recognition of Taxiway Closure Status – rollout clear of construction objects
10	Post Landing	Makeshift maneuver to a stop and passenger disembarkation



**NOTAM Cancelled RNAV
Approach inserted in
FMS**

Flight group apt OEWJ - EJH - WEJH DOMESTIC RWY 15 15L 33 33R

A0286/19 NOTAMN

Q) OEJD/QMRXX/IV/NBO/A/000/999/2612N03629E005

A) OEWJ B) 1902161401 C) PERM

E) MAIN RWY 15/33 OPN FOR LDG AND TKOF

MAIN RWY 15/33 ASPH LEN 3062M, WID 60M AND PCN 60/F/A/W/T

SIMPLE ALS 420 LIH AVBL AT MAIN RWY 33

TWY A ASPH PCN 63/F/A/W/T

LINKS A1,A2,A3 AND A4 ASPH PCN 60/F/A/W/T

TXL APN 2 ASPH PCN 80/F/A/W/T

APN 1 CEMENT CONC PCN 49/R/A/X/T

APN 2 CEMENT CONC PCN 80/R/B/W/T

APN 3 ASPH PCN 78/F/A/W/T

MAIN RWY 15 LAT: 261238.24N, LONG: 0362806.81E THR ELEV 65FT AMSL

MAIN RWY 33 LAT: 261111.62N, LONG: 0362900.98E THR ELEV 66FT AMSL

MAIN RWY 15 TORA/LDA/ASDA 3062M, TODA 3337M

MAIN RWY 33 TORA/LDA/ASDA 3062M, TODA 3317M

NON SKED FLT HAVE TO COOR THEIR OPR TIMES WITH AP MNM 24 HR BFR ARR

EDGE LGT AVBL FOR TWYS A1,A2,A3 AND A4, APN1 AND APN2

AIP AIRAC SUP 03/18 WEF 1 MAR 2018 ITEM S02 CNL

AIP SUP 05/18 WEF 18 OCT 2018 IAP RNAV (GNSS) FOR TEMPO RWY 15/33 CNL

IAP VOR/DME MAIN RWY 15 PAGE AD2-OEWJ-13 AND 14 SUSPENDED

IAP VOR MAIN RWY 15 PAGE AD2-OEWJ-17 AND 18 SUSPENDED

MAIN RWY 15 OPN FOR VFR FLT

CTC DOM AP OPS ON 00966503578765 MNM 24 HR PRIOR TO NON SKED OPS.

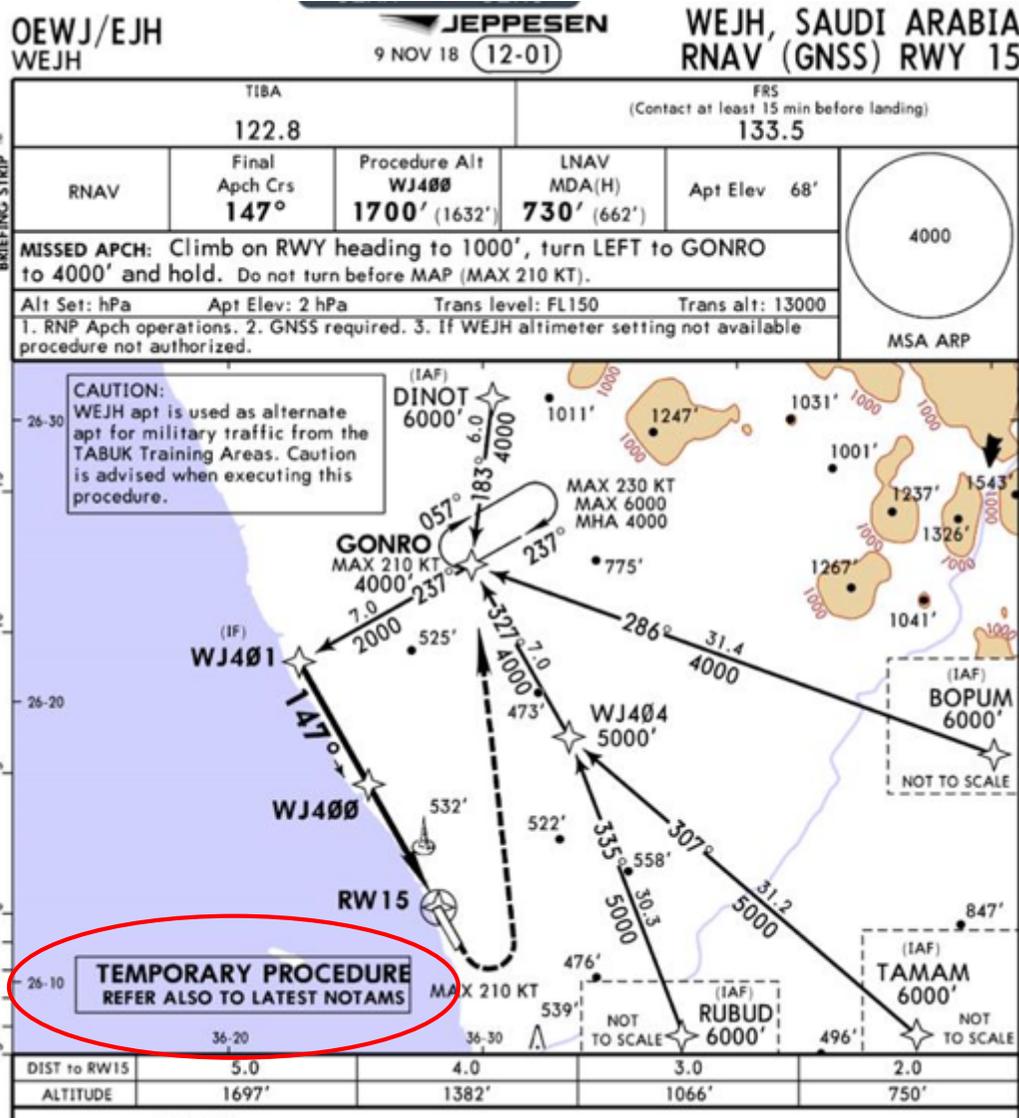
A0265/19 NOTAMN

Q) OEJD/QMXLC/IV/M/A/000/999/2611N03628E005

A) OEWJ B) 1902161401 C) 1903160801

E) TWY A CLSD EXC INT WITH A3

A1,A2 AND A4 LINKS CLSD



[twy | 9]

II, III



Flight Tracking 500' to touchdown Synchronized with CVR (1/3)



Autopilot: DISCONNECT
Flight Director: Displayed
Height: 460 ft AGL descending
Vertical Navigation: On VNAV Path
Lateral Navigation: LNAV Tracking
Configuration Assessment and/or Note Established on short FINAL – HAND FLYING; Stable Approach, AIRSPEED and SINK Rate are at targets;
Visibility of 4.5 KM allowed for surface markings on Taxiway Alpha and main Runway 15 to be distinguishable; PIC verbalizes “X” on main runway 15 SIC does NOT see “X” mark

At 500 feet; hand flying; at approximately 1.5 NM from touchdown



Flight Tracking 100' to touchdown Synchronized with CVR (2/3)



Autopilot: DISCONNECT

Flight Director: NO GUIDANCE

Height: 100 ft AGL descending

Vertical Navigation: REMOVED (terminated at MDA)

Lateral Navigation: Engaged with NO DISPLAY

Configuration Assessment and/or Note: HAND FLYING; Speed and Sink Rate are at target; Taxiway Alpha obstruction blocks within visible range.



Flight Tracking Flare & Rollout Synchronized with CVR (3/3)



Pilot Monitoring: Called for GO AROUND

Pilot Flying: Did not execute GO AROUND

Landing Roll: Speed Brake fully extended and Manual Braking

Configuration Assessment and/or Note : PIC applied manual and positive brake application with No “BRAKE OVHT” condition

Continued roll to end of Taxiway Alpha followed by a 180° turn maneuver to a full stop in the closed apron (APN-1) and engine shutdown

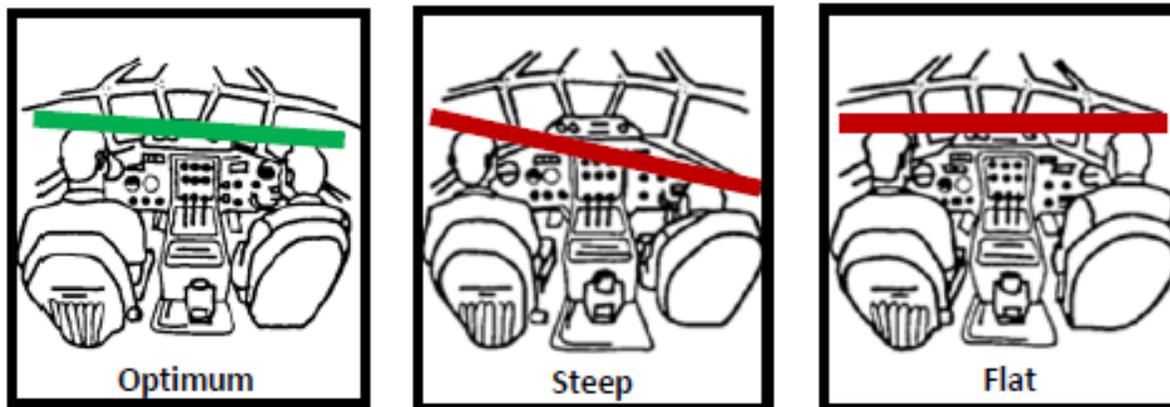


Personnel information

	PIC	SIC
License:	ATPL	CPL
License rating:	Single and multi-engine land instrument	Single and multi-engine land instrument
Date of issue:	11 JAN 2014	26 SEP 2018
Medical certificate class:	First Class	First Class
Date of issue:	05 FEB 2019	20 NOV 2018
Limitation	Must wear correctives lenses	Must wear correctives lenses
Total Flying Hours:	2675	280
Hours on Type:	932	280
Hours on Type Last 90 Days:	186	239
Hours on Type Last 30 Days:	56	75
Hours on Type Last 72 Hours:	3:25	6:08
Hours of Rest Prior to Duty:	36	36

The PIC has the following ratings: Airplane Multi-Engine Land: B737 , CE-500, DHC-8, ERJ-170, ERJ-190 and HS-125.

Trans Cockpit Authority Gradient (TCAG) Effect



The term 'Trans-Cockpit Authority Gradient' can be defined as the established, and/or perceived, command and decision-making power hierarchy in a flight crew and describes how a large variable within a flight crew's experience might influence effective teamwork and communication. A less than optimum gradient occurs when the PIC's role is either over-emphasized (steep gradient) or under-emphasized (flat gradient). An SIC is likely to effectively communicate and query the PIC when an optimal trans-cockpit authority gradient is present.

When a steep authority gradient is present between the flight crew, questioning or communicating doubts of the current plan of action can require considerable effort due to the fear of reprisal or being wrong. A steep authority gradient can result in unsafe situations remaining unchallenged.

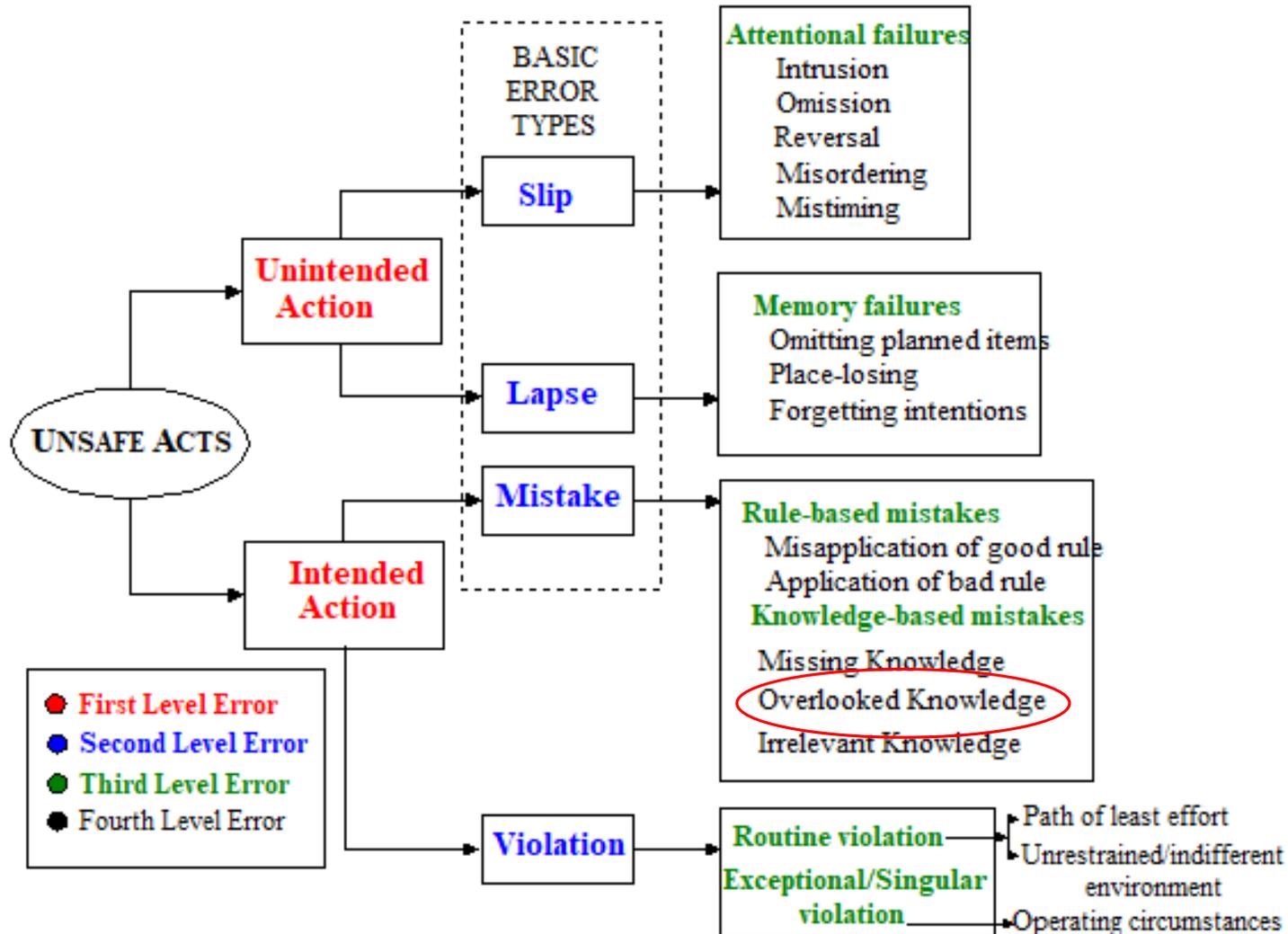
Risk Mitigation Matrix



TOPIC	(A) ARAMCO FLIGHT OPERATIONS							(B) GACA		
	PIC, SIC AND DISPATCHER ARE FAA LICENSED AND ARAMCO TRAINED AND SKILLED FOR OPERATIONAL DUTIES UNDER FAA 14 CFR PART 125 OC REQUIREMENTS AND COMPANY PROCEDURES							REGULATIONS & GUIDANCE OF: ICAO ANNEXES 14, 19, AND DOC 9981; GACAR PART 139, AND PART 5		
	CAPTAIN (PIC AND PF)			FIRST OFFICER (SIC AND PM)			DISPATCHER		AERODROME MANAGEMENT	AERONAUTICAL INFO.MGMT
CRITICAL ELEMENT	OPERATIONAL ELEMENT	RISK REDUCTION FACTORS	STATUS	ADDITIONAL ELEMENT	CONDITION		NOTAM "BRIEFING" RESPONSIBILITY		TRANSITION FROM: CLOSE-TXY A TO OPEN-RWY 15 (10 DAYS PERIOD TO EVENT)	INFORMATION MANAGEMENT FROM DATA RECEIVE TO NOTAM PUBLISH
							BRIEFED	NOT BRIEFED		
NOTAM A0265/19 TAXIWAY A CLOSURE	READ FULL TEXT	ⓐ MULTIPLE OPPORTUNITIES TO READ ON- HAND DISPATCH PACKAGE INFORMATION ON GROUND OEDF AND OERR AND IN- FLIGHT; ⓑ IMPLEMENT CRM PRACTICES ⓒ VISUAL RWY & TXY MARKINGS	NOT READ	DISPATCH BRIEFING	ATTEND AND PARTICIPATE	ABSENT	✓	✗	! "X" MARK MISSING IN TEMPORARY RWY	✓
NOTAM A0286/19 RNAV 15T CANCELLED	READ FULL TEXT		NOT READ	NOTAM COMPREHENSION	SATISFACTORY	UNSATISFACTORY	✓	✗	◆	✓
NOTAM A0286/19 MAIN RWY 15 OPENED FOR LDG AND TAKEOFF	READ FULL TEXT		NOT READ	INFLIGHT PIC AND SIC DUTIES FOR NAVIGATION AND VISUAL MARKINGS CALLS	SATISFACTORY	UNSATISFACTORY	✓	✗	! "X" MARK ONLY AT THRESHOLD-VERY FAINT IN MAIN RWY	✓
PROBABLE OUTCOME	LANDING ON MAIN RWY 15		LANDING ON TXY A; FLYING RNAV 15T APPROACH	◆	LANDING ON MAIN RWY 15	LANDING ON TXY "A" FLYING RNAV 15T APPROACH	LANDING MIAN RWY 15	LDG ON TXY A FLYING RNAV 15T APPROACH	<u>Conflictig Strip</u> <u>Markings</u>	LANDING ON MAIN RWY 15



The “WHAT”; “HOW” covered; we move to the “WHY”





Safety Recommendations

4.1 Safety Actions (Performed):

OEJW airport authority fully obliterated temporary Runway-15 markings and placed cross runway markings beyond both extremities of TWY-A to indicate its closure. This post event action provided an additional safety measure as a initiative.

4.2 Safety Recommendations:

AIB-2019-0034-SR-01 : Saudi ARAMCO Aviation Department to introduce risk controls, ensuring procedural items of primary importance (4.6.1 of ARAMCO's FOM) are effectively followed during the preflight aircrew briefing.

AIB-2019-0034-SR-02 : Saudi ARAMCO Aviation Department should revisit its Crew Resource Management (CRM) training program to ensure the effectiveness of the "Trans Cockpit Authority Gradients" and disseminating the lessons learned.



Thank you.
Questions/Comments
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