SYNOPOSIS

About 0541 Mexico Central Time on October 31, 1979, a Western Airline DC10-10 operated as flight 2605 crashed at the Mexico City Benito Juarez International Airport while attempting to land. Of the 89 persons on board, 73 were killed, 15 were seriously injured and one slightly injured. At least one person on the ground was killed and an undetermined number received lesser injuries. Aircraft was destroyed as were several buildings and ground service equipment.

Flight 2605 was making an approach to the airport in reported VFR conditions when it touched down in the dirt and on the left edge of Runway 23L, which was closed to traffic. A missed approach was initiated. During this maneuver, the aircraft struck a loaded dumptruck. The aircraft continued to fly for approximately 23 seconds before impacting airport buildings and ground equipment. After an extensive investigation, the Air Line Pilots Association is unable to determine the probable cause of this accident. The major contributing factors include:

1. Unavailability of accurate weather observation.
2. Ambiguous Air Traffic Control Clearances.
3. Pilot and Controller fatigue.
4. Flight Crew failure to follow established procedures.

There are many secondary contributing factors which will be discussed in the Analysis Section. The investigation continues to be open at this time.

The Air Line Pilots Association was notified of this accident almost

immediately. On sight investigation, under the auspices of the Mexican Servicio a La Navegacion e el Espacio Aereo Mexicano (SENEAM), equivalent to the US FAA began on the afternoon of October 31, 1979. Active participants in the investigation included the following organizations:

Servicio a La Navegacion en el Espacio Aereo Mexicano

National Transportation Safety Board

Federal Aviation Administration

Western Air Lines, Inc.

General Electric Company

McDonnell Douglas Aircraft Company

Association of Flight Attendants

Air Line Pilots Association

Allied Pilots Association (Observer)

FACTUAL INFORMATION

History of the Flight

On October 31, 1979, Western Air Lines Flight 2605, A DC-10-10, (N903WA), operated as a delayed passenger flight from Los Angeles, California to Mexico City, scheduled to depart Los Angeles at 0840 (All Times GMT).

Originally the flight had been scheduled to depart as Flight 605 at 2340 October 30, 1979. However, the aircraft planned for this flight developed a mechanical problem earlier in the day and aircraft N903WA was used as substitute equipment. This aircraft was not scheduled to arrive in Los Angeles until about 0730. Therefore, a delayed departure time was established and the flight number changed.

The Captain and Second Officer arrived at the airport one hour before the revised departure time. The First Officer however, due to his commute from Seattle, had arrived in Los Angeles about two hours earlier.

Flight 2605 departed Los Angeles at 0927 with 77 passengers and 10 crewmembers, plus 2 deadheading flight attendants. Estimated arrival time in Mexico City was 1148. Los Angeles Air Route Traffic Control Center (ARTCC) handed off control of the flight to Mazatlan (Mexico) ARTCC as the flight crossed the international Boarder southeast of San Diego at 0918. The Captain was flying and the First Officer was handling the communications. The flight continued uneventful, cruising at Flight Level 370. When the flight made its position report over Durango, Mazatlan ARTCC cleared the flight to contact Mexico ARTCC

over the Gaby intersection, 238 nm northwest of Mexico City. This was done, however communications with the Center were initially intermittant, but improved as the flight progressed toward Mexico City.

In transcribing the Cockpit Voice Recorder (CVR), the tape was found to be partially erased in a cyclic manner; 2.3 to 3.8 seconds were readable and 1.6 to 2.0 seconds nil, resulting in a 35% loss of intelligibility. As the flight neared the Queretaro VOR 102 nm northwest of the Mexico City airport, the Captain observed that, "Course if good all of a sudden, it ---". There was no further elaboration recorded on that subject until later during the approach. The flight requested a lower altitude and when radar contact was established by Mexico ARTCC at 1122:52, the flight was cleared to descend to 13,000' and proceed direct to the Tepexpan radio beacon and further to expect an ILS approach to runway 23 left. The Captain and First Officer agreed at this time that they would make a Tepexpan approach, which is actually the transition that leads to the ILS approach for runway 23 left.

During the descent while monitoring Mexico Flight Information Service (FIS) frequency, the Second Officer overheard Condor Flight 364 receiving the Mexico City airport weather. The Second Officer copied this weather information which was given as, "Partial obscure, visibility 3 miles, haze, smoke, fog, temperature 09, dew point 07, wind 060 7 knots, altimeter 30.20." The Second Officer then called FIS, giving his ETA at the gate as 46 past the hour and that they would have 26,000# of fuel on arrival. He advised that he had copied the weather except for the wind. FIS repeated the wind directio and velocity and advised flight 2605 that they would be using gate eleven. The Second Officer "Rogered" that information and then called back asking what runway was in use. FIS replied "twenty-three". The Second Officer read back, "Understand

runway two three". FIS replied "Roger". The Second Officer gave this information to the Captain and First Officer, adding verbally, "Runways two three, Charlie".

The In-Range checklist was started and all items of the checklist were accounted for on the CVR, except the Captain wanted to keep the Inertial Naviagation System (INS) information on his Horizontal Situation Indicator (HSI) until they were closer to the Tepexpan radio beacon. At 1128:17 control of the flight was changed to Mexico Terminal Arrival. At 1132:27 following clearance was issued: "Western 2605, descend to one one thousand, cleared for Tepexpan two three right". The First Officer replied, "And was that a Tepexpan arrival for 2605?" Terminal Arrival replied, "That is correct". At that time the Second Officer brought the Captain's attention to the fact that his HSI was still in the INS mode. Second Officer, "You are in RAD (HSI receives and displays ILS and VOR data) now, right?" Both the Captain and the First Officer replied, "Right". The Second Officer followed up with "Just checking up ole buddy to make sure, - in-range check complete, Charlie". At 1135:15, Terminal Arrival Control advised that the tower was reporting ground fog on the runway with 2 miles visibility on final approach. About 30 seconds later the Captain asked to have the slats extended and the First Officer briefly mentioned their alternate airport, Guadalajara. At 1136:21Z, the Captain requested 22 of flap. Twenty three seconds later at 1136:44 the flight passed over the Tepexpan radio beacon at 11,000' on a magnetic heading of 133 at an indicated airspeed of 185 Kts. True airspeed was 220 Kts with a wind component of plus 8 Kts giving the flight a ground speed of 228 Kts. The Captain asked that the ADF radio be changed from the Tepexpan frequency to the Mike Echo outer marker radio beacon frequency. He also requested that the instrument approach checklist be initiated. The aircraft was being slowed with the altitude and

heading remaining fairly constant for the next 50 seconds. By this time power had been reduced to flight idle on all engines and the indicated airspeed was 163 Kts. At 1137:23 the ILS leadin radial of 035 from the Mexico VOR was passed and 10 seconds later a pronounced right turn was started. The turn was continued for 95 seconds at a rate of 1.1 per second, rolling out on a heading of 246 . During this time the outer marker coded identification, Mike Echo, could be heard on the CVR. The instrument approach checklist progressed but was interrupted at 1137:46 Z when Terminal Arrival Control advised the flight that radar service was terminated and to change to tower frequency. The instrument approach checklist was completed and all items accounted for with the Second Officer challenging and the Captain and First Officer responding. At 1138:25 the flight made contact with the Mexico City tower and was advised, "Two three right approach, report over Mike Echo, wind calm". Flight 2605 replied, "Roger". At this poing the aircraft was descending through 9,600', had slowed to 156 IAS and was passing through the ILS localizer course on a heading of about 190 having completed about 50 of the required 100 turn to intercept the ILS. The turn continued to a heading which would re-intercept the ILS from the left. When the aircraft rolled out on a heading of 246 at 1139:07, it was about 3,600' left of the extended localizer course, 1nm east of the outer marker, 40' below the extended glide slope. At 1138:47 the Captain called for the landing gear down and 20 second later the Second Officer began to read the landing checklist but was interrupted when the Captain said, "What happened to that damn radio?" Followed by, "The whole damn thing just, ah, quit. I don't have any --". The CVR faded here for about 1.75 seconds, but when it came back the Captain repeated, "I don't have any, ah, --", before it faded out again for another 1.75 seconds. When the CVR came back on, the Captain was asking for 35 of flaps, (Landing Flap), simultaneously the 400 cycle outer marker signal could be heard in the background and the First fficer

commented, "It just died". Passing a beam the outer marker at 1139:23, the flight was about 2,400' left of the localizer and 120' below the glide slope. The Second Officer continued with the challenge portion of the landing checklist with the Captain and First Officer responding to their items. Sixteen seconds later, 1:24 before touchdown, the First Officer called and advised the tower that the flight was, "Inside mike echo". The tower replied, "Advise runway in sight". The Controller then asked, "Do you have your lights on?" and without waiting for a reply, advised the flight, "Western two six oh five, you are to the left of the track". The crew agreed with the Captain saying, "Yeah, we know", and the First Officer replying on the radio, "Just a little bit". The Captain then commented, "# # track (was not working) too good, I'll tell ya". As this was happening the Second Officer was making a P/A announcement that they would be landing shortly and for the flight attendants to be seated for the landing. Five seconds later, the tower again requested the flight report when the runway was in sight and advised further that, "there is a layer of fog over the field". Three second later at 1140:09 the ground proximity warning system activated emitting the words, "Glide slope, glide --.

At this time the flight was 120' below the glide slope, but still 671' above touchdown elevation. It was 975' left of the localizer, heading 241 with an indicated airspeed of 136 Kts (ground speed about 160 Kts.)

This was followed by the sound of increasing power and Captai saying that the, (automatic) "throttles are too # slow," and requesting the First Officer to, "set the missed approached (altitude, heading and) fifteen bank". The Second Officer continued with the challenge portion of the before landing checklist and again with the Captain responding. At 1140:35 the aircraft was 324' above the touchdown elevation and about 1.2 nm from the runway threshold the tower

queried the flight, "Two six oh five, do you have approach lights on left insight?" Simultaneously the Captain said, "Negative", as the First Officer replied, "Negative", over the radio. The tower came back with, "Okay sir, Okay, approach lights are on runway two three left, but that runway is closed to traffic". The First Officer replied, "Okay, 2605". When this exchange concluded at 1140:47 the middle marker 1300 cycle signal sounded faintly in the background. Almost simultaneously, with the other crew members, the Captain said, "We're clear on the right. We're clear on the right, is that correct?" The First Officer said, "The other runway" and the Second Officer said, "Yeah, the right". At that point, the CVR went to the 1.75 second erase cycle and when it came back on the Captain was saying, "No, this is an approach to the _____ _____ left", and the CVR faded again.

Altitude at this poing, 1140:55, was 140' above the runway touchdown zone. The aircraft was about 350' left of the runway center line and .24 nm from the threshold, less than 15' below the glide slope. When the CVR came back in the First Officer said, "Yeah, climb to eighty five hundred". Again the CVR faded and then recorded the First Officer saying, "Charlie, I have -", interrupted by the sound of heavy touchdown. Immediately afterward the Second Officer rapidly said, "(No or low) visibility here --------", followed by the sound of structual impact. Just prior to impact as the Second Officer was speaking, the Captain called out, "Oh, no."

The FDR indicated that the vertical acceleration of touchdown began at 1141:02.75, peaking at 1141:03 with a maximum force of 2.026g, decreasing to .543 at 1141:03.75. At 1141:05.5 an impact occurred, indicated by a lateral force of -.829g. Airspeed decreased from 136 KIAS at 1141:03 to 128 KIAS at 1141:07.

Tire marks indicated the aircraft touched down on the left main landing gear in the dirt, left of the left shoulder of runway 23 left, about 500' beyond the threshold. The right main landing gear tire marks began on the paved shoulder about 33' beyond where the left gear touched ----- about 18 inches inboard of the pavement edge. Pitch attitude of the aircraft at touchdown was 2.46 nose up and had decreased about 2.5 during the last 15 seconds of flight. Engine power indications were virtually unchanged until 1141:12 when, according to the FDR, N1 on all engines had been increased to a little over 100%. Four seconds later power was reduced to about 70% N1. Just prior to final impact power on number 3 engine had been increased to 95% N1. Almost simultaneously with touchdown, pitch began to increase reaching a maximum of 11.6 4 seconds after touchdown. The nose gear did not contact the ground at anytime. Five seconds after touchdown, the landing gear warning horn was sounding and the First Officer said "Fly heading --- ", as the CVR faded. Two seconds later, the Second Officer said, "Charlie, cut the ---". Fifteen seconds before final impact, the First Officer called for the gear up and later advised, "You're banking to the ___". The Captain expressed amazement and frustration with the situation. During this period, engine sounds were similar to those heard during a normal takeoff.

After the aircraft initially touched down, it continued along the ground for about 400' on the main landing gear. At that point, the right main landing gear lifted off and almost at the same instant struck a loaded dump truck proceeding northeasterly along the left hand shoulder of runway 23 left. The right main landing gear assembly was severed and as it swung aft, it and the destroyed truck wreckage impacted the right inboard flap and aileron, which were carried away. This wreckage continued aft tearing all but 18 inches of

the right horizontal stabilizer from the aircraft, along with both inboard and outboard rightside elevators. The aircraft continued airbourne flying just clear of the ground. An increasing and apparently uncontrollable bank to the right commenced and by 1141:17 had reached 12 right wing down. At that point the inboard flap hinge fairing beneath the right wing contacted the top of a tracked backhoe excavator located 75' beyond the right edge of runway 23 left, 5,100' from the threshold. The excavator was involved with the airport construction work with the cab being occupied until 1.5 seconds before it was struck. The aircraft continued flying in a right turn until the right wing tip began making contact with the ground near taxiway Alpha and runway 13, whereupon it struck a telephone junction box causing a flash fire there. Wing tip contact continued along the ground as the bank angle increased to about 43 . The wing tip then struck a mobil lounge garage, ground support vehicles, parked trucks and cars parked in the area. Fire erupted almost immediately. The aircraft began a rapid rotation about the wing tip with the nose of the aircraft finally impacting a two story concrete steel reinforced building on a heading of approximately 060 . The impact and fire destroyed the aircraft several buildings and an undetermined number of ground vehicles. Final impact occurred at 1141:29.

FLIGHT DOCUMENTS

The flight documents consisted of a computer generated flight plan/flight release showing the selected route; primary cruising altitude; secondary cruising altitude; required company reporting points; the estimated time enroute; fuel burn to destination; flag reserve, IFR alternate, reserve and holding fuel requirements. In the flight plan format were NOTAMs pertinent to the flight. the only NOTAM relating to the Mexico City airport stated: LCL...RWY 5R-23L CLSD UFN...MEXOO 10190700Z. (Local Runway 5 right-23 left closed until further notice as per Mexico Operations October 19 at 0700Z). Also included on the flight plan was an aircraft Mininum Equipment List advisory note which stated that the on aircraft 903, "the number one pneumatic regulator valve was closed".

On a separate form was the current and forecasted weather pertinent to the flight. (See section _____).

NOTAMs

On October 18, 1979 Servicio a La Navegacion en el Espacio Aereo Mexicano, (SENEAM), (equivalent to US FAA) released a summary of NOTAMs (NOSUM), for the Mexican airspace generated in the past 24 hours. NOTAM's which relate to runway 23 left at Mexico City are translated as follows:

No. 2815 - 171610Z (date/time) - Runways 5R/23L and 5L/23R. Effective October 181400Z runway 5R/23L will be closed for construction work (to level) until further advised. Runway 5L/23R will remain open between intersections of Taxiway Alpha and Hotel

effective October 171700Z with the following specifications. 5L usable length 3500 meters for takeoff on request. 23R usable 3100 meters for takeoff. VASI's certified on 5L with descent angle of 2.7 for first and second bar and 3.2 for the third bar.

No. 2819-171730Z- Mexico. Runway 5R closed to traffic effective 171945Z account disabled aircraft, until further notice.

No. 2833-191640Z- Mexico. Runway 5R/23L open all length.

The NOSUM of October 22, 1979 included the following NOTAM.

No. 2841-191920Z - Mexico. Runway 5R/23L closed from 192000Z until further notice. NOTAM 2815 is activated.

NOTAM's, both SENEAM and FAA, received at Western Air Lines operations office are reduced and simplified and entered into the flight plan computer. When a flight plan for certain airport pairs is called up, the computer print out includes pertinent NOTAM's, as abbreviated, for that flight.

Prior to the departure of flight 2605 the Captain signed the standard form, (WAL of 4094) acknowledging receipt of the Flight Plan/Flight Release, Flight Weather for the city pairs along with the date/time group of their issuance.

AIRCRAFT INFORMATION

N 903WA, a DC10-10, was owned and operated by Western Air Lines. It was equipped with three GE CF6 dual-rotor high by-pass ratio turbofan engines. In addition to required navigational radio and flight director systems, the aircraft was equipped with dual Inertial Navigation Systems (INS). Seating configuration was 24 first class and 246 coach class.

As there was no Maintenance Records Group formed during the Field Investigation, examination of such documents as would normally be apart of an accident investigation of this magnitude, was not permitted. Flight Deficiency Reports (FDR's), regarding N 903WA for the previous three years, were requested and supplied by the FAA. These computer readouts were reviewed in detail, but no particular trend or pattern of mechanical or electrical problems could be established. Industry DC10 FDR's for specific areas of concern, such as; electrical, flight controls, structures, flight guidance systems, hydraulic systems were also searched and compared with N 903WA reports. While this provided an almost infinite combination of possibilities for speculative thinking, nothing concrete was established. Therefore, the aircrafts Flight Data Recorder and Cockpit Voice Recorder were relied upon, to the extent possible in ascertaining the airworthiness of the aircraft during descent, approach and landing. From this evidence it appears that the aircraft was airworthy and capable of performing its mission as prescribed.

Prior to departure from Los Angeles the aircraft was fueled to 68,400# (10209 gallons) of Jet A type fuel, with a proposed burn of 41,580# to Mexico City. he aircraft weighed 342,222# at takeoff. Landing weight at Mexico City was approximately 302,143#. The aircraft was within allowable center of gravity

limitations for the operation.

AERODROME AND GROUND FACILITIES

The Mexico City Airport is located in the Mexico Valley at the east edge of the city surrounded by high mountainous terrain on all sides. The major runways are oriented northeast/southwest. The approach from the northeast lies over a lake bed which is often dry with only a scattering of ground lights. Concentrated city lights begin at the northeast airport boundary and extend from the east to the south, west and north. The field elevation is 7,341 feet above sea level.

There are two major runways. Runway 23R/5L is listed as being 11,221 feet in length and 131 feet wide with an asphaltic surface. The full length is only available on a request basis, with 10,171 feet normally being available. Touchdown elevation for 23R is 7,339 feet and for 5L 7,333 feet. Runway 23L/5R is 12,796 feet long and 148 feet wide, also with an asphaltic surface. Touchdown elevation for both 23L and 5R is 7,333 feet. Though both runways are slightly undulating, there is virtually no slope factor to either. Standard runway markings are used. Runway separation is 300 meters or about 985 feet. The runways are offset, with the threhold of 23 right being 3000 feet further south westward than 23 left. For noise abatement purposes, runways 23 left and 23 right are the preferred runways for landing with 5 left and 5 right for takeoff.

PUBLISHED RUNWAY AND APPROACH LIGHTING

Runways 23R/5L have high intensity runway edge lights, and a 3 bar VASI (Visual Approach Slope Indicator light system) and Runway End Identifier Lights for each landing direction. Runways 23L/5R have high intensity runway edge

lights. 5R has Runway End Identifier Lights and 3 bar VASI system. 23L has standard Approach Light System Sequence Flashing Lights - Type I and a standard VASI system.

Runway, taxiway and approach lights are controlled from a substation located near the terminal area at the southwest corner of the airport. A technician is stationed at a position remote from the actual control room. Communications from the tower controller to the technician are via telephone and/or walkie-talkie radio. When the technician receives a request for a lighting change; i.e., increase or decrease lighting intensity, turn taxiway or runway lights on or off, he must leave his position and proceed to the adjacent control room, some 120 feet distant, to make the requested change. Investigators visited this area 24 hours after the accident. In the control room were a number of large electrical junction boxes which were labeled as to the lighting area each box controlled, i.e.; runway, taxiway, approach, VASI etc. It was pointed out and confirmed by the investigators that the main electrical lead wires from a control unit labeled 23L ILLEGADA, said to be that which controlled the approach lights for runway 23 left, were disconnected and taped over. Investigators were further advised that this system had been disconnected since October 24th or 25th. Adjoining this same area was a room which was observed to contain a large number of runway edge light fixtures. Investigators were told that this equipment had previously been installed on runway 23L/5R and had been removed 7 to 10 days prior to the accident. No documentation was presented confirming the dates the equipment had been removed or disconnected.

Investigators were provided with a statement signed by the Technical Deputy Manager of the Mexico City airport stating that the High Intensity Runway Lights on 23 left were removed at the time of the accident. Also that all

approach light systems, the VASI lights and REIL lights were off on that runway. The statement declared further that all lights and visual aids for runway 23 right were operating normally. Inspection of the approach and touchdown areas of Runway 23L revealed that a great deal of construction was in progress; however, the runway surface was in usable condition. There were no markings conventionally used indicating that the runway was closed. Painted runway edge stripes and other markings were in good condition. There were no runway light fixtures installed. There were a considerable number of 5, 20 and 40 gallon containers in this vicinity which showed recent signs of having combustible fluid burned in them. These were located near the runway and threshold areas and along taxiway Alpha between Runways 23L and 23R. During the hours of darkness it was observed that these containers were lighted and buring, showing a considerble flame. They were apparently used to illuminate and mark the construction areas. Witnesses stated that just prior to the accident occurring there were six dump trucks in used on or near runway 23 left. The route of travel began from a point on the right side of the runway, 5100 feet from the threshold, where a tracked excavator loaded them. They crossed the runway there and proceeded northeast along the left or south edge of the runway to a point near the glide slope antenna building where they dumped their load. There was a second excavator working along the runway southwest of the first one. On taxiway Alpha, between the runways, there were two boom cranes extending upwards about 40 feet, in addition to other smaller equipment working there.

Inspection of the approach end of Runway 23R revealed that there were no Runway End Identifier Lights installed as published. Inspection of the 23L approach light system in the ground arra of the approach zone was not allowed by government authorities. However, at a later date, a drive around that area was

accomplished. Investigators noted that there was a large mound of dirt approximately 60 feet in height, perpendicular across the approach path, 2 1/4 miles from runway 23 left threshold. It was not confirmed that this mound of dirt was in place on the date of the accident, but it gave an appearance of being in place for a considerable period of time.

CREW INFORMATION

GENERAL

All flight crewmembers were properly certificated and qualified for the flight and were in compliance with flight time and duty time limitations as prescribed by Federal Air Regulations, Part 121, Subpart R, Section 483. All crewmembers were domiciled in Los Angeles, California. A breakdown of pertinent flight time at the time of the accident for the crew is as follows:

	Captain	First Officer	Second Officer
Flight Time			
Total	31,627:16	8,666:40	6,469:22
DC-10	2,251:35	357:03	1,351:29
Last 12 Hours	3:00	3:00	3:00
Last 24 Hours	4:50	3:00	3:00
Last 48 Hours	4:50	3:00	3:00
Last 7 days	16:27	16:06	6:29

DC-10	12:37	16:06	6:29
Last 30 days	56:35	41:00	44:40
DC-10	40:45	41:00	41:40
Last 60 days	129:41	97:42	88:52
DC-10	93:59	97:42	88:52
Last 90 days	155:06	173:56	161:41
DC-10	106:59	173:56	161:41
Known sleep during the last 24 hours	5:00	unknown	4:00
Rest before the trip	2:00	unknown	3:00
Official on-duty time	4:00	4:00	4:00

All pilots were free of duty in the 24 hours prior to departure.

CAPTAIN'S BACKGROUND

The Captain, age 53, initially received his flight training as a civilian after World War II under the GI Bill of Rights. After working for the Flying Tigers, he joined Western Airlines on July 21, 1949. He held an airline transport

pilot certificate with type ratings in Boeing 707/720, Lockheed 188, Douglas DC-3/6/7/10 aircraft, and airplane single engine and multi-engine land and sea privileges. He also held certificates as flight instructor and ground instructor. He possessed a first class medical certificate dated August 29, 1979 with a limitation requiring corrective glasses. He had been qualified into Mexico City airport as pilot-in-command for approximately 15 years and is estimated to have made 350 landings there. He had landed in Mexico City four times in October (all Flight 605). On the morning of October 14, 1979 subsequent to NOTAMed closure of Runway 23L, Flight 605, which the Captain commanded, was cleared to land on Runway 23L and did so. This landing occurred while the regular first officer was on sick leave.

PERTINENT ACTIVITIES PRIOR TO REPORTING FOR DUTY

The Captain had cancelled flights on October 18, 19, 23 and 24 because of a cold and sinus condition but was off medication thereafter. He flew from Los Angeles to Miami on the 25th of October, reporting for duty at 2140 and departing at 2240, arriving at 0320. After reporting for duty at 1315 the same day, the 26th, he departed Miami for Los Angeles at 1415 arriving at 1913 (all times Pacific Daylight Time). That same evening he flew as a passenger to El Paso. On the 27th he flew a P-51 from El Paso to Phoenix where the aircraft developed mechanical problems. The aircraft was left at Phoenix. He continued on a passenger flight to Palm Springs spending the night and the next day (Sunday) there. He drove home to the Los Angeles area that evening. On Monday the 29th at 1115 he reported to the McDonnell Douglas DC-10 simulator at Long Beach, Ca. for a briefing session prior to his required semi-annual training and proficiency check flight. The flight was conducted in the simulator starting at 1215 and lasted four hours. On October 30, the morning prior to

the accident, the Captain rose at about 0900, had a good breakfast, flew a T-6 aircraft to a nearby airport, gave one hour instruction in a Stearman aircraft, had lunch and flew home with a total flying time of 1 hour and 50 minutes. He had dinner at 1900 and went to bed at 2030. At 2230 he arose and departed his home at 2315. He had been advised earlier that the flight would be delayed for one hour. When he was advised is not known. He reported for duty at 2340.

FIRST OFFICER'S BACKGROUND

The First Officer, age 44, initially received his flight training in the U.S. Air Force pilot training pipeline under an agreement by the USAF to train pilots for the Federal (West) German Air Force (Luftwaffe). After completing his required duty in Germany, he returned to the U.S. and joined Western Airlines on January 15, 1968. He held a commercial and instrument pilot's certificate with airplane single and multi-engine land privileges and flight engineer turbojet certificates. His FAA first class medical certificate was datd January 2, 1979 with no waivers or limitations. He had recently performed 15 landings at the Mexico City Airport as DC-10 first officer, four occurring in October. The latter two were subsequent to the NOTAMed closure of Runway 23L. They occurred on October 19 and October 24, 1979 while the regular Captain was on sick leave. Both landings were made on Runway 23L.

PERTINENT ACTIVITIES PRIOR TO REPORTING TO DUTY

Though based in Los Angeles, the First Officer lived alone near Seattle, Washington. It was his custom to sleep during the afternoon when he was scheduled for this or similar flights. Whether this was done on this particular day is unknown. It was confirmed, however, that his Los Angeles

Chief Pilot called the First Officer at 0800 October 30, 1979 and had a conversation with him regarding a discrepancy report concerning his on-duty appearance earlier in the month. The Chief Pilot could not detect whether he had awakened the First Officer or not, but the conversation ended on a, "high note." To ensure arrival at Los Angeles in ample time to report for duty at 2240, October 30, 1979, (he was not advised of the delay) the First Officer had flown as a passenger on a Western Airlines flight which arrived there at 2117. during the interim before departure, he had a one-hour conversation with a close friend who reported that the First Officer appeared well rested, in good spirits and frame of mind. During the period of October 7-15, the First Officer had cancelled two sequences of flying. This may have been due to a strained back. Unfortunately, accurate logging of the First Officer's activities any more closely was not possible. As a side note, he had recently been divorced and had lost 20 pounds. He was not known to have been on any medication at the time of the accident.

SECOND OFFICER'S BACKGROUND

The Second Officer, age 39, initially received his flight training in the U.S. Air Force. He joined Western Airlines February 24, 1969. He held a commercial pilot certificate with an instrument rating in airplanes and airplane single-engine and multi-engine land, airplane single-engine sea, and helicopter privileges with a type rating CE500 (Citation). He also held a flight engineer turbojet certificate. He possessed a first class medical certificate dated August 14, 1979 with no waivers. He had recently made 16 flights into the Mexico City airport as DC-10 second officer, five occurring in October 1979. Landings on October 19 and 24 were made on Runway 23L subsequent to that runway being NOTAMed closed. He was reported to have had a full night's sleep the

previous night and had a 3 hour nap during the afternoon of the 30th. The second officer had called in sick for a flight on October 25, 1979. His ailment was gastric upset. He took no medication nor was he known to have been on medication at the time of the accident. Because of severe family impact it was not possible to accurately log the Second Officer's activities to a greater degree.

POST ACCIDENT MEDIAL ANALYSIS

There was considerable difficulty in recovering the Cockpit Crews bodies from the wreckage. The Captain's remains were brought out about 24 hours after the accident occurred. The First Officer and the Secod Officer about 6 hours and 24 hours after that. To the extent possible, a toxicological analysis was made at the FAA Civil Aeromedical Institute on a portion of the Captain's remains approximately 71 hours after his body was recovered. The chemical tests made proved to be negative in all respects. There were no toxicological analysis made of the First and Second Officer's remains.

FIRE, RESCUE AND ACCIDENT SURVIVAL ASPECTS

Fire

The initial point of ignition occurred when the right wing tip struck an electrical junction box located between Runway 5L/23R and taxiway Alpha. Initially, this was a low intensity fire, until the right wing struck the steel "I" beam corner post of the mobile lounge garage. At that moment a severe rupture of the right wing occurred creating a major conflagration. Simultaneously with this impact, the aircraft rotated violently to the right with the nose of the aircraft impacting an airline maintenance building which was constructed of steel-reinforced concrete. During the final impact gyration, the left side of the fuselage impacted semitractors with flat bed trailers and automobiles. The force of this impact, coupled with the rotational effect, was so great that it caused the left outboard wing panel to separate from the aircraft and fly over the remaining airport property, across the main airport access street, coming to rest on the roof of an apartment house an estimated 500 feet northwest of the crash site.

The crash fire rescue (CFR) station was located approximately 1,800 feet from the crash site. Two of the CFR fire fighters observed the DC-10 strike the electrical junction box and the genesis of the fire. They set the crash alarm, with the call from the tower following shortly thereafter. The CFR unit responded within 30 to 60 seconds with seven fire-fighting vehicles and two paramedic ambulances (which are part of the CFR operations at Mexico City). The initial attack of the fire by the turrets of the fire fighting vehicles was concentrated on the right side of the fuselage. Considerable difficulty in

reaching the left side of the fuselage was encountered because of the parked semitrucks and automobiles. Much of the fire-fighting effort on the left side was accomplished with handlines. The fire wad extinguished within 3 minutes of the time of the alarm. This time frame appears to be reasonable since a section of the fuselage remained basically intact, constituting seat rows 23, 24, 25 and 26. Fire in this section was evident by some charring of the seats and along the ceiling. No ceiling panels remained; however, the insulation in this area was scorched. Of the 36 seats normally attached to these four rows, only 20 seats remained in varying degrees of structural integrity.

RESCUE

Following the extinguishment of the fire, the CFR personnel entered the fuselage section that survived the postlanding crash fire. The fire fighters at Mexico City are trained to Emergency Medical Technician (EMT) standards. Triage began immediately which determined that 5 passengers in this section of the fuselage had survived. These victims were evacuated by the CFR crews. All of the seat belts were cut rather than unbuckled in removing these casualties. Backboards and litter baskets were used to carry the survivors. There were at least 2 fatalities in this section of the aircraft. CFR paramedics rescued some of the passengers who were in the aft section of the fuselage that remained intact. Other victims were thrown out of the aircraft, still in their seats.

ACCIDENT SURVIVAL

The accident presented a valuable evaluation of accident survivability because of the extreme range of injuries. The cockpit and forward cabin area injuries

were classified as severe fragmentation of the body, with traumatic injuries decreasing further aft through the cabin to bruises and minor abrasions suffered by the male flight attendant at door 4R. Virtually all occupants were subjected to some degree of fire damage, ranging from charring to singed hair. There were no known survivors forward of row 23. Particular interest is focused on the appearance of victims at the morgue who showed no significant injuries except that their heads were smashed beyond recognition as the result of fatal injuries when the seats ripped losse from the floor rails. (FAR 25.561 requires a seat restraint of 9G forward, 4.5G downward, 2G upward, and 1.5G sidewards. The seatbelt is stressed to 15G's. As a comparison, the typical automobile seat is restrained to a 20G limit.)

The aircraft in general revealed that the portion forward of the wing was destroyed when the airline maintenance facility collapsed on that section of the aircraft. The section of the aircraft attached to the wing root portion remained relatively intact along with 20 of the 36 seats in rows 23, 24, 25 and 26. Aft of this section was almost completely destroyed by fire, with the exception of the vertical stabilizer, rudder, the right horizontal stabilizer and the number 2 engine, all of which had separated from the main fuselage. It was not possible to determine the original and precise wreckage distribution, because of prior recovery activities. Access to the wreckage was denied to the Rescue and Fire Committee for over 48 hours by the authorities.

Of the 89 persons aboard, 14 passengers and 2 flight attendants survived.

INJURIES	CREW	PASSENGERS	OTHER**
Fatal	11*	62	1

Serious	1	14	?

* Two flight attendants were being deadheaded to Mexico City.

** The drive of the dump truck which was initially struck was a fatality. Information concerning other ground casualties was not given to the Rescue and Fire Committee.

In addition to the 2 paramedic ambulances assigned to the CFR station at Mexico City, there is one additional paramedic ambulance that is part of the medical clinic at the airport. Clearly, the emergency medical response of these facilities was a tremendous aid in the survival of many of the injured, since the degree of injury was generally quite serious. A mutual aid program is also in effect at Mexico City in which 10 city structural fire stations responded and 40 to 50 ambulances responded.

MEXICO CITY CRASH FIRE RESCUE EQUIPMENT

VEHICLES:

MAKE	YEAR	AGENT QUANTITY	TURRET	HANDLINES	REMARKS
Waters	1978	3000 G	Yes	Two	2 Dry Chem hand ext.
Walters	1973	3000 G	Yes	Two	2 Dry Chem hand ext.
Mercedes-Benz		750 K			lites
Unimag	1975	Dry Chem	Yes	Two	2 additional flood
Mercedes-Benz		750 K			lites
Unimog	1975	Dry Chem	Yes	Two	2 additional flood
John					1 portable CO2 ext.

Beanford	1973	1500 G	Yes	None	1 portable Dry Chem. exting.
Rambler	1978	900 K Dry Chem	Yes	Two	
International Pumper	1976	750 G	Yes	6 low press. 4 high press.	3% AFFF Solution

Foam used is AFFF (Light Water), 6% solution with the exception of the pumper.

Two Paramedic Ambulances assigned to CFR station.

PERSONNEL

A total of 16 fire fighters and 4 paramedics are on 24-hour shifts. There are 3 shifts, bringing the total CFR personnel assigned to 60. Shift changes usually occur at 0700 each day. At the time of the accident, a portion of the oncoming shift had already arrived for duty and participated in the fire-fighting and rescue efforts. All personnel are equipped with proximity suits and life packs. Each shift is required to fight a hot pit fire a minimum of three times per year. The most recent pit fire training was conducted on October 17, 1979. Mexico City has conducted simulated Disaster Drills to test airport/community emergency plans.

COMMUNICATION

There were no reported communication difficulties, however, during the CFR review, there were several instances noted where it was necessary for the flight crew to ask that clearances be verified or repeated. The exact reasons for this have not been ascribed, but this was found to be a common occurrance for all flight crews operating in Mexico whether Spanish or English speaking. Investigators found that radio used by the Mexico Air Traffic Control System are not tuned with the same fidelity and modulation as those used by the US ATC System, making voice transmissions somewhat more difficult to understand.

Execpt for the use of opening salutations, occasionally used by the First Officer of Flight 2605, all radio communications between the flight and the Mexican ATC Controllers were conducted in English. Pronunciation and terms used were consistant with world-wide useage. Once contact was established there was no evidence of a language barrier.

The commonly accepted practice of reading back ATC clearances was not adhered to by the crew of Flight 2605. In reviewing the entire CVR and ATC transcripts, investigators were unable to find one instance wherein an ATC clearance was read back in its entirety by the flight crew.

AIDS TO NAVIGATION

Mexico City airport is equipped with Approach Control Radar, VOR, ADF and ILS approach aids. Runway 23 left is equipped with a Category I ILS approach (See Exhibit _____). The inbound course is 228 magnetic. Subsequent to the accident the ILS course was changed to 232 magnetic. The glide slope/runway interception point is approximately 950 feet from the Runway 23L threshold. There is an Outer Compass Locator and Marker Beacon with a coded identification of ME (Mike Echo) located 4.5 nm from the threshold of Runway 23L. A Middle Marker is also installed .5 nm from the end of the runway. The Tepexpan Non-directional Radio Beacon, coded identification TPX, is located approximately 11 and 1/3 nm north-northeast of the runway. Decision height for the ILS is 200 feet. On the same chart is an NDB (Non-directional Beacon) approach procedure with a Minimum Descent Altitude of 719 feet. While there are no sppcific side-step procedures (an instrument approach made to one runway, but landing actually made on another runway, with transition made visually) provided, there is a note at the bottom of the chart which states, "600 ceiling - 1 1/4th required for landing rwy 23R."

The foregoing ILS and NDB approaches are the only approaches authorized for Western Air Lines utilizing the Tepexpan Non-directional Radio Beacon. In addition, there is a VOR RWY 23L/R and a VOR DME RWY 23L/R approach procedure which also uses the ME Non-directional Radial Beacon. There are also ILS, NDB, and VOR approaches to Runway 5L and 5R. However, the lowest airport weather minimums are on Runway 23L. Approach Radar is also available for all runways. On the morning of the accident, the tower radar was inoperative and not in service. Subsequent to the accident, the ILS was ground checked and was reported to be within satisfactory limitations by the airport facilities

personnel. The U.S. FAA offer to flight check the ILS was denied by the Mexican authorities.

A review of the Turno y Record Diario de Operacion, (Mexico City airport tower log), dated 30 October 1979 was made. It indicated, in part, that all approach lights, runway lights, VASI lights, Runway End Identification Lights were operational, but were not controllable from the tower. That the runway 23L ILS was operational, that one interphone system was inoperative and that the ATIS Transmissions were operational. It also stated that runway 5L was in use from 0300Z to 0500Z and that runway 23R was in use from 0500Z. The log made no mention of airport construction being in progress.

AIR TRAFFIC CONTROL

A transcript of communications between Mexican Air Traffic Control and Flight 2605 was provided by the Mexican authorities. This included all radio transmissions from initial contact with Mazatlan Center as the flight entered Mexican airspace at Tijuana to the final communications with the Mexico City tower. Time factors supplied with the transcript were not specifically accurate enough to establish a time basis, therefore it was necessary to adjust the ATC transcript so as to more closely coincide with the Digital Flight Data Recorder times. The exchange of ATC information and required position reporting by the flight appeared to be routine in all respects.

At about 1110Z Flight 2605 established communications with the Mexico City Air Traffic Control Center near the Gaby intersection, approximately 238 nm northwest of the Mexico City Airport. After initial contact, the Center, at approximately 1124Z, issued the following clearance and advisory: "Two six oh five, abeam Queretaro, radar contact, descend to one three thousand, proceed direct to Tepexpan, three zero two zero the altimeter, expect two three right." There is some discrepancy as to the exact verbage of the advisory portion of the transmission. Cockpit Voice Recorder analysis indicates that the flight recieved, "expect ILS two three left", while the transcript indicates that "expect two three right", was transmitted. Investigators were not authorized to listen to the Mexican ATC tape recordings.

The flight was unable to receive the ATIS (Air Terminal Information Service) transmission on the normal frequency. Investigation found this to be a proven and common situation at the Mexico City Airport. It was customary for inbound flights to contact Mexico Flight Information Services (FIS) on frequency 126.9

for weather conditions, runway in use, gate assignments, etc. In turn, flights would provide ETC fuel on arrival and make any special service request. This was done in the case of flight #2605. As the frequency was tuned in, the Second Officer overheard Mexico FIS giving the weather to another flight, Condor #364 about 1125Z.*

*Note: As discussed in the CVR section, the CVR was only 60% readable and did not record on channel 1, the Second Officer's radio. Inconsistencies between the ATC transcript and the CVR were noted. Therefore, the communication between flight 2605 and Mexico ATC and Mexico FIS, as described herein, are a combination of the two transcriptions and deemed to be accurate.

DF364 Condor 364 requests the latest weather and gate.

FIS Mexico weather partial obscure. Visibility 3 miles, haze, smoke, fog; temperature 09; dewpoint 07; wind 060, 7 knots; altimeter 3020 and your gate number 17.

EF364 OK and thank you very much and gate 17.

FIS Affirmative.

WA2605 Mexico City, Western Flight 2605, over.

FIS 2605 Mexico.

WA2605 Roger. We'll be on the blocks at 46 pass the hour. 26,000 of gas. Will you give me my gate, and I copied all the weather

except the wind.

FIS OK. The wind 060 degrees at 7 knots. Your gate is One, One.

WA2605 Roger. Copied gate One, One. Western 601 --- Western 2605.

FIS Roger.

WA2605 And Mexico City, Western 2605. What runway are you using.

FIS Twenty Three.

WA2605 Understand runway Two Three.

FIS Roger.

At 1126.59, the Second Officer advised the Captain, "runways 23 Charlie."

At 1132:27 when the flight was approximately 21.5 mn northwest of the airport (34.5 flying miles), Terminal Arrival Control issued the following clearance.

TML Western 2605 descend to 11,000. Cleared for Tepexpan 23 right.

WA2605 Will descend to 11,000, 2605.

TML Roger.

WA2605 And was that Tepexpan arrival for 2605?

TML That is correct.

A review of the approach plates issued by Western Airlines revealed that the only transition for approach which included the Tepexpan Radio Beacon leads to an ILS approach or Runway 23L (see Exhibit _____). While there were approach procedures available and plates issued for runway 23R, none of these procedures utilized the Tepexpan Radio Beacon in any manner. About 2 minutes after the above clearance was issued, Terminal Arrival Control told flight 2605 that "Tower advises patches of ground fog on the runway and two miles visability on the final approach." Radar service was terminated shortly thereafter and the flight changed to the tower frequency. Initial contact with the tower proceeded as follows:

1138:25

WA2605 Good morning Mexico Tower. Western 2605 is inbound for 23.

1138:33

TWR Western 2605 23 right approach. Report over Mike Echo, wind calm.

1138:38

WA2605 Roger.

1139:39

WA2605 Inside Mike Echo.

1139:46

TWR Western 2605 advise runway in sight. 1139:52 - Do you have your

lights on? 1139:57 - 2605 you are to the left of the track.

1140:01

WA2605 Just a little bit.

1140:06

TWR Advise runway in sight. There is a layer of fog over the field.

1140:03

WA2605 Twenty six oh five, Roger.

1140:35

TWR Two Six oh five, do you have approach lights on left in site.

1140:37

WA2605 Negative.

1140:39

TWR Okay sir, approach lights are on runway 23 left, but that runway is closed to traffic.

1140:45

WA2605 Okay, twenty six oh five. (Approximately 16 seconds to touchdown).

In reviewing the foregoing exchange of communciations, a close look at time elements were made. About 80 seconds elapsed from the flight report, "... inside Mike Echo" made at 1138:25 until the final transmission of the flight, "Okay, twenty six oh five", at 1140:45. During this time the tower

transmissions absorbed 27 seconds of time and the First Officer replied for about 12 seconds, which equates to just over 48% of the 80 second time period mentioned.

An examination of the ATC transcript of an arrival flight about 20 minutes prior to Western 2605 was made. This flight was Mexicana Flight 111. Their approach clearance from Mexico ATC was; "Cleared direct to Tepexpan, after Tepexpan, Metro Echo, 23 right." Mexico Center handed the flight off directly to the tower rather than to Terminal Arrival Control. About 15 minutes before landing while still in contact with the Center, Mexicana 111 asked the Center to query the Tower regarding the weather at the airport. After a short wait, the Center replied: "Mexicana 111, still the same, 2 miles, the bank tends to get in by the side of the runways five. Tower says that (garble) in case of its start coming on runway 23 left --- right could turn the lights on for arrival reference, ... for approach reference to 23 right." According to the Tower transcript, shortly after Mexicana 111 contacted the Tower, the controller called the airport light control sub-station three times, apparently on a walky-talky type radio, asking that the lights on runway 5 left be turned up to their maximum intensity. There was no recorded reply. Mexicana 111 landed on runway 23 right without incident. There was no record that Mexicana 111 received the ATIS or had contacted Mexico FIS.

Mexicana Airlines approach plates were reviewed and found to be in basic conformity to those issued to Western Airline pilots at the time of the accident.

Investigators reviewed the handwritten log made by the terminal arrival controller for this period. The following is a translation of what was

recorded.

1138 Western 2605 from Los Angeles transferred to the Tower over Tepexpan. On approaching 23R, 23L, was advised that there was ground fog over the runways and visability was 2 miles.

1140 Tower called to advise that the fog bank has covered the runways and unable to see the runways. That Western probably has to go around and was told that i that event to climb over the Mexico VOR at 11,000. Tower acknowledged. Tower listen, the Western crashed. --- It didn't see the runways and it's on fire. Coordinated with airport Manager, A.S.A., Comandancia, Fire Department.

1145 Weather report for Western Airline 1100Z MEX minus X 3 HK 09/07/0607/3020. (Thin obscured, 3 miles visibility, haze, smoke, temperature 9 C dew point 7 C, wind 060 7 knots, Altimeter setting 3020).

1148 Western 2605 has accident. Airport below minimum and closed to all operations --- flights PL 622 and DF 364 diverted to alternate ACA.

Investigators were not permitted to interview any of the Air Traffic Controllers on duty during the time Flight 2605 was in the air.

Other sources however provided a description of the Tower Controllers observations of Flight 2605 during its final minutes of flight. It was said that he could clearly see the aircrafts landing lights after the flight had reported, "inside Mike Echo". He said that at this point if the flight had

been properly aligned with the runways, he should have been over here, gesturing, but instead he was over here, again gesturing, this time about 30 to his right, as though he were looking at the aircraft. He advised the flight they were, "to the left of the track", at that time. When the Controller asked the flight if he had the approach lights in sight, he thought the lights were indeed on at that time. He said he saw the flight enter the fog and continued to see the glow of the aircrafts lights while it was in the fog. At short time later it came out of the fog and was in the clear until it crashed.

Investigators were advised that the Tower Controller was a person with some 17 years experience in Control Tower operation, with the past 15 years as Controller in the Mexico City Tower. His shift began at 2100 hours on the evening of October 30 and would have been complete at 0700 hours October 31. It was customary between the hours of 0000 and 0600 to have only one controller on duty. This Controller was the sole occupant in the Tower Cab during flight 2605's approach and landing at Mexico City. The Air Traffic Radar Display Scope in the Tower Cab was inoperative. Investigators reviewed the handwritten log made by the Tower Controller. Some upper and side margin notes o the log had been erased and were illigible. The following is the translated version of that log:

1144 Aircraft Accident.

1152Z Airport closed.

1140 Western 2605 made contact with the Tower. Instructed to Runway 23R. Wind calm. Report Metro Echo. He was informed that the visability was reduced to 2 miles in fog. Having the aircraft in sight, he was

told that he was on the left of the Trajectory. He was asked if the approach lights were in sight, and the answer was negative. He was advised that the approach lights on Runway 23L and this Runway was closed. He was told that there was a layer of fog over the field. Report Runway in sight. He acknowledge. He never reported runways in sight, neither was cleared to land. Later on and,

1144 When he was in sight, due to a fog bank over the field, the aircraft constantly appeared and disappeared, apparently touching ground near runways 13/31, veering suddenly to the right and exploding instantly.

On the left margin of this report was the following:

1100Z minus X 3HKF TEMP 9 ALT 3020 23D.

METROLOGICAL INFORMATION

The weather conditions which existed in the Mexico Valley at the time of the accident were typical for the time of year. The rainy season had concluded four to six weeks earlier and the air mass was relative dry and stable. The area was under the influence of a high pressure system. Because of the topographic location of the Mexico City airport and its proximity to the city itself, the airport area is very susceptable to early morning ground fog, plus the high concentration of smoke and haze from industrial and civilian sources, particularly during the fall and spring months.

1. Before departure from Los Angeles Flight 2605 was provided the following Mexico City weather and plain language terminal forecast:

   (The format of the weather report messages are a combination of U.S. National Weather Service and Mexico Weather Bureau abbreviations and symbols are sometimes difficult to interpret and are not consistant with ICAO standards.)

   MEX SA 310725 DSP 12 12/08 0000/220 ALGS CI
   (31st of the month, issued at 0725Z, clear, 12 nautical miles visibility, temperature 12 C, dewpoint 8 C, wind calm, barametric pressure 1022.0 milibars, a few cirrus type clouds.)
   MEX FT 310734 PLATF 310606 MEX 1510 8 3SC30 4 CI 12Z C 3HZE
   4CI 16Z 2610 5 P3/)4 19Z 3318 8AC90 5CI OCNLY 5BD 00Z 3616
   8 5AC90 5CI HITEMP 21 LOTEMP 14
   (Terminal forecast, 31st day of the month, issued at 0734Z Plain

Language terminal forecast, for the period 0600Z of the 31st of 0600Z next day, wind 150 at 10 knots, 8 nautical miles visibility. 3/8 sky coverage with strato cumulus based at 3000', 4/8 sky coverage with cirrus clouds. 1200Z, wind calm, 3 miles visibility with haze, 4/8 sky coverage with cirrus clouds. 1600Z, wind 260 at 10 knots, 5 miles visibility, (symbols garbled). 1900Z, wind 330 at 18 knots, 3/8 sky coverage with cirrus clouds, occasionally 5 miles visibility with blowing dust. 0000Z wind 360 at 16 knots, 8 miles visibility, 5/8 sky coverage with alto cirrus clouds based at 9000', 5/8 sky coverage with cirrus clouds, high temperature 21 C low temperature 14 C during the period.)

2. At 1100Z, while Flight 2605 was enroute to Mexico City, the Mexico City Weather Bureau issued a revision to the Mexico City airport terminal forecast for the period of 31 October from 0600Z to 0600Z as follows:

FT MEX MMX 311100 1 GF/HFE NT RAPIDLY 1/5 F 03 OSC TEMPO ZERO F ZERO OSC 15Z 0610 1 HZE/SMK SKC 17Z 2410 4HZE CLR 19Z 3015/20 3CU30 4AC9 4CI OCNLY 22/00Z 2 BD

(Terminal forecast for Mexico area 1, 31st day of month issued at 1100Z (for the period from 0600Z to 0600Z next day). Visibility one nautical mile, ground fog, haze, lowering rapidly to 1/5 mile visibility in fog, 300' ceiling, sky obscured. 1500Z, wind 060 at 10 knots, one mile visibility in haxe an smoke, sky clear. 1700Z, wind 240 at 10 knots, 4 miles visibility in haze, sky clear.

1900Z, wind 300 at 15 knots with gusts to 20, visibility 20 miles, 3/8 sky coverage with cumulus clouds at 3000', 4/8 sky coverage with alto cumulus clouds at 9000', between 2200Z and 0000Z, visibility 2 miles in blowing dust.

There is no evidence that Flight 2605 received this revised terminal forecast. Nor is there any evidence that the company Flight Control Center in Los Angeles or the Mexico Air Traffic Control Center at Mazatlan or Mexico City made an attempt to forward this forecast to the flight. Further, investigators were unable to determine at what time the forecast issued at 1100Z was actually released.

3. The Mexico City airport weather observation issued at 1100Z was as follows:

RS1 -X 3HKF 09/07 0607/224 HKF2 VIS NE 2 MI F

(Record special number one, partial obscuration, 3 nautical miles visibility, haze, smoke, fog, temperature, 9 C dewpoint 7 C, wind 060 at 7 knots, barametric pressure 1022.4 milibars, haze, smoke, and fog obscuring 2/8 of the sky, visibility north east 2 miles in fog.)

The 1200Z weather was issued as:

RS2 WOX OF 09/07 0706 227/FK10 AVION ACCIDENTO PISTA 23 DERECHO

(Record special number 2, ceiling indefinite zero, sky obscured, visibility zero, fog, temperature 9 C, dewpoint 7 C, barametric pressure 1022.7 milibars, fog and smoke obscuring 10/10 of the

sky, aircraft accident runway 23 right.

Weather readings are taken near the passenger terminal located about 2 miles from the approach end of runway 23 left. These are made at each hour and half hour from 1200Z to 1600Z and each hour from 1600Z to 1200Z. Observers start their observations approximately 15 minutes before reporting time. The visibility reading is normally taken at the terminal area weather station until the visibility is reduced to a certain level. There is some conflict whether that level is 5, 4 or 3 miles. At that point, visibility readings are made at the tower. The tower cab is 80' in elevation and is located approximately 7,400' from the approach end of runway 23 left. Prevailing visibility is reported and is an average of readings taken 360 by sight, therefore a single segment may have considerably less visibility than reported. The Mexico City airport does not have Runway Visual Range (RVR) measuring equipment.

4. The Mexico City Air Terminal Information Service (ATIS), log was examined. Hourly entries commenced on 30 October 1979 at 1700 hours continuing through 0600 hours, - apparently in local time. The entry following the 0600 one was marked 1100Z and those thereafter, while not labeled, were probably in GMT. Entries for 0500, 0600 1100Z and 1200 were as follows:

0500 - Information R, partial obscuration, high scattered clouds, 8 miles visibility, temperature 13 , altimeter 30.20, Tepexpan ILS 23 right, 23 left closed, 126.9.

0600 - Information S, partial obscuration, 8 miles visibility, temperature 13 , altimeter 30.20, (marks indicating ditto of Tepexpan ILS 23 right, 23 left closed, 126.9).

1100Z - Information (designation missing), partial obscuration, 3 miles visibility, haze, smoke, fog, temperature 9 , altimeter 30.20. (Marks indicating ditto of Tepexpan ILS 23 right, 23 left closed, 126.9).

1200 - Information A, ceiling indefinite zero obscured, visibility zero, fog, smoke, temperature 9 , altimeter 30.22 airport closed UFA, avion accidentado, 1152Z

The time zone applicable to Mexico City is GMT minus 6 and referred to as Mexico Central time. Therefore the entry at 0500 local would equate to 1100Z. The 0600 entry to 1200Z. This would place the ATIS in conflict with the Mexico City Weather Bureau observations. There was no explanation for this ambiguity.

The frequency used to braodcast the Mexico City airport ATIS is 117.0, the same as the MEX VOR frequency. Spanish language is used followed by an English translation. Investigation revealed that the strength and quality of this transmission was so poor that even while at the airport the information was often times unreadable. Airline flight crews reported that they could not rely on this source for airport information, but ordinarily contacted Mexico Flight Information Service by voice on frequency 126.9 for airport and weather conditions. There was no evidence that Flight 2605 received ATIS

information during their descent and cruise toward Mexico City.

5. At approximately 1125Z or 16 minutes prior to final impact, the Second Officer of Flight 2605 overheard Mexico Flight Information Service, (FIS), transmit weather information to another flight, Condor 364, as follows: "Mexico weather, partial obscure, visibility 3 miles, haze, smoke, fog, temperature 09, dewpoint 07, wind 060, 7 knots, altimeter 30 20." This compares, in part, with the Mexico City 1100Z weather report. The Second Officer then made contact with Mexico FIS as follows:

2605 Mexico City, Western flight 2605 over

FIS 2605 Mexico

2605 Roger, will be on the blocks at 46 past the hour 26 thousand of gas. Will you give me my gate and I copied all the weather except the wind.

FIS Okay, the wind 060 degrees at 7 knots, your gate is one one, one one.

2605 Roger, copied gate one one.

FIS Roger.

2605 And Mexico City Western 2605, what runway are you using?

FIS Twenty Three.

2605 Understand 23.

FIS Roger.

The next weather information passed to Flight 2605 was made by the Terminal Arrival Controller at approximately 1135Z, 6 minutes before touchdown, when he said; "Western 2605, tower advises ground fog on the runway and 2 miles visibility". After the flight had changed to tower frequency that controller, said; "At 1140:06Z advise runway insight there is a layer of fog over the field. At 1140Z the Air Route Traffic Control log entry indicates that the tower controller called and advised ARTC: "that the fog bank has covered the runways and unable to see the runways, that WAL probably has to go around". The tower was told that in that event the flight was to climb over mEX VOR to 11,000'. The Tower acknowledged.

At the time of touchdown a witness involved with the runway construction was located on the left side of the approach end of runway 23 left, between the runway and the loop portion of taxiway alpha, almost a beam of the initial impact area. He stated that although it was foggy he could easily see the lights of the aircraft maintenance hanger across the airport approximately 4,200' distant. He made no statement regarding ceiling conditions.

Digital Flight Data Recorder

The Digital Flight Data Recorder (DFDR) was recovered from the wreckage in useable condition. It was transported to the NTSB laboratory in Washington, D.C. for printout and interpretation. Copies of this information were made available to interested parties. The Mexican Government provided radio transcripts of conversations between Air Traffic Control and Flight 2605. From the foregoing, analysis and investigation was conducted to determine a possible ground track and flight profile (appendix ___) Flight control movement and engine performance data were also studied. The following are the findings of these studies.

1. CVR/DFDR/ATC. Because evident time differences existed between the CVR and the provided ATC transcript it was necessary to rely almost entirely onnthe DFDR to establish an accurate time basis. Both CVR and ATC times were adjusted to the DFDR time for proper correlation. A constant factor could not be used with the CVR because of tape variables described in Sec. 1.13.

2. Flight Control Analysis. Comparisons were made with other flights to determine if inconsistencies or aberrations were present or occurred during the approach, touchdown and flight after initial impact.

   Ailerons. Normal, until 3 seconds after touchdown, at that time the right outboard aileron indication went to 0.000 (data fallout), while the left inboard aileron began showing increasing up deflection reaching a maximum of about 22.7 eight seconds prior to final impact. The right

outboard aileron began indicating again 14 seconds before final impact showing and increasing up deflection reaching a maximum of about .8 .

Elevators. Generally normal and consistant, except an unaccounted for difference between the left inboard and the right outboard 25 seconds before initial impact. At that time the left inboard indicated a minus 4.386 while the right outboard was 0.000 . A split occurred again 4 seconds later with the left inboard indicating plus 4.396 and the right outboard showing plus 0.599 . Three seconds later another minor split occurred, left inboard plus 2.555 and the right outboard only plus 0.899 . From that point on elevators indicated within reasonable alignment until the moment of touchdown where upon the left inboard indicated plus 8.929 and the right outboard only plus 0.899 . One second interval indications from that point were:

	Left Inboard	Right Outboard
11:41:04Z	plus 4.679	plus 9.294
11:41:05	plus 1.705	plus 10.643
11:41:06	plus 9.637	plus 0.149
11:41:07	plus 6.804	plus 0.149
11:41:08	plus 13.461	plus 0.149
11:41:09	plus 17.569	plus 0.149
11:41:10	plus 8.787	plus 0.149
11:41:11	plus 6.804	plus 0.149
11:41:12	plus 8.220	plus 0.149

The left inboard remained fairly constant until 9 seconds before final impact whereup up deflection began decreasing to 3.405. The right outboard

indication was a constant plus 0.149 from 3 seconds after touchdown until final impact.

Rudder. The upper and lower rudder were in good and consistant alignment throughout the approach and touchdown. The initial impact caused some disparity with the upper rudder indicating a left deflection of 5.592 and the lower rudder left only 3.055 . During the next 12 seconds differences averaged about 2 , then returning to good alignment until final impact. At touchdown rudder (upper and lower) deflection averaged about 3/4 to the left. Left rudder increased to about 4.3 at initial impact, slowly returning to near neutral during the next six seconds, with the upper rudder actually indicating almost 1 to the right. At that point left rudder indication again increased to about 3 . Rudder deflection again slowly decreased toward neutral during the subsequent six seconds. During the final seconds of flight the upper rudder averaged 1/2 left and the lower rudder 1/4 to the right.

Flaps. Flaps extension indicated 38.321 for the 2 minutes prior to touchdown. One second after touchdown flap indication increased to 38.673 and remained there for the next two seconds at which time extension began to increase. One second later flaps indicated 47.462^, increasing two seconds later to 53.087 about six seconds before extending to 53.438 16 seconds before final impact.

Horizontal stabilizer. Operation appeared normal and consistant with other reviewed DFDR's. Indicated that the autopilot was probably disconnected about 2:30 before touchdown after the aircraft was on the approximate final approach heading.

3. Aircraft Performance. Performance appeared consistant with control movements.

Roll. Similar to other approaches to touchdown. At that point a slight left wing down condition existed and remained so for 3 seconds. At that time an increasing right bank began at a less than 1 per second for 10 seconds. Roll rate then increased to about 2.4 per second during the succeeding 10 seconds which brought the bank angle to 33 right wing down. During the final 4 seconds of flight the bank angle increased to 40 .

Pitch. Reasonably stable throughout the approach. During the 10 seconds prior to touchdown the pitch averaged just over 3.8 nose up. Pitch decreased slightly however in the 3 seconds prior to contact resulting in a touchdown attitude of about 2.5 nose up. Immediately after touchdown pitch attitude rapidly increased to 11.6 within 3 seconds, decreasing to an average 8.5 for the next 11 seconds, then averaged 10 for 4 seconds. During the remaining 6 seconds of flight pitch decreased to virtually zero at final impact.

Rate of Descent. Although some what erratic, rates of descent were generally in alignment with the ILS glide slope until 220' or 16 seconds prior to touchdown. Rates of descent from that point were:

16 seconds to TD	504 fpm
11 seconds to TD	624 fpm
6 seconds to TD	1099 fpm
5 seconds to TD	1248 fpm

3 seconds to TD ..... 1080 fpm

Airspeed. From 1,000' above touchdown indicated airspeed was quite stable varying from 141.75 to a low of 136.25, averaging 139.75. At touchdown the speed was 136.25. 4 seconds later it had decreased to 127.75. Thereafter it slowly decreased to 150.25 at final impact.

4. Auto Pilot and Auto Throttle Operation. Information deduced. Auto Pilot. Operation appeared normal. Evidence indicates that it was disconnected on the vicinity of the outermarker after the aircraft was on the approximate final approach heading. Auto Throttle. Operation appeared normal, maintaining power on the three engines in reasonable alignment. However for reasons which have not been determined the power on all engines slowly decreased to near idle 65 seconds prior to touchdown and remained there for about 6 seconds. At that point evidence indicates that the auto throttle system was disengaged and the power increased manually to approximately 88% N^1 and then averaged 70% N^1 until touchdown.

5. Engine Operation. Operation and response indicated normal as compared with other approaches, except as noted above. At touchdown power was approximately 70% N^1 and remained so for 3 seconds. During the next 5 seconds power increased slightly to 75% N^1, then was increased to 102% N^1 for about 6 seconds, followed by a reduction to about 70% N^1. Just prior to final impact power on number two and number three engines had been increased to 81% N^1 and 95% N^1 respectively. All thrust reversers remained in the stowed position throughout the flight to final impact.

6. Acceleration Forces.

Vertical. Maximum downward vertical acceleration of 2.0261 occurred at 11:41:03Z, 27 seconds prior to final impact. Vertical forces before and following that occurrance were within normal flight parameters.

Lateral. Lateral acceleration forces were normal during the approach and touchdown. 25 seconds prior to final impact 11:41:05 a momentary increase to the left of -.8285 was recorded. Thereafter acceleration continued to the left but at a much less rate.

Longitudinal. Longitudinal acceleration forces were within a normal range until 27 seconds prior to final impact when a negative .1235 was recorded, followed one second later with a negative .0177 force. The recordings of the final 25 seconds of flight all indicated positive acceleration with the maximum reading of +.3352 9 seconds after touchdown.

7. Temperature. Temperature readings were consistant with the existing weather pattern and descent into Mexico City. A pronounced temperature decrease began 232' above ground level where it was 13.5 C. At 110' above ground level the temperature was 10.0 C. The Weather Bureau reported the surface temperature as 9 C.

8. VHF Communications. The keying of the number 1 VHF communication radio during the final 3 1/2 minutes of flight was correlated with the ATC transcripts, and the cockpit voice recorder to establish a time base. Comparison examination however revealed that not all of the number 1 VHF radio transmissions were recorded on the DFDR.

WITNESSES

During the organizational process of this investigation, it was noted that a witness group had not been formed. During the daily meetings of the group leaders, ALPA brought this apparent omission to the attention of the Mexican authority in overall charge of the investigation on several different occasions. ALPA felt it imperative that group witness interviews be conducted of people who were known to be in key locations at the time of the accident. ALPA's investigation team was particularly interested in the conditions as they existed near the threshold area of Runway 23L at the moment Flight 2605 entered this portion of the flight. Some of these areas of concern were: actual airport lighting, including construction work; positive and factual information about whether the approach lights were illuminated or not; actual sky and visibility conditions; and the amount and type of vehicular movement in the vicinity of the glide slope and localizer antennas. People were known to be in these areas who could have provided much of this vital information during the field investigation, but access to them was denied to all interested parties by the chief investigator with the final announcement that, "Statements have been taken of all people that need to make statements." Some of these statements were read at the daily meetings, but copies were not provided for interested parties of the investigation. ALPA, through its own resources, was able to interview some witnesses, and in the case of the truck driver was granted permission to use interview notes from other sources. he following is a summary of those interviews.

4R POSITION FLIGHT ATTENDANT

During the descent and approach into Mexico City, the 4R position (see seating diagram Exhibit ____) Flight Attendant (male) looked out and observed the lights of the city. He was the last flight attendant to pass through the cabin to check the passengers and seatbelts prior to landing. When he took his position at 4R, an aft-facing seat adjacent to the rearmost door on the right side of the aircraft, he tightened his seatbelt and shoulder harness uncomfortably tight, but since they were so near landing he left them that way. He glanced out the window located in the door and saw the aircraft was passing through clouds. He could see only the reflection of the red rotating beacon. Almost immediately they were in the clear again. Very shortly thereafter, there was a very hard landing, and once again he glanced out the window and could see nothing but the glow of the red beacon in the fog. He thought that they had bounced back into the air, because there was no power change for what seemed to be about 6 or 7 seconds. There was another impact, the power came on, and there was a definite rotation and turning of the aircraft. He continued to look out the window and saw some sparks flash from the right wing. (This would have been about the point where the construction equipment was struck by the right inboard flap hinge fairing.) When the aircraft came to rest, the seat portion of the flight attendant's seat had completely failed and he was hanging in the straps. Numerous portions of the cabin interior had struck him, including one of the lavatory doors. He realized he was not seriously injured and saw an opening in the fuselage about 15 feet aft. The next instant, he saw flash fires start, but he was literally covered with debris. He made his way toward the opening, at one poing heaving a three-passenger seat section to one side. After getting clear of the aircraft, he returned and assisted the 4L position Flight Attendant (male) from the aircraft. The 4R position Flight Attendant felt the crash/fire rescue crew with handlines were very slow in getting water to the fire, and felt had they

been able to respond more quickly, it may have been possible to save some of those passengers trapped in the wreckage. After helping all he could, he made his way to the terminal. He said the fog was very thick at that time. The Flight Attendant at position 4L was unable to recall any of the events prior to or following the accident.

SEAT 26K (RIGHT-SIDE WINDOW SEAT)

The occupant was an ATR-rated Lear jet captain based in Mexico City. The passenger was asleep until the passenger in seat 25K just ahead of him advised that they were landing and to tighten his seatbelt, which he did. The flight seemed to be on final approach at that time. He did not look out the window, nor did anything outside attract his attention during the approach. He felt the letdown was normal, and the touchdown was smooth and easy. Three to five seconds later, he felt a very heavy impact and instinctively felt in imminent danger. He immediately assumed the "brace position," head in lap, arms around knees. He remained in that position until final impact, and the aircraft had come to a complete stop. During this time he did not hear any sounds of power increase or decrease or recollect any other particular noises. Though he had never experienced one, he was totally aware that he was in an accident situation.

After the aircraft came to a halt, he first noted that the cabin was completely dark. He did not see any emergency lights, but was able to see to some extent by outside light (apparently from the fire). People were shouting, running back and forth, stepping on the tops of the seat backs. The fuselage was rotated or twisted to the right (the right side was lower to the ground than the left). He noticed that the plastic wall covering was gone from the

fuselage sidewall exposing the metal at his position, and that there was a large break or crack in the structure. The double seat at row 26 where he was sitting seemed still attached to the floor, but the right-hand end of row 25 ahead of him appeared to be displaced forward of its original location. Looking down, he could see the ground through the crack in the sidewall, and tried to enlarge the opening with his hand. The metal was very hot. A white residue adhered to his hands and they were burned. The passenger then used his feet, and kicked or stamped the hole large enough to gain exit. He noted that the paving was covered with soft, pulverized concrete.

Prior to the aircraft's coming to a stop, and also because of his frantic efforts to extricate himself, the passenger's jacket and shirt had become bunched up at a point above his shoulders and behind his neck, exposing his torso. By the time he was completely out of the aircraft, he was burned in at least 25 places as melting plastic material dripped on him, becoming embedded in his flesh. His lower legs were burned in a similar manner. He stated that the fumes were very intense and caused tremendous pain in his nose and sinuses. He also said he was in a euphoric high for one or two days afterwards as the result of inhaling the fumes.

Once outside the aircraft, and to keep from being engulfed in the fire, he ran in a southeasterly direction. At that moment a crash/fire vehicle appeared and directed a high pressure stream of water from the top turret at him, knocking him down. He later located an ambulance and received medical attention. This passenger could not estimate how long it took him to clear the aircraft after it came to a stop. Although he though people were at the emergency exits, he did not see those exists opened. The fumes from the burning plastic seemed to be more impressive to him than either the heat or the fire.

SEAT 25K (RIGHT-SIDE WINDOW SEAT)

The occupant was an ATR-rated Lear jet first officer based in Mexico City. The passenger awoke during descent. He estimated the aircraft's location as approaching the Tepexpan radio beacon. As the aircraft made a right turn, he could see lights on the ground ahead of the aircraft. After that he could only see the top of the wing and flaps. As the final P.A. announcement was made, he turned around to his associate in seat 26K to make sure that he was awake, and advised him to tighten his seatbelt. The witness stated that he could clearly see the beam of the landing lights and though he did not detect flying through clouds prior to landing, he did observe vapor forming over the wings shortly after touchdown, also smooth, but immediately followed by an extremely heavy impact.

His first impression was a very rough landing. The oxygen mask over the flight attendant's seat at Exit 3R just ahead of him fell down. He was next aware that the engines were spooling up. He looked out the window and saw what was later identified as a backhoe excavating machine collide with the inboard wing area. There were sparks, but no flames. He thrust himself back and upright hard against his seat, bracing himself on the seat arms. He was now aware that an accident situation was in progress. The passenger recognized that the aircraft was in a bank to the right. When the right wing tip struck what was later found to be the corner of the mobile lounge garage, he said he felt heat at once. At that impact he pitched forward, striking his face on the seat back in front of him, breaking his nose and cutting his head. All the lights in the cabin went out, and it was completely dark before the aircraft came to its final stop.

Fire wal all around him, but not on him at that moment. He was aware that it was very hot and almost instantaneously his hair and mustache were on fire and his hands were burning. He could not use them, but was able to trip his seatbelt loose with one fingertip. He left his seat and rand down the aisle toward the rear of the aircraft, covering his face with his hands. When he felt cool air he looked and saw an opening, actually a break in the fuselage. He jumped down, turned to his left and departed the aircraft. He lacerated his legs on the jagged metal during his exit.

Once outside he realized that his associate was not with him. He returned to the break in the fuselage from where he had come, but saw no one inside. Fire and heat was very intense. He then ran toward the southeast, meeting an ambulance going toward the accident site, and received medical attention.

TRUCK DRIVER AT SITE

A truck driver who was involved with the airport construction work was located and interviewed about 14 months after the accident. He was driving the truck that preceded the one struck by the accident aircraft. His route of travel on the airport began at an excavation site on the right or northwest edge of Runway 23L, approximately 5,800 feet from the threshold. At this location, there was a tracked excavator loading trucks which parked on the paved shoulder of the runway. Besides the truck being loaded, one or two trucks usually waited in this area also. From this point, trucks would proceed diagonally across the runway in a northeasterly direction toward the approach end, following the white left-edge runway marking to the dumping site about 900 feet from the threshold of the runway and 100 feet left of the left shoulder near

the Runway 23L glide slope antenna. The trucks were said to have had their headlights on and were equipped with rotating beacons. The witness also stated that when parked or when dumping, the trucks turned their headlights off. The return route to the excavation site was basically the same. The round trip took about 15 minutes. Six trucks with a load capacity of about 14 tons were involved.

At about the time Flight 2605 touched down, the interviewed driver was dumping his load of dirt about 160 feet from the initial impact site. Although his truck was facing the approach end of the runway, he said that he neither heard nor saw anything which attracted his attention. He discovered that an accident had occurred only after returning to the loading site. The driver stated that the visibility at the dumping location was somewhat restricted, but that he could easily see the ramp lights across the airport approximately 4,200 feet away. He could not give an estimate of the ceiling or cloud cover. He also stated that he was near the finish of a double shift of 20 hours and was about to clean up and have breakfast in prepartion for starting a new shift.

WRECKAGE

I. Flight Ground Track Path

A. Approximately 500 feet beyond the threshold of runway 23 left, there are very clear landing gear tire tracks marking the point of touchdown. The left truck tire marks begin 33 feet prior to the right truck tire marks. Impressions are in the dirt and on the grass off the runway shoulder. Right tire marks occur on the paved portion of the left shoulder, 18 inches from the pavement edge. The only perceptible widening of the marks on the pavement are approximately 8 feet from the beginning. Though the left and right tire marks are only 10 inches wide at the widest point, it appeared that the greater weight came to bear on the left main tires. Tire impressions are in a straight line on a track approximately 5 greater than the runway heading or 233 magnetic. They continue to a point just short of where impact with the dump truck occurred, approximately 900 feet from the threshold and 2 feet left of the left runway edge markings. Impact evidence indicated that the right main landing gear was about one foot above the surface at the moment of collision, striking the truck virtually in the center of the bumper/radiator area.

B. Approximately 5,100 feet from Runway 23 left threshold, the right wing inboard flap hinge fairing struck the cab of a tracked excavator, located approximately 75 feet right of the right-hand edge markings on Runway 23 left.

C. The next evidence of surface contact occurred when the right wing tip struck an electrical junction box near its base between Runway 23 right and the parallel taxiway Alpha, southwest of Runway 13, approximately 8,500 feet from Runway 23 Left threshold. There was evidence of a flash fire here.

D. There were deep grooves cut in the ground evidently caused by the right wing tip between taxiway Alpha and the paved ramp area with marks continuing on across the pavement and terminating where the right wing contacted the mobile lounge storage building. Several service vehicles were crushed. Fire erupted, destroying the building and several mobile lounges.

E. Final impact occurred as aircraft rotated about the right wing tip with the nose impacting a two-story steel and concrete aircraft maintenance building on an approximate magnetic heading of 60 .

II. Initial Impact Area, Runway 23 Left Area - All distances approximate.

A. Nine hundred feet from the threshold area were the scattered remains of a totally destroyed dump truck which had been loaded with dirt. Estimated gross vehicle weight was 14 tons.

B. Sixteen hundred feet from the threshold, about 30 feet left of the left runway edge, was approximately 20 feet of the right-hand stabilizer and elevator assembly. Fractured areas were all of the impact and shear type.

C. Eleven hundred feet from the threshold of the runway and located 20 feet left of the centerline were two pieces comprised of the right-hand inboard trailing edge wing flap.

D. In the same general area as the flap (C above) was a spoiler actuating hydraulic cylinder with the piston fully retracted.

E. Right-hand main landing gear strut and side brace assembly less the wheel and axle assemblies were 1,500 feet from the threshold.

F. The right-hand main gear aft axle, beam, wheel, and two assemblies were located 1,550 feet from the threshold. Both tires had several deep gashes; the inboard tire was still inflated while the outboard tire had cuts and was completely penetrated.

G. The right-hand main gear forward axle and beam assembly and wheels were located 2,100 feet from the threshold. Both wheel rims had separated from the axle. The inboard wheel and tire were severely damaged. The outboard wheel and tire had separated. Tthe wheel was destroyed and the tire came to rest between the runways 1,900 feet away.

H. A small piece of the right wing flap hinge fairing was found inside the cab of the excavator. The cab was destroyed, with all impact areas showing displacement from the northeast to southwest. The height of the cab was 10 feet. The height of the impact was 9 feet. With landing gear struts compressed at average DC-10 weights the inboard flap hinge fairing is 8' above the ground.

Note: There was no sign of ground contact between the dump truck and the electrical junction box adjacent to taxiway Alpha, a distance of approximately 7,500 feet.

III. Final Impact Area

A. The main wreckage was oriented on a magnetic heading of about 60 magnetic with the cockpit and forward cabin section totally destroyed under the collapsed concrete roof and wall structures of the aircraft maintenance building. Workers and heavy equipment used in searching for human remains had throughly disturbed the wreckage. The only cockpit components recovered were the forward overhead switch panel and the glare shield switch panel. Many switches on the overhead panel were forced out of the panel and were missing. Those remaining were bent aft and to the right. No positive intelligence could be obtained from them. Of the switches on the glare shield panel, the only position which could be confirmed was the left-side INS/RAD switch, which was confirmed to be in the RAD position by the manufacturer. Both VOR/ILS selectors were set at 109.7.

B. The center wing section with 40 feet of the right-hand wing and 15 feet of the main cabin still attached was located immediately west of what had been the aircraft maintenance building. Two rows of cabin seats were still in the cabin section. Fire damage here was minimal. All seats had been displaced from right to left. Seat tracks in this area were still in place and relatively undamaged. However, all seat legs or attachments were broken. Approximately half of the seats had

legs that showed signs of failure from side loading, and the other half had attachments sheared off at the track fitting lugs.

C. The right-hand wing section still attached to the center wing section had suffered severe fire damage with considerable meltdown of the aluminum skin fracture. The right engine and pylon assembly were located 50 feet south of the wing section and had obviously been moved by equipment used by the emergency crews. The #3 engine fan and compressor sections showed signs of violent impact and postcrash fire damage. Fan blade distress indicated considerable rotational speed on impact.

D. The left side of the center wing section showed evidence of violent explosion. The outboard wing section separated from the aircraft and came to rest over 500 feet northwest of the center wing section. Examination showed severe outward displacement of all structure (skin-hat sections and ribs) from a point approximately 5 feet forward of the right-hand main gear attachments. The wing was lying upside down with the wing tip outboard from the main wreckage and the leading edge reversed in direction from the main wreckage orientation. The wing had knocked down a masonry wall and come to rest with the inboard end on top of a one-story apartment, the tip extending northwestward into the adjacent street. Evidence verified that the wing had struck the wall and apartment in a nearly horizontal attitude, as the electrical wires were still intact about 25 feet above the apartment. There was an intense fire as evidenced by meltdown of sections of the wing structure and the puddling of metal directly beneath the burned sections. Ailerons, flaps and spoilers were still attached to the

wing. The #1 engine was located about 35 feet northwest of the crash site, still attached to its pylon. Fan and compressor sections showed signs of violent impact and postcrash fire. Fan blade distress indicated considerable rotational speed on impact.

E. The main fuselage empennage was located approximately 75 feet west of the crash site and was oriented roughly north and south with the forward end facing south. Portions of the main cabin and aft cargo compartment were lying between the empennage and the crash site with most of the debris consisting of cabin furnishins, seats, galleys, toilets, upper storage racks, etc.

F. The horizontal stabilizer trim mechanisms were still attached to the aft bulkhead structure. Examination disclosed 41 threads between the top of the right-hand jack screw and nut, and 40 and one half threads for the left-hand jack screw. This equates to about 6.5 stabilizer trim up, and compares with 6.025 as recorded by the Flight Data Recorder. Cursory examination of seats in this area showed all track attachment lugs sheared off.

G. The horizontal stabilizer with the left elevators attached was located approximately 200 feet west of the crash site. Approximately 1 1/2 feet of the right stabilizer was still attached. Inside the right stabilizer section still attached was found dirt impinged on the forward-facing areas which corresponded to the dirt found in the remains of the dump truck on Runway 23 Left. This dirt did not correspond to dirt in the immediate area where the stabilizer came to rest.

H. The vertical stabilizer, rudders and #2 engine were still intact as an assembly, showing very little damage. The unit was lying on its right side with the leading edge facing the crash site and was located approximately 350 feet to the west. The entire assembly had torn loose from the structure above the horizontal stabilizer. Both spars were still intact and all separation had occurred within the main enpennage structure. The #2 engine, turbine and fan sections showed no visible damage and turned freely in the breeze. The left main landing gear assembly was separated from its attach points and had been removed by emergency crews prior to the investigator's inspection. Its location before being disturbed could not be determined.

Analysis

Field and crash site investigators were severely hampered and restricted in their efforts to conduct a logical and thorough search and investigation of the runway and final impact areas. On several occasions, certified and approved investigators were ejected from the impact sites by Mexican Government authorities. Functional tests of the remaining aircraft components and systems were not allowed. The opening of inspection panels of the wreckage for visual observation was not allowed in most cases. Little regard was given to preserving the impact sites a sufficient length of time for complete examination. The crash site wreckage was needlessly removed and destroyed by heavy excavation equipment.

Cockpit Voice Recorder

The Cockpit Voice Recorder, a Fairchild A-100 model, was recovered from the wreckage and sent to the Audio Laboratory at the National Transportation Safety Board in Washington, D.C. for transcription. The transcribing group included representatives from the following organizations:

National Transportation Safety Board
Western Air Lines, Inc.
Air Lines Pilots Association
McDonnell Douglas Corporation
Servicio a La Navegacion en el Espacio Aereo Mexicano
Federal Aviation Administration

The recorder was relatively undamaged, however the recorder frame and dust cover were bent and the input cannon plug was crushed into the case. When the tape was removed and played back it was found to be partially erased. In addition, there was recording on only two of the four channels; the area microphone and the First Officers radio position. The Second Officers radio position was found to be inoperative. The Captains radio position apparently was not used during this portion of the flight. There was a 400 cycle tone which impinged on the unerased portion and added to the problems of transcription. The erasures resulted in 35% loss of intelligibility of the tape in a cyclic manner. The first portion of the recording was readable for 2.3 seconds, interrupted by a 1.7 second erased portion, in a repeated fashion. Mid way through the tape, the readable portion increased to about 3 seconds duration and toward the conclusion it increased further to about 3.8

seconds. The erased segments remained fairly constant throughout the recording, varying from 1.6 seconds to 2.0 seconds.

When the CVR unit was examined at the manufacturers laboratory it was discovered that the unit case had been pierced by a foreign object. According to the technicians, this penetration came in contact with the erasure circuit and this coupled with the shock of impact cuased a momentary electrical impulse to the bulk erase feature of the CVR. When this occurred a wedge shaped segment of the tape on the supply reel was erased.

Erasures presented a continuing problem in determining with complete accuracy and continuity the experiences and actions of the flight crew during the final minuts of this flight. This particular CVR tape had been in use for approximately 2500 hours, which meant the tape had probably been recycled and erased about 5000 times. During this process the tape was subject to continual stretching and flexing. This created some aberrations in the timing process of the transcript.

During the examination of the CVR unit it was noted that the monitoring phone jack had been tampered with so as to render it inoperative.

Investigators determined that cockpit radio speakers were in continuous use during the approach and landing phase of this flight. This created some overriding and blocking out of crew conversation and cockpit operational ambient noises.

The transcribing group spent a considerable amount of time at the NTSB Audio Laboratory enhancing and transcribing the recording. Further enhancement

effort was made at the FBI Laboratory in Washington, D.C. with little additional success. ALPA CVR technicians spent additional hours in analysing the tape and were only slightly more productive. The transcribed version provided (Appendix ____) is felt to be accurate as can be produced at this time.

APPENDIX _____

Transcription of the Cockpit Voice Recorder removed from aircraft N903WA at Mexico City on October 31, 1979.

LEGEND

CAM	Cockpit area microphone
RDO	Radio transmission from the aircraft
-1	Voice identified as Captain
-2	Voice identified as First Officer
-3	Voice identified as Second Officer
-?	Voice unidentified
CTR	Mexico Air Traffic Control Center
TML	Mexico City Terminal Arrival Control
TWR	Mexico City Air Traffic Control Tower
+	Unintelligible word
#	Non-pertinent word
ooo	Erased portion
( )	Questionable text
(( ))	Editorial insertion

NOTE:

1. Times are expressed in GMT.
2. The initial portion of the tape was non-pertinent and is not a part of this transcription.
3. All erased portions are not tabulated on the transcript.

CAUTION

It should be particularly noted that all utterances of the flight crew, radio transmissions received in the cockpit and

ambient cockpit background noises were not audible on this tape and therefore the reader is cautioned not to conjecture or speculate as to what may or may not be hidden in the erased portions.

INTRA-COCKPIT		AIR-GROUND COMMUNICATIONS	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
		1121:40 RDO-2	Centro Mexico ooo two six oh five ooo ooo ooo
		1122:06 RDO-2	Centro Mexico Western ah two six zero five ooo ooo
1122:16 CAM-1	Twenty point one, is that it?		
CAM-2	Yeah ooo		
1122:30 CAM-1	Course is good all of a sudden it ooo		
		1122:36 RDO-2	Centro Mexico ooo six zero five ooo
		1122:42	Thanks Western ooo

RDO-?

1122:47 Go ahead he said

CAM-1

RDO-2 Okay Western two six oh five ooo

1122:52 Two six oh five is ah,

CTR ooo Queretaro, radar contact descend to one three thousand one ooo three zero two zero the altimeter, expect ooo I (base) two three left ooo

1123:05 Okay we'll descend to one three

RDO-2 thousand ooo

1123:07 (I think it's) a Tepexpan

CAM (2-3) approach

CAM-1 Yeah, right ooo ooo ooo

1123:23 Well ooo ooo ooo

CAM-1

1123:32 Western two six oh five ooo

RDO-1 leaving three seven thousand for one three thousand ooo ooo

1123:48

CAM-1 (Get) that ooo

1124:39 Western two six oh five leaving

RDO-2 three thousand

1124:51

CTR Two six zero five roger ooo

1124:54

RDO-2 Thank you

1125:30 (Is the flight plan)

CAM-1 matter over ooo

1125:34

CAM-2 Okay

CAM-1 Ah, ADF ooo

1125:48 ((Sound of TPX in code

CAM for next 30 seconds))

1126:06

CAM-1 Morning Dan

CAM-3 (Morning)

1126:59

CAM-3 Runways two three Charlie

CAM-1 Okay, Dan

1127:40 Got the, got the weather

CAM-1 there, ah ooo

CAM-? (Yeah) ooo ooo

CAM-? ooo (thirty twenty) ooo

CAM-? (Zero six zero) ooo ooo

1128:17 Western two six zero five,

CTR change to one, ah, nineteen seven ooo

1128:22 Say again for two six oh five

RDO-2 ooo

CTR One nineteen seven

RDO-2 One nineteen seven ooo

1128:40 ooo Noches Mexico Western two

RDO-2 six zero five^{ooo} out of two
five point five^{ooo}

1128:44

TML Two six (radio squeal)^{ooo}

CAM-1 ^{ooo}Gear (handle)^{ooo}
he must of had a nap
because^{ooo}

1128:39 Yeah, theres the sun coming
CAM-3 up^{ooo}

CAM-1 Yeah

CAM-2 Yeah

1128:55 Gonna be light by the time we
CAM-3 get to the blocks^{ooo}

1129:02 What do you figure our (weight)
CAM-2 (wait) will be?^{ooo} ^{ooo}

1129:07
CAM-3 No more than an hour or two

1129:22
CAM-? ((Sound similar to human sneeze))

1130:14

CAM-? ((Sound similar to human sneeze))

1130:34

CAM-1 Nice and clear so far down there

CAM-? (And ah)

1130:38

CAM-1 Yeah, smoke over the city and ooo

CAM-? Yeahooo

CAM-1 Giving three and smoke

CAM-2 Yeah three and smoke

CAM-1 It should beooo

CAM-3 You can have it now

CAM-1 Look at that smog

1131:14

CAM-3 Seat sign

CAM-1 Auto on

CAM-3 Altimeters

CAM-1 Set thirty twenty[ooo]

CAM-2 Thirty twenty

CAM-3 Fine back here. Radio altimeters[ooo]

CAM-2 Two hundred

CAM-1 Set minimum and test

CAM-3 HSI

CAM-1 Radio

CAM-2 Rad

CAM-3 Landing data

1131:31 I want to stay, ah, I want to

CAM-1 stay on INS for a minute here[ooo]

CAM-? ++

CAM-1 Yeah, its set

CAM-3 Okay, CDU

CAM-1 Track and groundspeed

CAM-2 Groundspeed

CAM-3 Shoulder harness

CAM-1 On

CAM-2 Right[ooo]

1131:51 I think I'm gonna sleep late[ooo]

CAM-3 all night[ooo]

CAM-3 I think I got about three hours sleep this afternoon[ooo ooo ooo]

1132:27 Western[ooo] two six zero five

TML descend to one one thousand, cleared for Tepexpan two three right[ooo]

1132:35 [ooo] descend to one one thousand, Western twenty six ooo

1132:40 Descend to eleven and cleared

CAM-1 for the approach. Is that correct?

1132:45

RDO-2 Tepexpan arrival for twenty six oh five sir? ooo

1134:06

CAM-2 Go around, please

1134:07 Charlie, do you realize

CAM-3 that you're in INS? ooo

CAM-1 Huh

1134:12

CAM ((Sound of altitude alerter))

CAM-3 You're in Rad now, right?

CAM-1 Right

CAM-2 Right ooo

1134:19 Just checking up old buddy

CAM-3 to make sure that, ah ooo

the in-range is complete, Charlie

1135:09

CAM-2 ooo six hundred

1135:15 Six zero five, tower advises,

TML ah, ground fog ooo the runway and two miles visibility

CAM-1 Roger

1135:26

RDO-2 Roger twenty six oh five ooo

1135:29

CAM-3 Stabbed again

CAM-2 Looks like it might ooo

CAM-1 Yeah

1135:33

CAM-1 Let's have, ah, slats ooo

CAM-? (Someone) open (ED) it up ooo

CAM-1 Huh

CAM-2 ooo Guadalajara, if we have to

CAM-1 Yup

1136:16 ((Sound of landing gear warning

CAM horn))

1136:21

CAM-1 (Twenty two) flaps

CAM ((Sound similar to flap handle movement[ooo ooo ooo]

1136:37

CAM-2 [ooo](Twenty two)

CAM-1 (Okay) [ooo]

1136:44

CAM-2 [ooo]Tee, Double-you, oh,[ooo]

1136:56 Change the ADF please [ooo] to

CAM-1 the outer. Approach checklist

CAM ((Sound of MEIN code for next :0 seconds))

1137:14

CAM-2 Set [ooo]

CAM-3 Course selectors

1137:24

CAM-2 Set

CAM-1 Set ooo

1137:27

CAM-2 Flight guidance

CAM-3 Flight guidance system ooo

1137:31

CAM-1 As desired for now

CAM-3 Flight mode annunciators ooo

1137:35 Ah, speed, vertical speed

CAM-1 heading select ooo

1137:39

CAM-2 Vertical speed, heading ooo

1137:46 Twenty six zero five change

TML to tower, one eighteen one, radar service terminated ooo

1137:50

RDO-2 Eighteen one

1137:51

CAM-3 ADF marker beacon switch

CAM-1 ADF and on ooo

CAM-2 Set right

1137:55

CAM ((Sound of altitude warning horn))

1138:00

CAM-3 Instrument comparison

CAM-2 Going ooo

1138:07 Going through one eighty, one

CAM-1 eight, ah, one ooo ah, ten thousand

CAM-2 Check

1138:17

CAM-3 Alright to give'em the no smoking ooo

1138:20

CAM-1 Ah, yeah go ahead ooo

1138:24

CAM ((Sound similar to avionics cooling fan)) ooo

1138:25 Good morning Mexico tower

RDO-2 Western two six oh five ooo

1138:33 Western two six oh five, two

TWR three right report ooo wind calm

1138:38

RDO-2 Roger ooo ooo

1138:47

CAM-1 Gear down

CAM ((Sound similar to gear handle movement ooo))

1138:06

CAM-3 Landing gear

1139:07

CAM-1 What happened to that # radio?

CAM-? Huh ooo

1139:11 The whole ## thing just, ah, quite,

CAM-1 I don't have any ooo

1139:15

CAM-1 I don't have any, ah, ooo

1139:22

CAM-1 Thirty five flaps, set the bug ooo

CAM ((Outer marker sounds 7 times simultaneous with above))

1139:27

CAM-2 It just died

CAM-1 Died, Dan

CAM-3 Spoiler handle ooo

1139:30

CAM-2 One thirty six ((rachet sound simultaneous

CAM-3 Spoiler

1139:36

CAM-1 Armed? Yeah ooo

CAM-1 +

1139:39 (Ahh) twenty six oh five is
RDO-2 mike echo ooo

1139:46 Western twenty six oh five,
TWR ah ooo

CAM-3 ((Over PA)) We estimate
on the ooo
((Simultaneous with TWR
above))

1139:50 Flight Attendants be seated,
CAM-3 we'd like to thank you all for
flying Western.

1139:52 Do you have your light on ooo
TWR (Simultaneous with CAM-3 above)

1139:56 Set the missed approach
CAM-1 altitude heading and,
((Sound of heavy cough))

1139:57
TWR Twenty six oh five you are to
ooo

1140:00

CAM-1 ooo Yeah, we know

1140:01

RDO-2 Just a little bit

CAM-1 # # Track ooo too good
I'll tell ya

1140:06 Advise runway in sight.

TWR There's ah, ooo

1140:09

CAM Glide slope glide ooo

1140:16

CAM-3 Okay flaps, slats

1140:17 Throttles are to # slow. Set

CAM-1 the missed approach ooo
fifteen bank ooo

CAM ((Racheting sound)) ooo

1140:29 Flaps Thirty five, thirty five,

CAM-3 green. Land

CAM-1 Check 'em ooo

1140:34 Flight guidance ((Remainder
CAM-1 overridden by tower))

1140:35 Two six oh five, do you have
TWR approach lights on left in
sight?

1140:37
CAM-1 Negative ooo

1140:39 Okay sir okay approach lights
TWR are on runway two ooo but
that runway is closed to
traffic ooo

1140:47 ((Middle marker faintly
CAM sounds 3 times simultaneous
with and overridden by CAM-1))

1140:48 We're cleared on the right. We're
CAM-1 cleared on the right, is that
correct?

CAM-2 The other runway

CAM-3 Yeah, the right ooo

1140:53 No, this is an approach to the

CAM-1 # # left ooo

1140:58

CAM-2 Yeah, climb to eighty five hundred ooo

1141:02 Charlie I have ((Sound of heavy touchdown))

CAM-2 (no (low))visibility here, # ((Sound of

CAM-3 impact)) ooo

CAM-1 Oh, Oh ((Simultaneous with visibility here))

1141:08 Fly heading ((Simultaneous with sound

CAM-2 of gear warning horn))

CAM-1 Oh, Oh

CAM-3 Charlie, cut the ooo

1141:15

CAM-2 Gear up

CAM ((Sound of engine buzz))

CAM-2 You're banking ooo

CAM-1 Oh # # # Oh

CAM-3 Charlie ooo

1141:25

CAM-? Get it up, get it up, oh ooo

1141:29

CAM ((Sound of final impact))