National Transportation Safety Board
Office of Aviation Safety
Washington, D.C. 20594-2000
April 17, 2000

METEOROLOGICAL FACTUAL REPORT
DCA00MA030

A. ACCIDENT

Location: Burbank, California
Date: March 5, 2000
Time: 1810 Pacific Standard Time (0210 UTC March 6, 2000)
Aircraft: Southwest Airlines flight 1455, Boeing 737-300, N6685SW

B. METEOROLOGICAL GROUP

Group Chairmen: Donald E. Eick
Meteorologist
National Transportation Safety Board
Operational Factors Division, AS-30
Washington, D.C.

Member: Dave Wotton
Chief Dispatcher
Southwest Airlines
Dallas, TX

Member: Captain Larry Kline
Go-Team
Southwest Airlines Pilots' Association
Dallas, TX

C. SUMMARY

On Sunday, March 5, 2000, at 6:11 PST, a Southwest Airlines Boeing 737-300, N668SW, operating as flight 1455 from Las Vegas, Nevada, overran the departure end of runway 08 following a landing at Burbank-Glendale-Pasadena Airport, Burbank, California. The airplane traveled through a fence at the end of the runway and came to rest on a highway outside the airport perimeter. There were no fatalities to the 137 passengers and 5 crew aboard. The flight was on an IFR flight plan and was cleared for a visual approach to land. VFR weather conditions prevailed at the time.

D. DETAILS OF INVESTIGATION

All the weather data used in this report was obtained from official National Weather Service (NWS) sources and the National Climatic Data Center (NCDC). All times are Coordinated Universal Time (UTC) based upon the 24 hour clock. Local time is + 8 hours to UTC, and UTC=Z. Directions are referenced to true north and distances in nautical miles. Heights are above mean sea level (MSL) unless otherwise noted in weather observations and forecasts, where they are reported above ground level (AGL). Visibility is in statute miles and fractions of statute miles.

1.0 Synoptic Situation

The NWS National Center for Environmental Prediction (NCEP) Surface Analysis chart issued at 0000Z and 0300Z on March 6, 2000, were used to define the synoptic features impacting the area. The 0300Z National surface analysis chart is included as attachment 1. The chart depicts a low pressure system Idaho with a central pressure of 985 millibars (mb), a low over Nevada at 996 millibars (mb), with a cold front extending from the low's southward into eastern California and the Mexican Baja. A separate low pressure system is also depicted across central California to the northeast of the Burbank area with a central pressure of 996 mb.

The southwest regional plot at 0300Z (attachment 2) depicted a cold front east of Burbank with the isobars[1] oriented in a northwest to southeasterly direction, with the 1004 mb line to the east of Burbank. The station identifiers were not included on the plot, however, several stations in southwestern California were reporting continuos rain and rain showers.

The 0000Z southwest region surface analysis is included as attachment 3, the chart depicts similar conditions as described on the 0300Z chart, with the exception that the

[1] Isobar - a line of equal pressure on surface analysis chart, usually drawn at 4 mb intervals. Isobars provide an indication of wind direction and speed.

cold front is slightly west of its previous position and the 1004 mb isobar is located almost on top of the Burbank area.

2.0 Meteorological Aerodrome Reports (METAR)

Burbank-Glendale-Pasadena Airport (KBUR), is located at latitude N 34° 12.04' and longitude W 118° 21.51', or 3 miles northwest of the city of Burbank, California at an elevation 775 feet. The airport is in the east-southeastern end of the San Fernando Valley, between the San Garbriel Mountains and the Pacific coastline. To the northeast of the airport, man-made structures rise to over 2,000 feet within 2 miles, the Verdugo Mountains rise above 2,000 feet within 3 miles, and the San Garbriel Mountains rises to 5,074 feet within 8 miles.

The primary precision approach to Burbank is runway 08 which is published as 6,032 feet long and 150 feet wide, it is an asphalt-grooved runway. The non-precision runway is 15/33 which is 6,886 feet long and 150 feet wide. The airport is equipped with an Automated Surface Observation System (ASOS) and is augmented by the Air Traffic Controllers (ATC) under the Limited Aviation Weather Reporting Station (LAWRS), and resulted in Burbank Airport having Service Level C status[2]. The observations surrounding the time of the accident were as follows:

Burbank special observation at 0220Z, wind from 250 degrees true at 6 knots, visibility 10 statute miles, ceiling overcast at 9,500 feet, temperature 9 degrees Celsius (48 degrees F), dew point temperature 0 degrees C (32 degrees F), altimeter 29.66 inches of mercury (hg). Remarks; Automated Surface Observation System (ASOS).

Burbank weather observation at 0153Z, wind from 250 degrees at 6 knots, visibility 10 miles, a few clouds at 6,500 feet, ceiling overcast at 9,000 feet, temperature 9.4 degrees C (49 degrees F), dew point 1.1 degrees (34 degrees F), altimeter 29.65 inches of hg. Remarks; ASOS, sea level pressure 1003.6 millibars.

Burbank weather observation at 0053Z, wind from 270 degrees at 18 knots gusting to 26 knots, visibility 10 miles, a few clouds at 3,900 feet, ceiling overcast at 5,500 feet, temperature 11.1 degrees C (52 degrees F), dew point 2.2 degrees C (36 degrees F), altimeter 29.60 inches of hg. Remarks; ASOS, peak wind from 270 degrees at 26 knots at 0048Z, sea level pressure 1002.5 mb.

Burbank observation at 2353Z, wind from 270 degrees at 12 knots, visibility 10 miles, a few clouds at 4,200 feet, ceiling overcast at 5,500 feet, temperature 11.1 degrees C (52 degrees F), dew point 2.8 degrees C (37 degrees F), altimeter 29.60 inches of hg. Remarks; ASOS, wind shift at 2309Z, rain began 2315Z and ended at

[2] Service Level C - provides a certain level of augmentation standard, see Aeronautical Information Manual section 7-1-18 for details.

2335Z, a trace[3] precipitation recorded from the observation, total 6 hour precipitation 0.77 inches, the 6-hour maximum temperature was 11.1 degrees C and the low temperature 8.9 degrees C, 3-hour pressure tendency indicated an increase of 2.3 mb.

Burbank has several special notices included in the Airport Facility Directory (AFD) regarding weather and operations at the airport, the data includes the following information:

- Runway 08 is closed for takeoff to multiengine aircraft 12,500 pounds and over.
- Helicopter and fixed wing aircraft operating 2,503 feet MSL (1,500 FT AGL) and below at Whiteman Airport, 5 miles northwest.
- Turbulent conditions near airport at times of high winds from the north and east. Downdrafts and wind shear may occur at liftoff or final.
- Curfew in effect from 0600Z to 1500Z, prohibiting operation of noisy aircraft and intersection takeoffs, maintenance run-ups, flight training operations, practice approaches and touch and go landings.

3.0 Pilot Reports

Burbank urgent pilot report (UUA), over Burbank at 0116Z, reported from a pilot of a B737 aircraft, indicating he had encountered low level wind shear with 10 knot loss at 100 and 200 feet on runway 33.

Van Nuys urgent pilot report (UUA), over Van Nuys Airport at 0104Z, report from a Lear 60 jet pilot at 100 feet indicating low level wind shear with plus and minus 15 knots on 1/4 mile final.

Las Vegas pilot report (UA), 20 miles west of Las Vegas at 0035Z, reported from a pilot in B737 aircraft indicating moderate rime icing from 14,000 to 10,000 feet, with the remarks on the FUZZY arrival.

Las Vegas pilot report (UA), 40 miles northeast of Las Vegas at 0042Z, from a pilot flying a B737, reporting true air temperature of 04 degrees C with moderate rime ice between 10,000 to 9,000 feet, remarks on NOOTN arrival.

4.0 Upper Air Data

The 0000Z upper air sounding from Miramar/San Diego, California, number 72293, for March 6, 2000, was obtained and plotted on the Safety Boards Man

[3] Trace is defined as less than 0.01 of an inch of precipitation.

Computer Interactive Data System (McIDAS) and is included as attachment 4. The Miramar sounding indicated low level winds from the west at approximately 15 knots with winds backing to the southwesterly above 4,000 feet. The level of maximum wind was located at 29,000 feet with wind from 230 degrees at 109 knots. Below 10,000 feet the winds were west to southwesterly at less than 20 knots. Two shallow low level inversions were also depicted from 781 to 778 mb (6,740 feet to 6,840 feet) and between 673 to 634 mb (10,532 to 12,001 feet). The sounding remained within 5 degrees of saturation below 740 mb or 7,000 feet. The freezing level was at 834 mb or 5,000 feet.

The winds and temperatures observed below 5,000 feet were:

Pressure (MB)	Temp (C)	Dew Point (C)	Wind Dir. (true)	Wind Speed (KT)	Height (FT)
990	11.6	7.4	270	14	420
969	10.0	5.5	270	15	997
934	7.2	2.3	265	16	1998
925	6.4	1.4	260	17	2268
900	4.7	0.4	255	17	2999
867	2.3	- 1.1	250	16	3999
850	1.0	- 1.8	245	15	4525
835	0.1	- 2.8	240	15	5000

The stability indices were as follows:

Lifted Condensation Level (LCL)	877 mb
Level of Free Convection (LFC)	798 mb
Equilibrium Level (EL)	779 mb
K Index	19.7
Lifted Index (LI)	3.0
Severe WEAther index (SWI)	154.8
Total Totals index (TTI)	52.2
Precipitable Water (PW)	11.2 mm (0.44 in)

5.0 MDCARS Ascent/descent reports:

The National Oceanic and Atmospheric Administration (NOAA) Forecast System Laboratory (FSL) located at Boulder, Colorado, provided access to the MDCARS[4]/ACARS[5] data base. Aircraft ascent and descent reports from 0100Z to

[4] MDCARS - Meteorological Data Collection And Reporting System

0300Z on March 6, 2000, the Los Angeles area were examined into to provide another source of wind and temperature data close to the Burbank Airport. The following tables of MDCARS data were obtained:

LAX Descent report (aircraft # 87) arriving from 301 degrees:

Press Alt (FT)	MB	Temp. (C)	Wind dir/speed (true/KT)	Bearing/range (true/NM)	Time (Z)
2,000	942	6.0	267 at 30	062 at 5	0127
3,990	875	1.3	268 at 26	060 at 10	0124
5,970	813	-3.8	266 at 22	039 at 8	0123
7,990	753	-8.0	258 at 19	323 at 7	0121
10,000	697	-11.8	259 at 21	301 at 12	0119

LAX Ascent report (aircraft # 664) departing towards 266 degrees:

Press Alt (FT)	MB	Temp. (C)	Wind dir/speed (true/KT)	Bearing/range (true/NM)	Time (Z)
330	1001	11.3	263 at 19	0 at 0	0131
1,040	976	9.6	276 at 23	0 at 0	0131
1,790	949	7.6	270 at 29	284 at 1	0131
2,150	937	6.7	270 at 30	284 at 1	0132
3,040	907	3.8	277 at 31	274 at 3	0132
3,400	895	3.0	278 at 32	274 at 3	0132
5,410	830	-1.4	281 at 32	262 at 6	0133
7,210	776	-5.3	266 at 22	264 at 8	0133

LAX Descent report (aircraft #734) descending from 082 degrees:

Press Alt (FT)	MB	Temp. (C)	Wind dir/speed (true/KT)	Bearing/range (true/NM)	Time (Z)
1,990	942	6.0	276 at 05	078 at 5	0221
4,000	875	0.8	277 at 22	080 at 11	0219
5,990	812	-3.5	273 at 19	081 at 17	0217
7,980	753	-7.3	243 at 16	082 at 23	0215
9,990	697	-13.0	232 at 18	082 at 29	0213

[5] ACARS - Aircraft Communications Addressing and Reporting System

6.0 Satellite imagery:

The Geostationary Orbiting Environmental Satellite number 10 (GOES-10) imagery was displayed on the Safety Board's McIDAS system immediately following the accident and documented. The infrared band 3 and 4 satellite imagery, or infrared and moisture channel imagery provided a 4 kilometer resolution of the area.

Attachment 5 is the infrared 10.7 micron wavelength GOES-10 image at 0200Z on March 6, 2000, at 4X magnification and with a standard GMS enhancement curve applied. The enhancement curve is used to help identify the higher and colder cloud tops that are often observed with convective activity and cirrus clouds. The images depicted a band of clouds over the Burbank area with a radiative cloud top temperature of 267.8 degrees Kelvin or -5.36 degrees Celsius observed. Based on the Miramar sounding (section 4.0 above) the cloud tops were approximately in the 7,000 feet over the area. No cumulonimbus clouds were observed in the immediate vicinity of the airport. The image provided the following statistics:

Minimum temperature	261.0° K	- 12.16° C
Maximum temperature	279.5° K	+ 6.34° C
Mean temperature	270.3° K	- 2.86° C
Standard deviation	5.748	

Attachment 6 is the 6.8 micron wavelength moisture channel image or the band 3 image for 0200Z on March 6, 2000, at a 4X magnification. Moisture darkening was observed over eastern California to the east of Burbank Airport, and was associated with descending drier air.

7.0 Weather Surveillance Radar Data

The NWS Level I and III Archive data for the Weather Surveillance Radar 1988 Doppler (WSR-88D) located at Orange County (SOX) and Los Angeles (VTX), California were examined for any significant features at the time of the accident. Orange County or Santa Ana Mountains/March AFB, SOX, is located 42 miles east-southeast (122 degree azimuth). Los Angeles, VTX, is located 43 miles west-northwest of Burbank Airport (288 degrees azimuth)

7.0.1 Base Reflectivity

The base reflectivity from the 0.5 degree elevation scan from 0000Z through 0400Z on March 6, 2000, was examined on-line from the National Center for Atmospheric Research (NCAR) achieve data. The images indicated only scattered echoes over the region with none impacting the Burbank Airport. Attachment 7 is the base reflectivity

at 0203:11Z from SOX - Santa Ana Mountains. The reflectivities ranged from 5 dBZ to 35 dBZ or light to moderate intensities, or NWS VIP Level 1 and 2 activity, with only an isolated area of 40 dBZ or level 3 indicated off the coast.

7.0.2 Velocity Azimuth Display (VAD) Wind Profile

The Velocity Azimuth Display (VAD) Wind Profile provided observed wind data at various heights versus the volume scan times. The wind profile from VTX from 0121Z to 0211Z indicated wind from the northwest at 10 knots with a root mean square error (RMS) of less than 4 knots for the period (attachment 8).

While SOX reported three volume scans during the period, from 0113Z to 0213Z (attachment 9-11), at 0208Z and 0213Z the wind was observed from the west at 25 knots, with a RMS error of 4 knots or less.

8.0 Terminal Aerodrome Forecast (TAF):

The forecast that was current for Burbank Airport at the time of the accident was issued by the NWS Forecast Office at 2325Z on March 5, 2000, and was valid from 0000Z on March 6, 2000, to 2400Z. The forecast from 0000Z was for wind from 250 degrees at 12 knots, visibility better than 6 miles with thunderstorms in the vicinity, a few clouds at 3,000 feet in cumulonimbus clouds, ceiling broken at 5,000 feet. Temporary conditions between 0000Z and 0600Z of light rain showers, ceiling broken at 2,500 feet. From 0600Z, wind variable at 3 knots, visibility better than 6 miles with thunderstorms in the vicinity, a few clouds at 3,500 feet in cumulonimbus clouds, ceiling broken at 5,000 feet. Probability 40 percent between 0600Z and 1400Z of light rain showers and ceiling broken at 3,000 feet. From 1400Z wind variable at 3 knots, visibility better than 6 miles with thunderstorms in the vicinity a few clouds at 3,000 feet with cumulonimbus clouds, ceiling broken at 8,000 feet. Probability 40 percent between 1400Z and 2000Z of light rain showers and ceiling broken at 3,000 feet. From 2100Z wind from 160 degrees at 12 knots, visibility better than 6 miles, scattered clouds at 4,000 feet, ceiling broken at 10,000 feet.

9.0 In-flight Advisories Current

The NWS Aviation Weather Center (AWC) located in Kansas City, Missouri had the following AIRMET series of in-flight weather advisories[6] current at the time of the accident (attachment 12 plot and text):

[6] In-flight weather advisories are designated as Severe Weather Forecast Alert, Convective SIGMET, SIGMET, AIRMET, and Center Weather Advisory. They are issued as observed and/or forecast weather require and that meet the specific criteria for issuance.

AIRMET Tango update 5 for turbulence issued at 2045Z on March 5, 2000, and valid until 0300Z on March 6, 2000. The advisory covered sections of California, Oregon, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, and New Mexico. Two separate advisories were included, one advisory for high altitude clear air turbulence and one advisory for low altitude turbulence. The high altitude advisory was for occasional moderate turbulence between 16,000 feet and 39,000 feet, with conditions continuing beyond 0300Z to 0900Z. The low altitude advisory was for occasional moderate turbulence below 16,000 feet, with conditions continuing beyond 0300Z to 0900Z.

AIRMET Zulu update 5 was issued at 2045Z and was valid until 0300Z. The area encompassed sections of Washington, Oregon, California, Idaho, Montana, Nevada, Utah, Colorado, Arizona, and New Mexico. The advisory warned of occasional moderate rime to mixed icing in-clouds and in-precipitation between 5,000 to 7,000 feet, and 18,000 feet. Conditions were expected to continue beyond 0300Z.

There were two separate AIRMET Sierra advisories current for the area. One AIRMET was issued for occasional ceilings below 1,000 feet and/or visibility below 3 miles in precipitation. The other AIRMET was issued for occasional mountain obscuration in clouds and precipitation. Both AIRMETs were expected to continue beyond 0300Z.

There were no Severe Weather Forecast Alerts, SIGMETs, Convective SIGMETs, or Center Weather Advisories current for the area.

10.0 Preflight Weather Document

The Southwest Airlines flight 1455 weather document, a required part of the dispatch release attachments was issued at 2152Z based on the initial scheduled departure time and is included as attachment 13. The document included weather reports, pilot reports, terminal forecasts, and NOTAMs[7] for the departure, destination, and alternate airports listed in the release. The weather document also included a hazard information header where the SIGMET and western region Convective SIGMET were identified with no current activity. A separate enroute weather section followed, with selected observations, forecasts, D-NOTAMs, pilot reports, winds and temperature aloft forecasts was included.

The destination forecast for the Burbank Airport at the time the document was issued was for the following:

[7] NOTAM - abbreviation for notice to airmen, generally referring to D-NOTAMs and FDC NOTAMs. D-NOTAMs are disseminated hourly on weather circuits and affect approach and navigation system, runways, field conditions, and other operational factors which can affect the operational decisions of the flight. FDC NOTAMs are issued twice a day and are issued for temporary flight restrictions, changes to enroute and approach procedures.

Terminal Aerodrome Forecast (TAF) for Burbank issued at 1725Z and valid from 1800Z to 1800Z on March 6, 2000. Beginning at 1800Z, wind from 140 degrees at 12 knots, visibility 5 miles in light rain and mist, scattered clouds at 1,000 feet, ceiling overcast at 2,500 feet; temporary conditions between 1800Z and 2200Z, visibility 2 miles in moderate rain and mist, ceiling broken at 800 feet. From 2200Z, wind from 170 degrees at 15 knots, visibility 5 miles in light rain showers, scattered clouds at 1,000 feet, ceiling overcast at 3,000 feet; temporarily between 2200Z and 0500Z, visibility 2 miles in thunderstorm and moderate rain, ceiling broken at 800 feet in cumulonimbus clouds. From 0500Z, wind variable at 3 knots, visibility better than 6 miles with light rain showers, scattered clouds at 1,500 feet, ceiling broken at 3,500 feet; probability of 40 percent between 0500Z and 1200Z of visibility 3 miles in thunderstorm and moderate rain, ceiling broken at 1,000 feet in cumulonimbus clouds. From 1200Z, wind variable at 3 knots, visibility better than 6 miles, scattered clouds at 1,500 feet, ceiling broken at 3,500 feet, with a 40 percent probability between 1200Z and 1800Z of visibility 3 miles in thunderstorms and light rain, ceiling broken at 1,500 feet in cumulonimbus clouds.

The Burbank Airport also had a D-NOTAM issued indicating that the runway 8 ILS[8] approach glide slope was unmonitored, and several FDC NOTAMs with changes to the runway 8 approach minimums.

11.0 Flight Dispatch Officers Statements

A telephone interview was conducted by Mr. Donald E. Eick, chairman of the weather group, and the Flight Dispatcher releasing Southwest Airlines flight 1455, Mr. W. David Benge, and the relieving dispatcher, Mrs. Leah Watson, on March 9, 2000. Present by the request of Mr. Benge and Mrs. Watson was Mrs. Rhonda Cates, Counsel for the Southwest Airlines Employee Association (SAEA). Captain Larry Kline (SWAPA) and David Wotton (SWA) were also present during these interviews as members of the weather group.

11.1 Releasing Dispatcher

The releasing dispatcher Mr. David Benge, started with Southwest Airlines in December 1983, in Station Operations in Amarillo, Texas, working on ramp for seven months. He then moved to the position of a Customer Service Agent for two years. Mr. Benge then transferred to Flight Information in Dallas, Texas. In April 1988, he became an Assistant Dispatcher after obtaining his Dispatcher Certificate, number 448567635, from Aviation Training Incorporated in Minneapolis, Minnesota. He upgraded to the position of a full dispatcher after 1 year. Mr. Benge holds no other

[8] ILS - Instrument Landing System

airmen or NWS certificates. He stated that his last recurrent training month was in May 1999, and that Minimum Equipment Lists (MELs), systems, and general dispatch related items were covered. The 3-day recurrent training occurred in May. He could not recall what specific weather topics were covered. With regards to the flight planning and weather systems available to the dispatchers, Mr. Benge stated that he was comfortable with the level of training he had received with the weather systems and that training was continuous as new features and products were added.

He stated his normal duty cycle was 6 days on, 3 days off. The day of the accident was his third day on duty. He stated he had received plenty of rest before duty and met all duty rest requirements.

Mr. Benge normally works a 0700-1500 Central Time shift. This shift relieves one of four desks from the 2300-0700 shift, which are divided by geographical regions. The turnover includes a briefing on the flight releases already completed, weather that will affect the sector, and any other factors that may affect flights released by the relieving Dispatcher. The time to accomplish this turnover varies by the weather conditions in the sector. He would then do a self-brief, set up the computer system, and review the releases already sent.

Mr. Benge was responsible for the southwest region on March 5, 2000. The workload for the southwest region, normally releases 75-80 flights with an additional 15-20 from the previous shift to flight watch. He stated that there is a procedure to offload work to other Dispatchers by alerting the Superintendent on Duty (SOD) or a Chief Dispatcher. Help is also offered without asking if other Dispatchers see that he is becoming too busy.

On the day of the accident he arrived at work early, at approximately 0650 CST. His turnover briefing included details of the releases generated by the midnight shift. He then conducted a self-briefing, which included reviewing the winds aloft at 34,000 feet, the high level significant weather, weather radar, METARs, TAFs, and NOTAMs. Mr. Benge stated that he saw thunderstorms southwest and west of the Los Angeles basin building as forecasted. He expected an ATC Flow Control Program for Los Angeles with the possibilities of increased miles-in-trail and airborne holding due to the weather and demand on the air traffic control system.

Mr. Benge stated that he considered the workload on March 5, 2000, to be heavy due to airborne holding into Los Angeles, San Diego, and Phoenix, and he had also experienced computer problems with the flight planning which caused 10 to 15 minutes delay in generating some flight plans. At one point in his shift he indicated he was about 30 minutes behind. Other desks were also experiencing a heavy workload due to the weather in the southern California area. However, overall he did not consider it an "uncommon" day.

Flight 1455 was released approximately 7 hours into the shift at 2010Z. Mr. Benge stated that he had released numerous other flights into the Los Angeles, Burbank, and San Diego areas, and was aware of what had been occurring throughout the day. He saw no changes coming to what he had seen all day long. Flight 1455 was released based on the NWS forecast issued at 1725Z, beginning at 1800Z. Based on this new forecast he expect the heavy rain and thunderstorms to continue. He stated that he continued to plan runway 08 in Burbank and that the winds were considered in his planning. The forecast winds in the terminal aerodrome forecast resulted in a 90-degree crosswind, but were within limits. Close alternate airports such as Los Angeles, Ontario, and San Diego were not viable alternates due to the weather, so he chose Las Vegas. Due to the full flight and weight considerations he ran the flight plans several times and could only plan 30 minutes of contingency fuel.

When asked about other hazardous weather impacts or variables he considered in his planning, Mr. Benge indicated that turbulence, windshear, and runway condition were considered, but he had not received any reports of turbulence and wind shear. He knew of no weather advisories in effect, and planned a wet runway. He had received a field condition report that was sent at 1130Z. With regards to updating the release, he indicated that he did not send out anything new out as nothing had changed based on his planning. He did not received any PIREPs from any crews, and from what he observed, the weather pattern continued as forecast and no changes to his releases were necessary.

Mr. Benge stated that he was familiar with the Airport/Facility Director (A/FD) and the Southwest Airline/Jeppeson special airport page for Burbank warning of wind shear conditions in the area with north and east wind flows. He stated that the A/FD was available to flight dispatch for reference as needed.

The flight crew of Southwest flight 1455 from Las Vegas to Burbank did not contact him regarding his release, or the weather conditions. The weather document issued for the flight was generated from the Operations Terminal Information System (OTIS) and attached to the release at the station. Mr. Benge stated he was aware of what was on a weather package, and that he could see what is on a specific flights weather package. He stated that if a flight is delayed, there is a procedure to update the weather package, but that flight 1455 was not delayed during his shift.

Mr. Benge was notified of the accident at his home by a friend in Dispatch at approximately 0340Z. At approximately 0415Z he received a call from Greg Wells, the Director of Dispatch, and was asked to report to the office for drug and alcohol testing. Approximately 5 minutes later, Mr. Wells called back and told him not to come back to the office for testing due to the time frame involved.

On his next scheduled work day following the accident, Mr. Benge was relieved of duty until a review and debrief was accomplished. He then returned to work on March 7, 2000, and got back into his normal work schedule.

11.2 Dispatcher on Duty

The dispatcher on duty at the time of the accident was Mrs. Leah Watson. She started with Southwest Airlines as a Provisioning Agent in Albuquerque, New Mexico in 1990. She held this position for 2 years and then worked as an Operations Agent in Phoenix, Arizona for 8 more years. After 3 months as an Operations Supervisor she was hired into the Dispatch department as an Assistant Dispatcher on August 16, 1999.

Mrs. Watson obtained her Dispatch License, number 525715418 in December of 1998 at the Airline Flight Dispatch Training Center in Euless, Texas. She holds no other FAA or NWS Service certificates or licenses. She completed her initial dispatch training with Southwest Airlines in November of 1999.

Mrs. Watson stated that although she was learning new things everyday, she was comfortable with her abilities to utilize the dispatch tools.

The day of the accident occurred on the third duty day, of her 6 days on and 3 days off duty cycle. Mrs. Watson stated she had received plenty of rest before duty, and met all rest requirements. Mrs. Watson stated that she normally works the 1500-2300 Central Time shift. She normally arrives 10-15 minutes early and receives a shift turnover briefing. This briefing includes information on weather, turbulence, alternate airports in use, and any ATC advisories. She then reviews flights in progress, the weather, and the releases from the previous shift.

She stated that if the workload becomes unmanageable there is a procedure in place to get assistance. The procedure requires her to inform the SOD and they will get someone to help with the workload. On the day of the accident, Mrs. Watson stated that her workload was moderate and manageable. She stated that she had 80 to 85 flights to work including the ones from the morning shift. She was concerned with airports staying above landing minimum, turbulence, and that flight crews had "solid" alternates.

On the day of the accident, the shift briefing given by Dave Benge consisted of discussions on the weather that had been occurring. This included heavy rainfall, ATC delays for Los Angeles, San Diego, and Pheonix, the potential for more delays, and that rain showers appeared they would last the remainder of the evening. A busy shift was anticipated. She stated that she looked at high level significant weather charts, Convective SIGMETs, single-site radar images, and noted that there were no weather watches or SIGMETs for turbulence over the region.

Mrs. Watson picked up flight 1455 from the previous shift; it was not yet airborne when her shift started. She stated that she did not recall what time it departed. She did not update the weather document or advise the flight crew of 1455 when the new

terminal forecast for Burbank was issued at 2325Z. When questioned on this, Mrs. Watson generally believed that the new forecast indicated general better ceiling and visibility information and as such she did not notify the crew. A forecast that indicated conditions to be worse than previously forecast would be passed along. She was concerned with the change in wind speed however, but did not react to the newer forecast. When questioned on this, Mrs. Watson acknowledged that this would require notification to the flight crew.

She received a phone call from a crew member asking about Burbank operations. She advised him that the rain was expected to continue all evening, but the airport was expected to remain operational. She did not know if this was a crewmember from flight 1455.

Consideration was given to turbulence, but none had been reported. She continued to consider the runway wet due to rain showers off and on in the area. No additional field condition reports or pilot reports were received and none provided to the flight crew. Mrs. Watson did not expect any problems with flight 1455.

Mrs. Watson stated that she did not know when the weather document was issued, but that there were procedures in place to generate and issue a new document either through Dispatch or the station.

She stated that she became aware of the accident about 5 minutes after it occurred when the Burbank station called, advising her that an aircraft had gone off the end of the runway. A pilot at the accident scene also called on his cell phone to let everyone know that there was no fire, but the aircraft went through the wall and onto the street. She then looked for other flights going to Burbank and advised them to return to the gate and not to depart for Burbank. Persons on the emergency notification list were called by herself and the SOD.

Once the initial notifications were done, another dispatcher came over and relieved Mrs. Watson of her duties. She then sat with the SOD for a few minutes, and then was put in another room to await a drug and alcohol test. No written briefing was done. Upon receiving the results of the testing, Mrs. Watson returned to work on March 8, 2000.

In closing Mrs. Watson added that she continued to monitor the runway activity in Burbank after the new forecast had been issued and noted that runway 08 remained the active runway. She was also aware that runway 08 was the most restrictive runway in Burbank and stated that the Pilot-in-Command has the final say on which runway would be used based on the latest Automated Terminal Information Service (ATIS) broadcast. She also added that there are other methods for the flight crew to receive up-to-date weather other than through Dispatch. Each station also receives the most current text and graphical weather information, which is available to all crews

before departure. She stated that she felt she had done all she could do as a dispatcher for flight 1455.

12.0 Forecast Models

The NWS Aviation Weather Center experimental model "MWAVE" for mountain wave activity is included as attachment 14. The 6 hour forecast is a composite created from the rapid update cycle (RUC) forecast for breaking pressure drag which is a diagnostic tool used to identify mountain wave activity, which is responsible for a large percentage of severe turbulence or clear air turbulence (CAT) encounters. The chart indicates several areas of potential CAT over southern California to the east of the Los Angeles and Burbank, and to the south and east of the route of flight. The high values of breaking pressure drag correlates well with the moisture channel darkening observed by the moisture channel satellite image in section 6.0 above.

13.0 Astronomical Data

The astronomical data was obtained from the U.S. Naval Observatory located in Washington, D.C. and was calculated for Burbank, California at station elevation. The following data is provided:

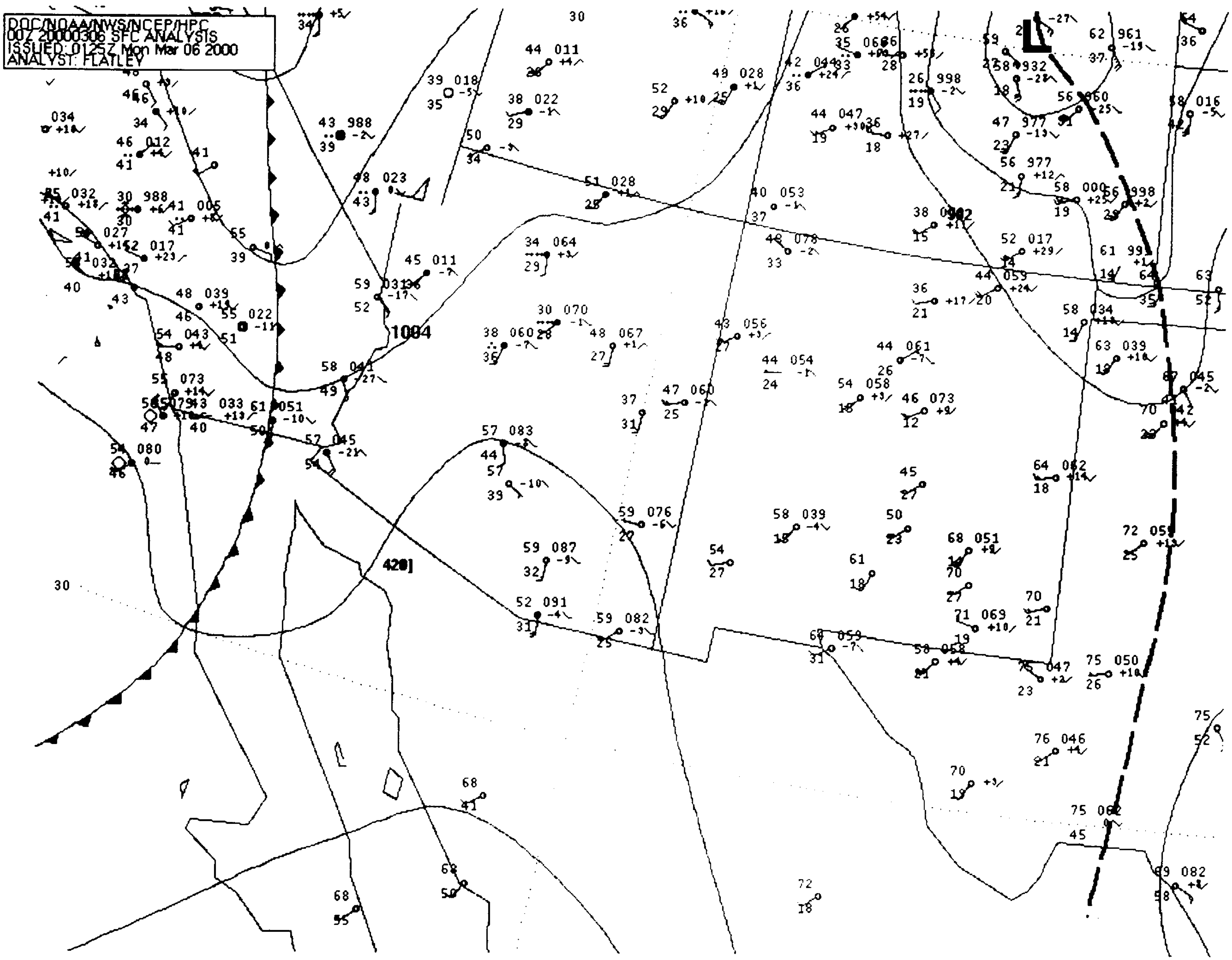
Astronomical date:	March 5, 2000
Sunset:	1753 PST (0153Z)
End civil twilight:	1818 PST (0218Z)
Altitude of the Sun:	- 4.3 degrees below the horizon
Azimuth of the Sun:	266.1 degrees
Moon set:	1737 PST (0137Z)
Moon phase:	New moon on March 5, 2000, at 2117 PST.

The definition of night time according the Code of Federal Regulations is the time between the end of civil twilight and the beginning of morning civil twilight, converted to local time. The accident occurred before the end of civil twilight and therefore occurred during the day.

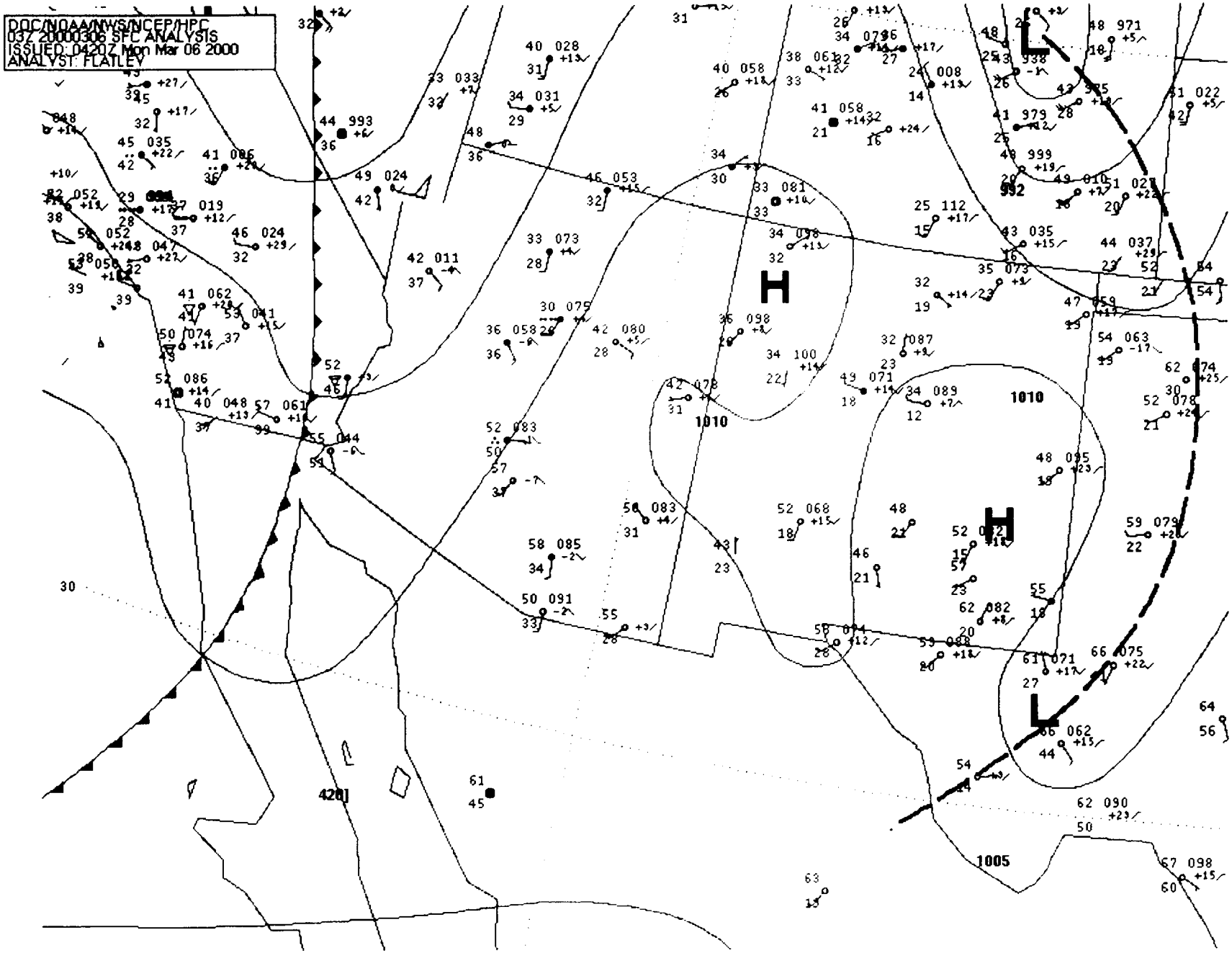
[redacted]

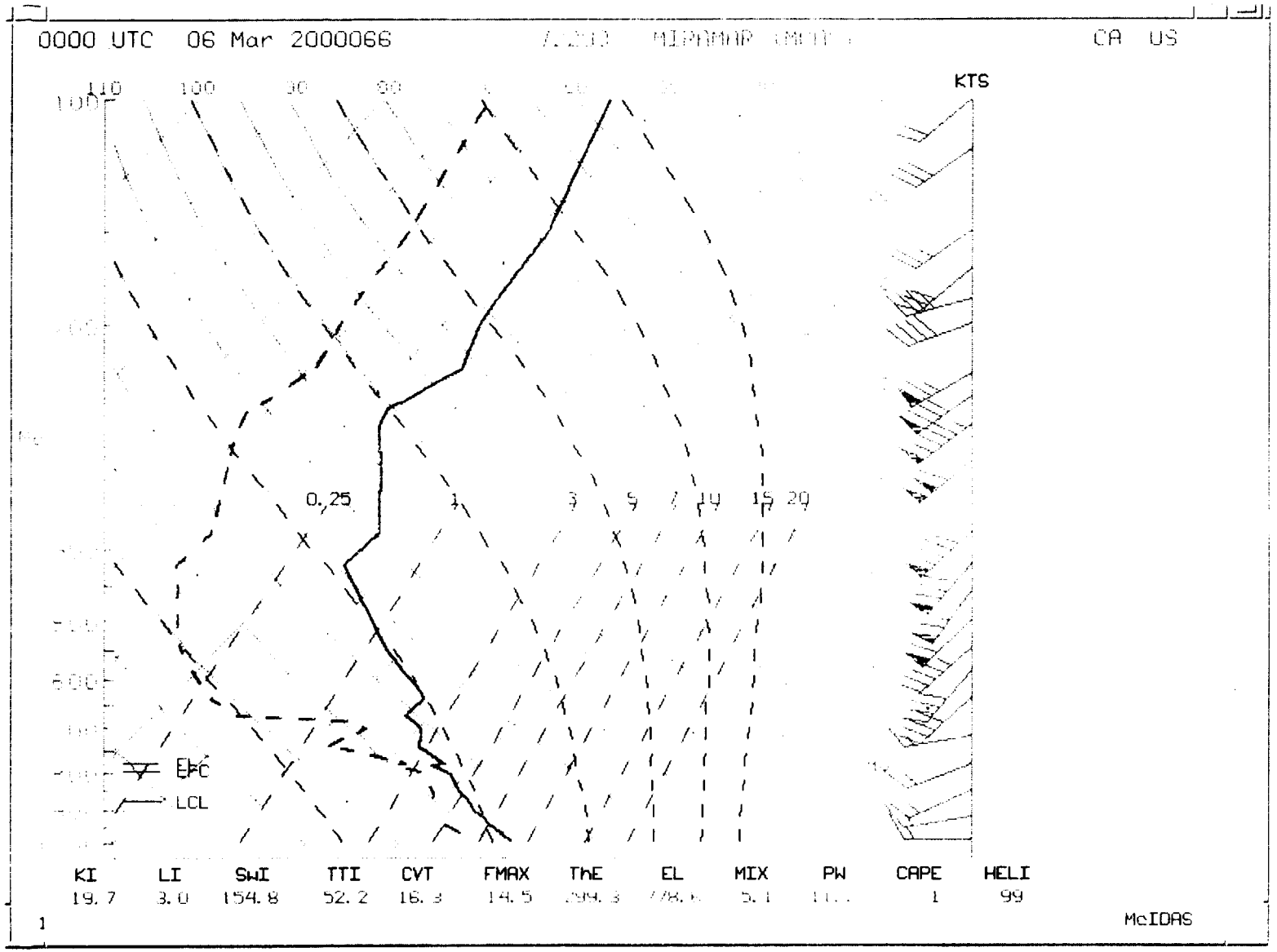
Donald E. Eick
Meteorology Group Chairmen

Dave Wotton
Capt. Larry Kline

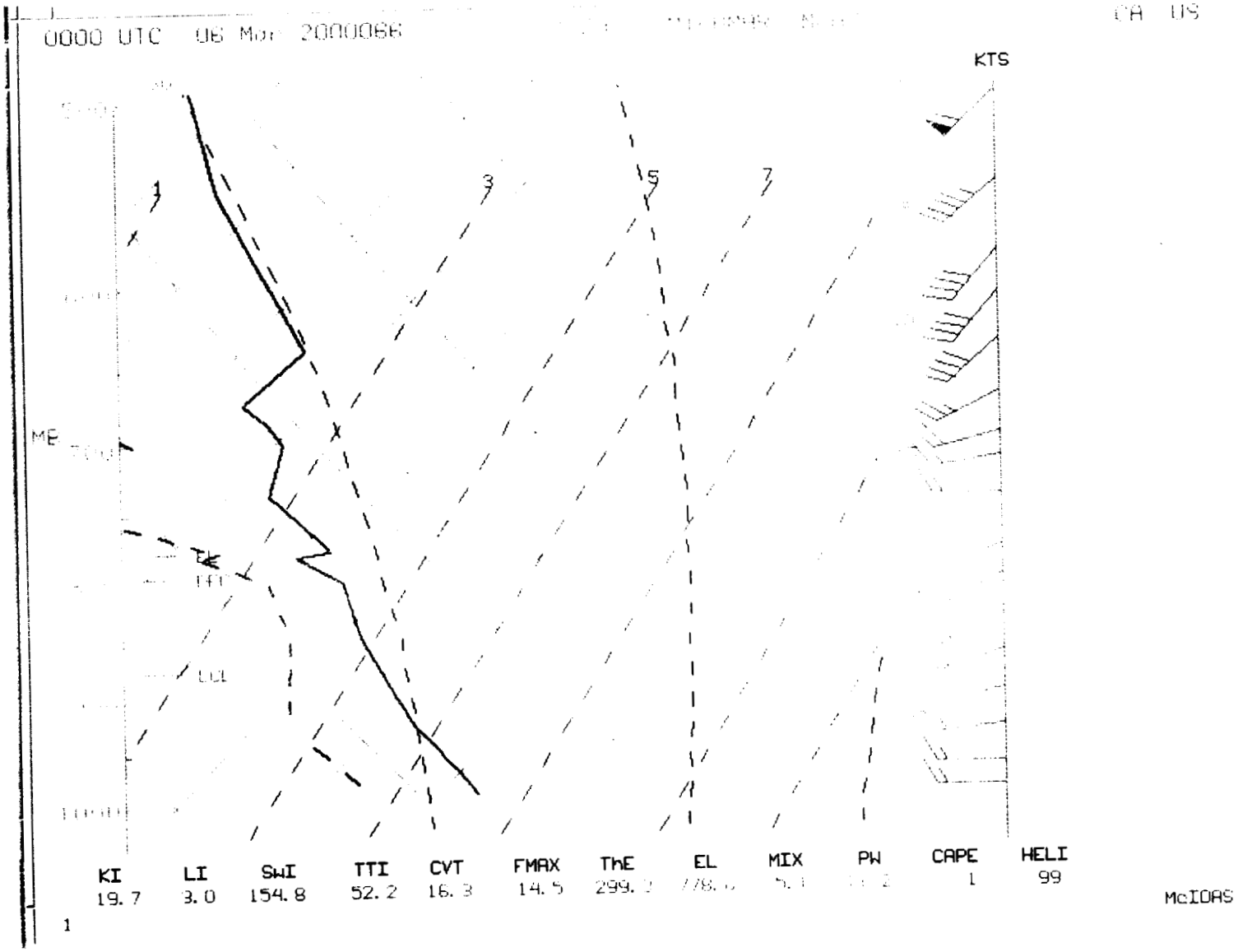


Attachment 2


DOC/NOAA/NWS/NCEP/HPC
037 20000306 SFC ANALYSIS
ISSUED: 0420Z Mon Mar 06 2000
ANALYST: FLATLEY
1010
1010
1005
H
H
L
L



Attachment 4



Attachment 4A

SOUNDING # 1 IDN= 72293 DAY=2000066 TIME= 0 VALID LEVELS= 52

Idn	Id	Station Name	St	Co	Lat	Lon	Elev
722930	KNKX	MIRAMAR (MCAS)	CA	US	32:52N	117:08W	146

Level Type	Pressure [MB]	Temp [C]	Dew Point [C]	Dir [deg]	Speed [KT]	Height [FT]	Theta [K]	Mix [g/kg]
SFC	990.0	11.6	7.4	270.0	14.0	419.9	285.6	6.538
SIGW	969.2	10.0	5.5	270.0	15.0	997.4	285.7	5.862
SIGW	934.2	7.2	2.3	265.0	15.9	1998.0	285.8	4.830
MAND	925.0	6.4	1.4	260.0	16.9	2268.2	285.9	4.580
SIGW	900.0	4.7	.4	255.0	16.9	2998.7	286.3	4.366
SIGW	866.9	2.3	-1.1	250.0	15.9	3999.3	286.9	4.086
MAND	850.0	1.0	-1.8	245.0	15.0	4524.5	287.2	3.944
SIGW	834.8	.1	-2.8	240.0	15.0	5000.0	287.7	3.731
SIGW	803.6	-1.9	-4.9	240.0	15.0	6000.7	288.8	3.315
SIGT	803.0	-1.9	-4.9	240.2	15.0	6018.9	288.8	3.308
SIGT	781.0	-4.9	-8.9	247.4	15.7	6740.6	287.9	2.495
SIGT	778.0	-3.7	-8.1	248.4	15.8	6840.2	289.5	2.667
SIGW	773.1	-4.2	-9.3	250.0	15.9	7001.3	289.5	2.452
SIGW	743.6	-7.4	-16.4	270.0	16.9	8002.0	289.2	1.425
SIGT	736.0	-8.3	-18.3	267.3	16.9	8267.1	289.1	1.227
SIGW	715.1	-9.1	-16.8	260.0	16.9	8999.3	290.6	1.433
MAND	700.0	-9.7	-15.7	255.0	18.8	9541.7	291.8	1.606
SIGT	685.0	-11.3	-18.3	248.3	23.7	10089.1	291.8	1.319
SIGT	673.0	-12.9	-30.9	242.9	27.7	10532.9	291.5	.432
SIGT	638.0	-12.5	-35.5	226.6	39.6	11870.4	296.4	.292
SIGW	634.6	-12.8	-35.8	225.0	40.8	12001.3	296.5	.285
SIGW	609.3	-15.3	-38.0	220.0	42.9	13002.0	297.1	.237
SIGW	585.0	-17.8	-40.3	220.0	42.0	14002.6	297.6	.195
SIGT	546.0	-22.1	-44.1	228.5	46.9	15700.9	298.5	.139
SIGW	539.1	-22.7	-44.6	230.0	47.8	16003.9	298.8	.133
MAND	500.0	-26.5	-47.5	225.0	60.8	17806.5	300.7	.104
SIGW	455.0	-31.4	-50.7	215.0	66.8	20003.3	302.9	.083
SIGT	420.0	-35.5	-53.5	220.6	78.4	21865.4	304.6	.068
SIGT	383.0	-34.9	-52.9	226.9	91.5	23975.0	313.5	.080
SIGW	365.9	-36.4	-54.1	230.0	97.9	25003.3	315.6	.073
SIGW	306.3	-42.4	-58.6	230.0	108.8	29005.9	323.7	.054
MAND	300.0	-43.1	-59.1	230.0	107.8	29473.2	324.6	.052
SIGW	292.8	-44.0	-59.7	230.0	105.9	30006.6	325.6	.049
SIGT	273.0	-46.5	-61.5	232.8	96.9	31543.5	328.6	.044
TRO1	258.0	-47.3	-62.3	235.0	89.7	32772.7	332.7	.044
MAND	250.0	-46.1	-61.1	235.0	82.8	33458.4	337.5	.050
SIGW	233.0	-44.0	-59.8	240.0	67.8	35006.6	347.6	.061
SIGT	229.0	-43.5	-59.5	241.1	65.0	35384.5	350.1	.065
MAND	200.0	-46.3	-61.3	250.0	42.9	38355.7	359.5	.062
SIGW	185.3	-46.9	-61.9	255.0	40.8	40009.8	366.4	.063
SIGW	169.0	-47.7	-62.7	230.0	29.9	42007.9	374.9	.064
SIGW	161.4	-48.1	-63.1	220.0	28.0	43008.5	379.2	.064
MAND	150.0	-48.7	-63.7	235.0	26.8	44596.4	386.2	-----
SIGW	147.1	-49.0	-63.9	240.0	28.0	45009.8	387.7	-----
SIGW	116.2	-53.2	-67.0	235.0	28.9	50009.8	407.0	-----
MAND	100.0	-55.9	-68.9	230.0	19.8	53204.8	419.7	-----
SIGT	99.0	-55.5	-69.5	-----	-----	53414.9	421.7	-----
SIGT	83.4	-58.3	-71.3	-----	-----	56979.6	437.2	-----
SIGT	74.1	-56.3	-69.3	-----	-----	59432.9	456.5	-----
SIGT	60.5	-62.5	-74.5	-----	-----	63599.6	469.9	-----
SIGT	21.3	-57.3	-71.3	-----	-----	85000.7	649.0	-----
SIGT	11.9	-51.7	-66.7	-----	-----	97237.6	786.5	-----

Parcel Definition for 100 mb Boundary Layer: 0000 UTC 06 Mar 2000066

Dewpoint Temperature (TD)	=	3.1	C
Potential Temperature (Th)	=	285.9	K
Equivalent Potential Temperature (ThE)	=	299.3	K
Mixing Ratio (MIX)	=	5.1	g/kg

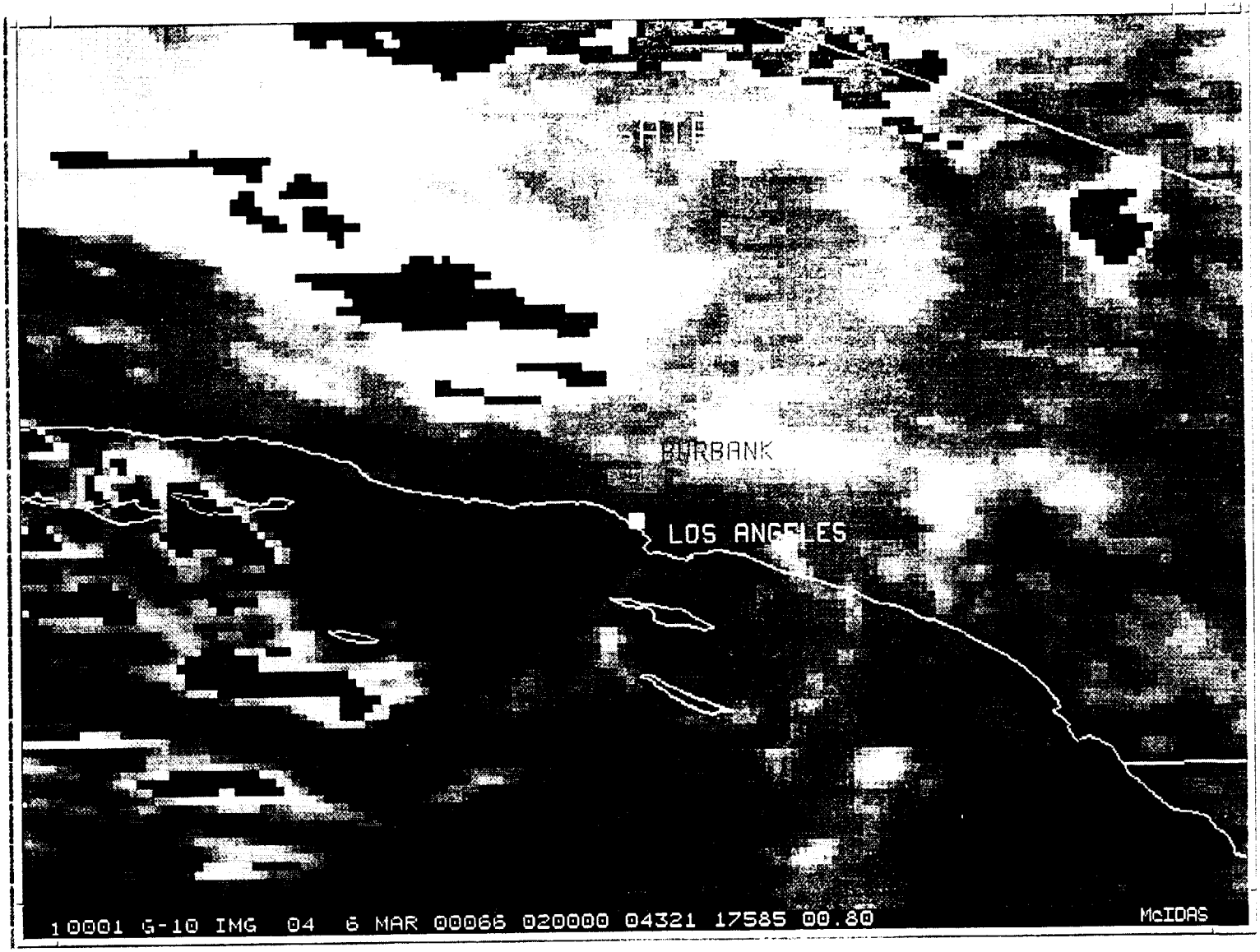
Stability Indices and Levels:

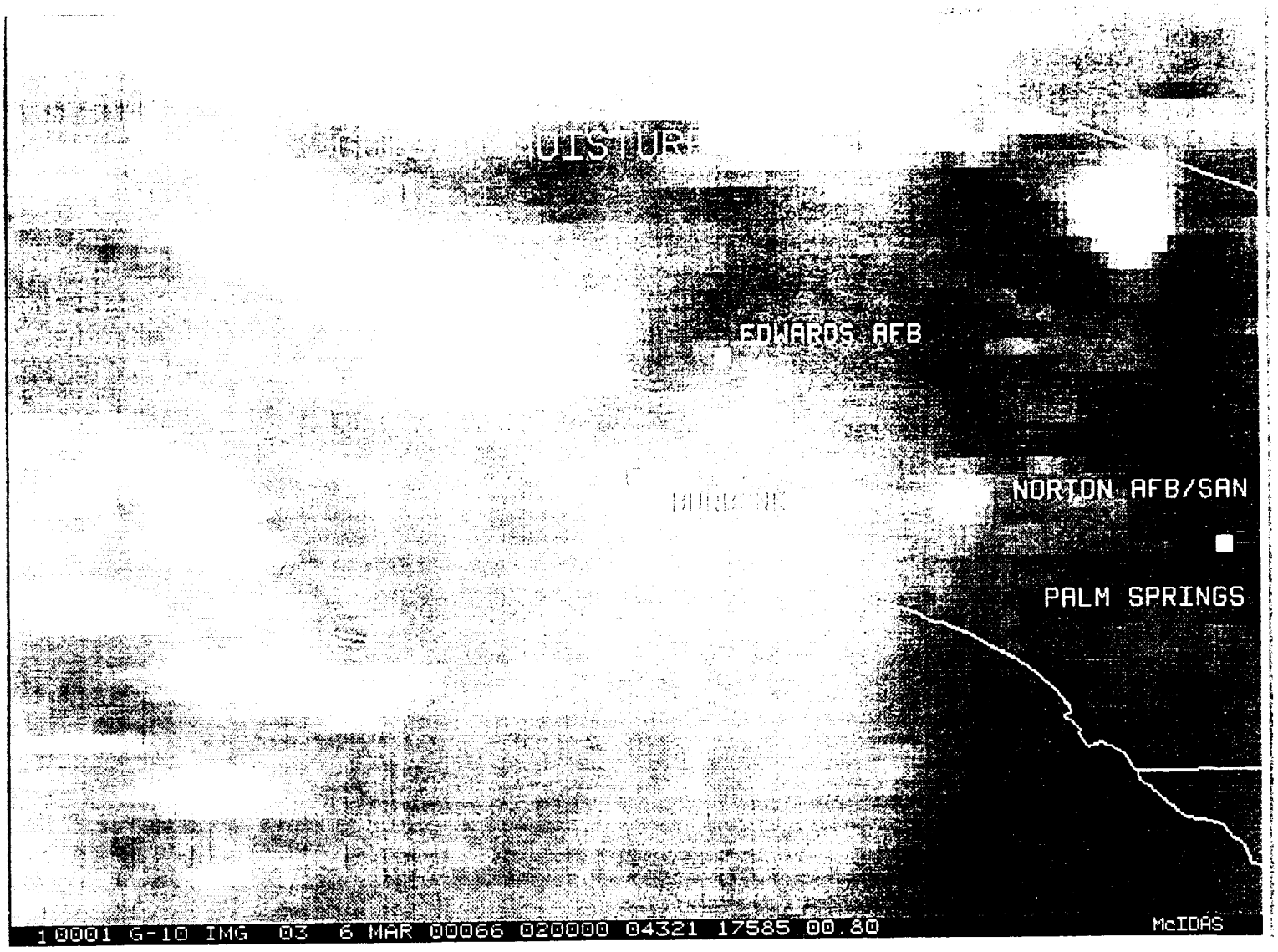
Lifted Condensation Level (LCL)	=	877	mb
Temperature at LCL (TLCL)	=	2.2	C
Level of Free Convection (LFC)	=	798	mb
Equilibrium Level (EL)	=	779	mb
Convective Temperature (CVT)	=	16.3	C
Forecast Maximum Temperature (FMAX)	=	14.5	C
K Index (KI)	=	19.7	
Lifted Index (LI)	=	3.0	
Severe WEAther Threat Index (SwI)	=	154.8	
Showalter Index (ShI)	=	4.1	
Total Totals Index (TTI)	=	52.2	
Precipitable Water (PW)	=	11.2	mm

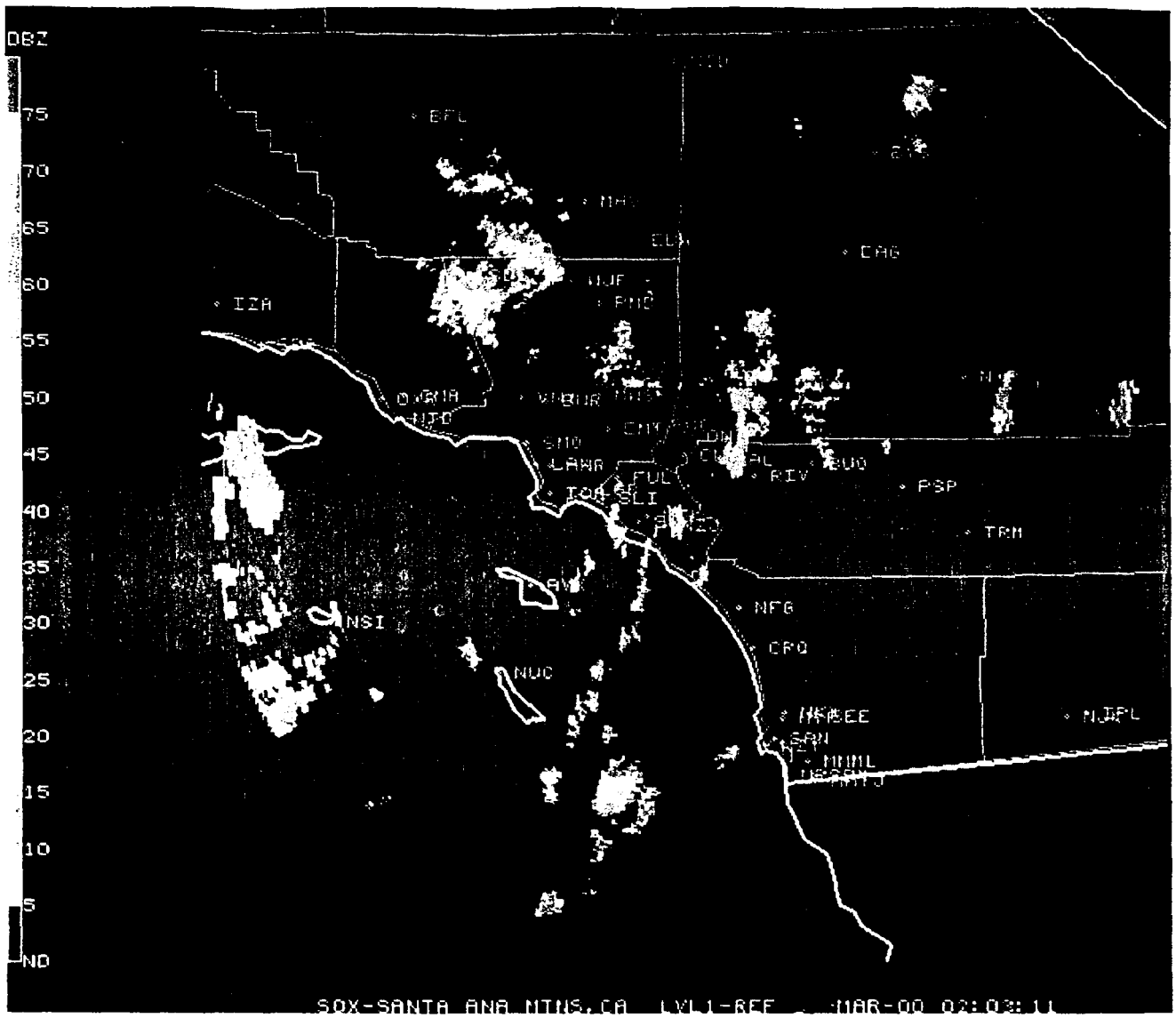
Energy Analysis:

Helicity (HELI)	=	99	m**2/s**2
Convective Available Potential Energy (CAPE)	=	1	J/kg
Convective Inhibition (CIN)	=	71	J/kg
Theta-E for Forecast Maximum Temperature	=	302	K
CAPE for Forecast Maximum Temperature	=	151	J/kg
Maximum Theta-E at or below 300 mb	=	324	K
Pressure Level of Maximum Theta-E	=	306	mb
CAPE for Maximum Theta-E	=	-----	

UALIST: Done

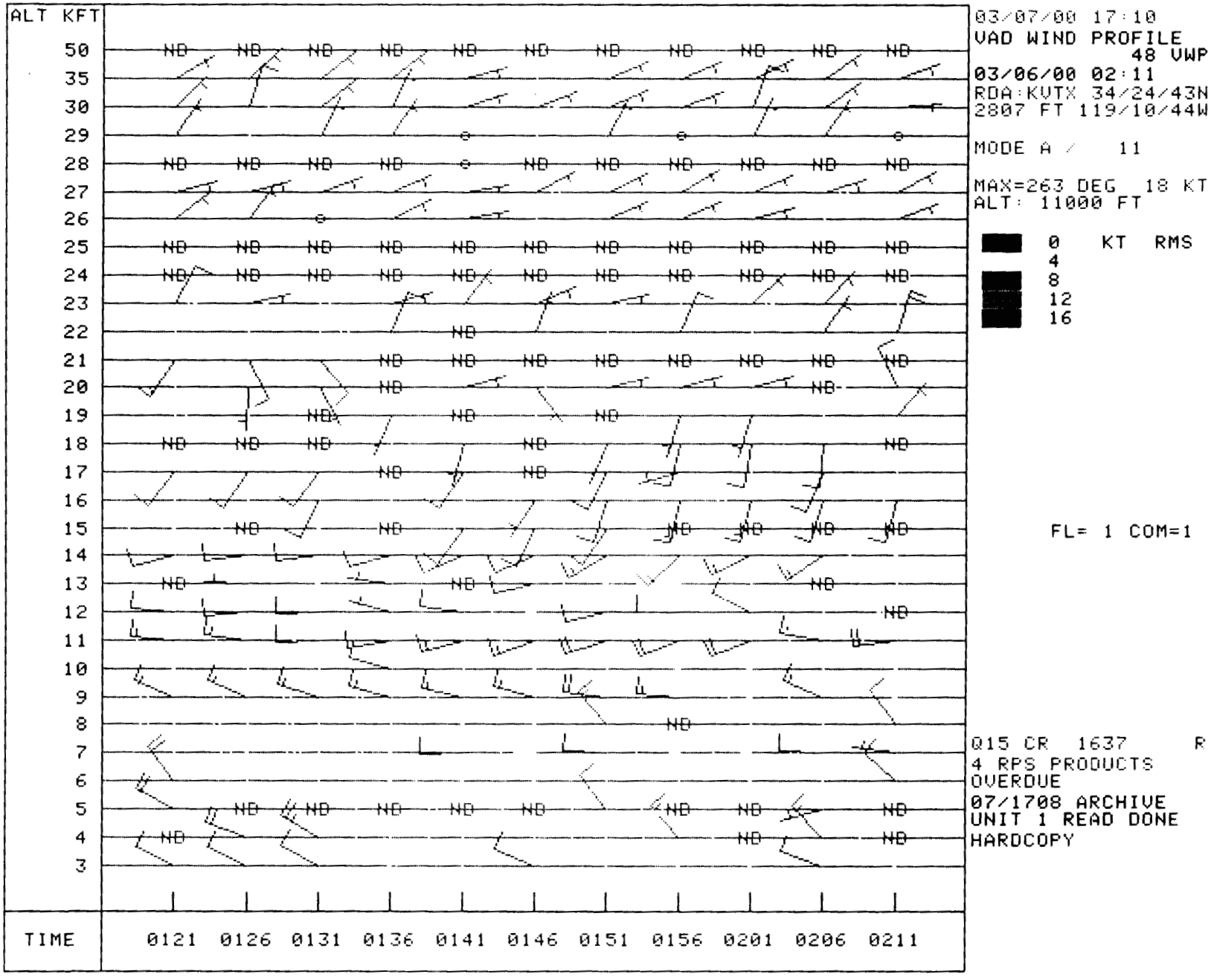

BURBANK
LOS ANGELES
10001 G-10 IMG 04 6 MAR 00066 020000 04321 17585 00.80
McIDAS


DISTUR
EDWARDS AFB
NORTON AFB/SAN
PALM SPRINGS
1 0001 G-10 IMG 03 6 MAR 00066 020000 04321 17585 00.80
McIDAS

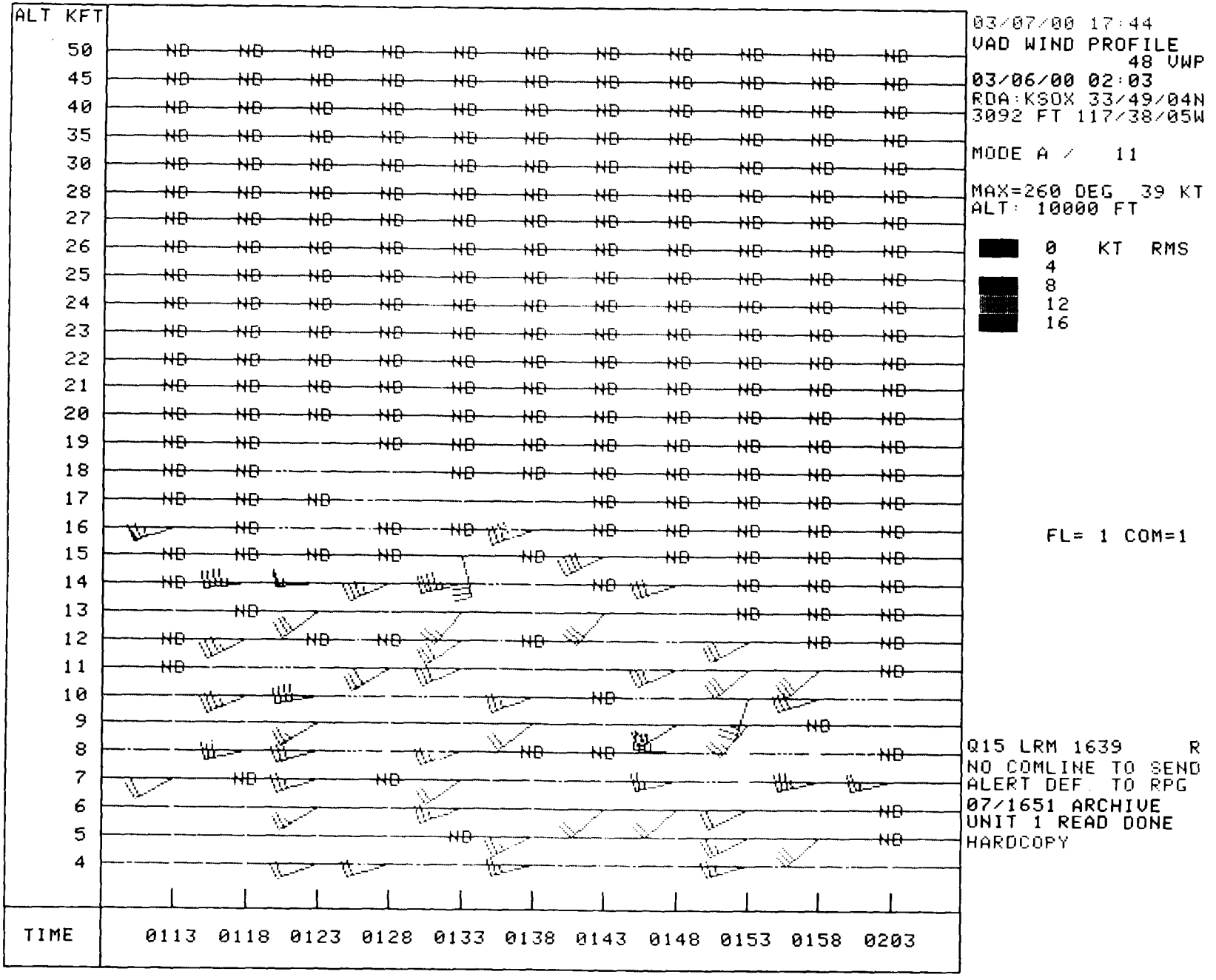


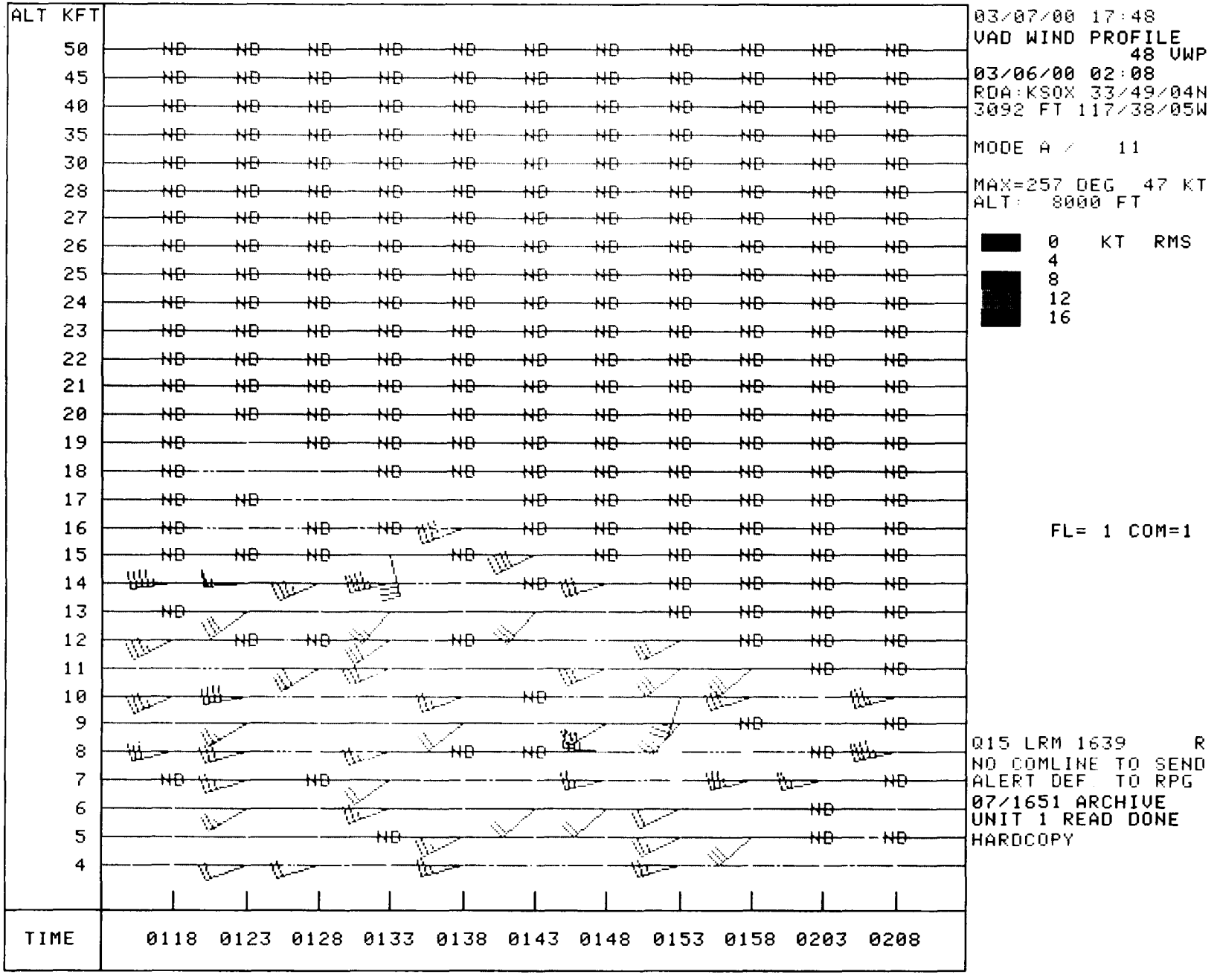
Reflectivity Only	Frames in loop: 25	Santa_Ana_Mtns, CA	Start: 000306/00:00	End: 000306/02:00	Request Fullfilled

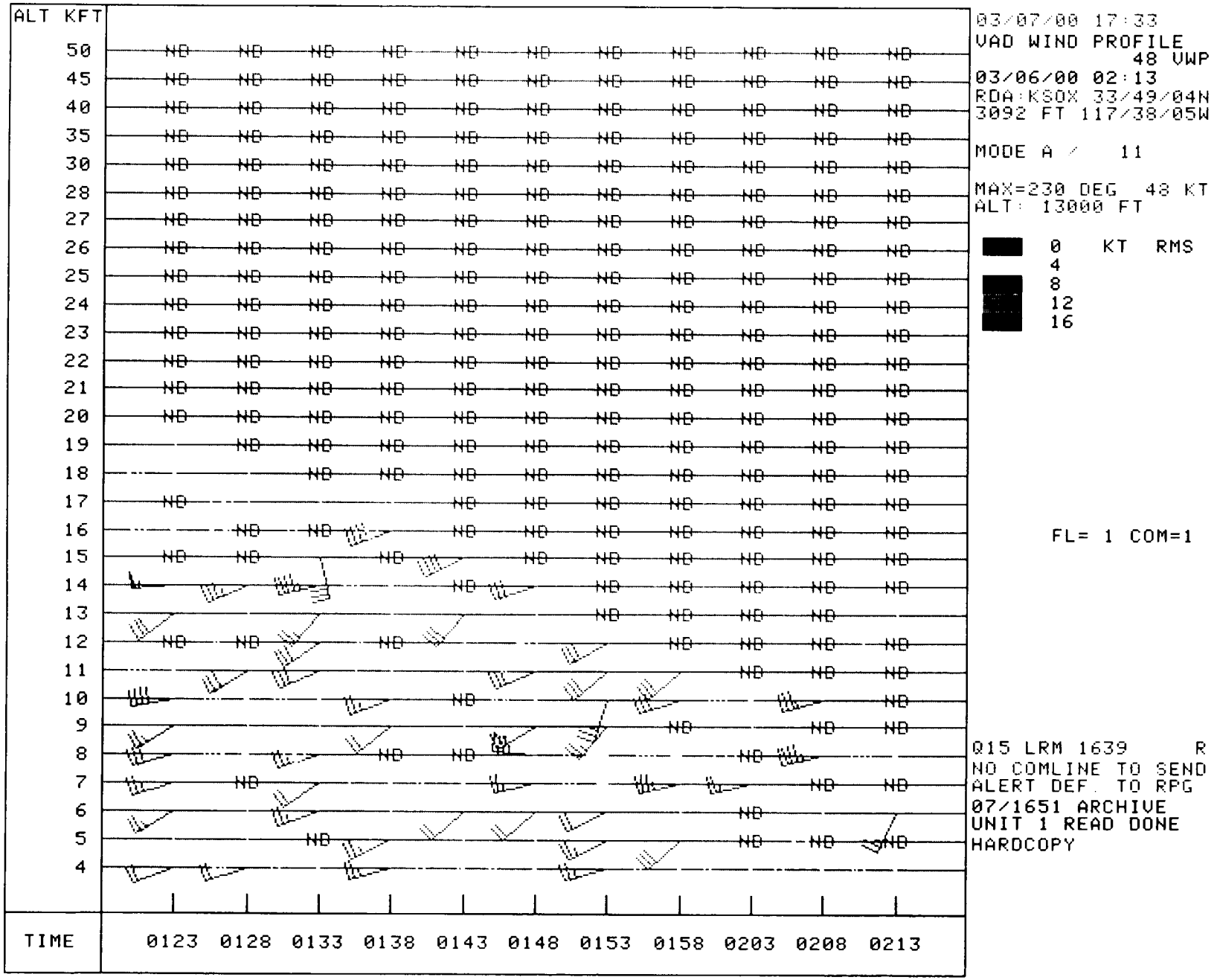
Full Resolution Radar Data Page | NEXRAD Radar Images Archives Page



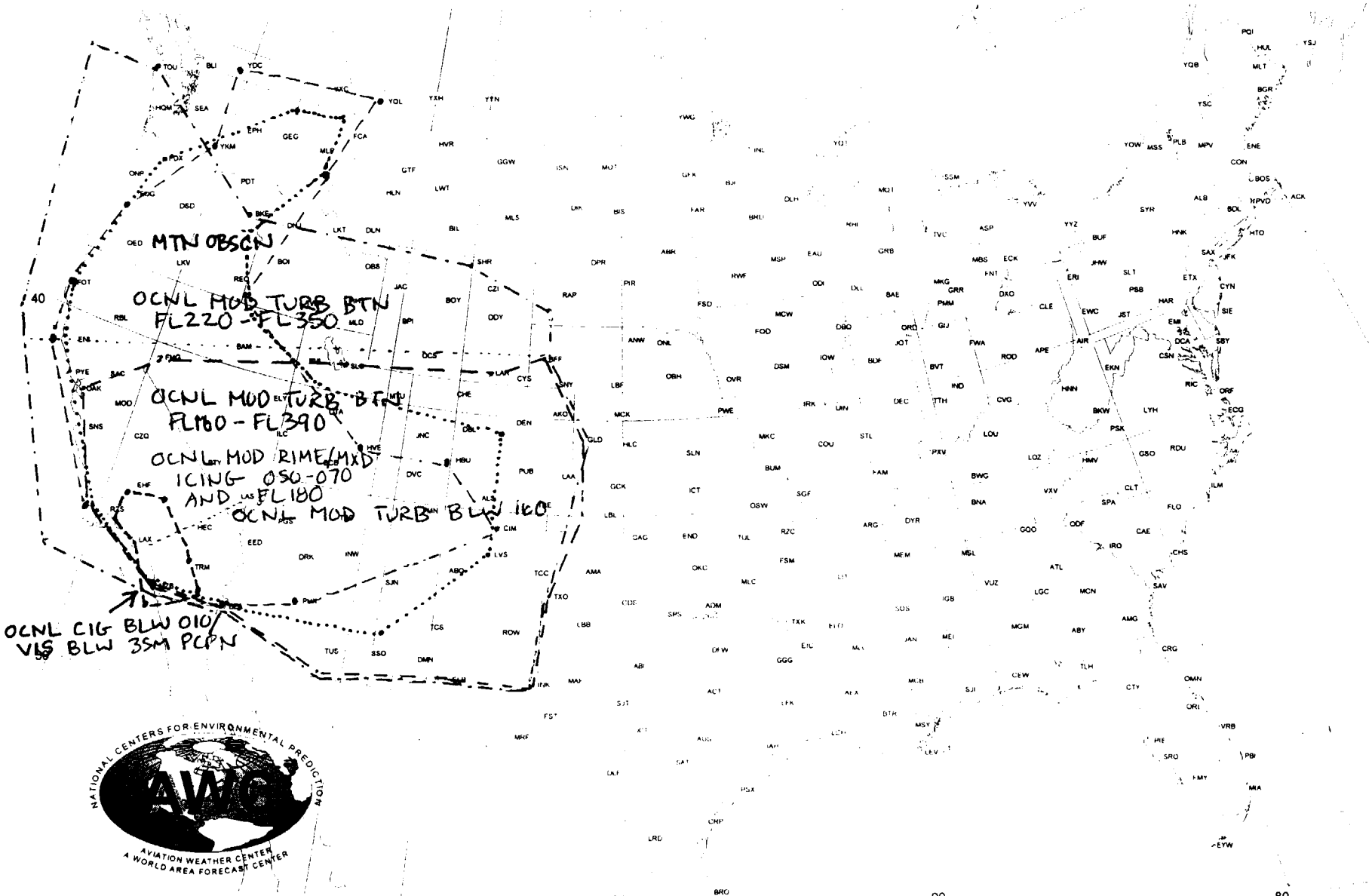
Attachment B


ALT KFT
50
45
40
35
30
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
ND
TIME
0113 0118 0123 0128 0133 0138 0143 0148 0153 0158 0203
03/07/00 17:44
VAD WIND PROFILE
48 VWP
03/06/00 02:03
RDA:KSOX 33/49/04N
3092 FT 117/38/05W
MODE A / 11
MAX=260 DEG 39 KT
ALT: 10000 FT
0 KT RMS
4
8
12
16
FL= 1 COM=1
Q15 LRM 1639 R
NO COMLINE TO SEND
ALERT DEF TO RPG
07/1651 ARCHIVE
UNIT 1 READ DONE
HARDCOPY


ALT KFT
50
45
40
35
30
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
ND
TIME
0118 0123 0128 0133 0138 0143 0148 0153 0158 0203 0208
03/07/00 17:48
VAD WIND PROFILE
48 VWP
03/06/00 02:08
RDA:KSOX 33/49/04N
3092 FT 117/38/05W
MODE A / 11
MAX=257 DEG 47 KT
ALT: 8000 FT
0 KT RMS
4
8
12
16
FL= 1 COM=1
Q15 LRM 1639 R
NO COMLINE TO SEND
ALERT DEF TO RPG
07/1651 ARCHIVE
UNIT 1 READ DONE
HARDCOPY


ALT KFT
50
45
40
35
30
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
TIME
0123 0128 0133 0138 0143 0148 0153 0158 0203 0208 0213
03/07/00 17:33
VAD WIND PROFILE
48 VWP
03/06/00 02:13
RDA:KSOX 33/49/04N
3092 FT 117/38/05W
MODE A / 11
MAX=230 DEG 48 KT
ALT: 13000 FT
0 KT RMS
4
8
12
16
FL= 1 COM=1
Q15 LRM 1639 R
NO COMLINE TO SEND
ALERT DEF. TO RPG
07/1651 ARCHIVE
UNIT 1 READ DONE
HARDCOPY

IN-FLIGHT WEATHER ADVISORIES



NATIONAL CENTERS FOR ENVIRONMENTAL PREDICTION
AWC
AVIATION WEATHER CENTER
A WORLD AREA FORECAST CENTER

ADVISORIES ISSUED 2045Z VALID UNTIL 0300Z

- – – – AIRMET TANGO - LOW ALTITUDE
- – · – · AIRMET TANGO - HIGH ALTITUDE CAT
- – – – AIRMET ZULU - ICING
- – – – AIRMET SIERRA - LOW CIG/VIS
- ..... AIRMET SIERRA - MOUNTAIN OBSCURATION

Attachment 12

Flight Release

Flight 1455 From LAS To BUR

03/05/00 1410C

Released IFR LAS(1645C) BUR(1745C) (LASBUR01)

REMARKS NONE

ALTNS: LNDG LAS

FLT#	AC#	ATOG	LM	TP	FP	RWY
1455	N668SW	118.6	L	13	30	08

FILED ROUTE:

FP SWA1455 T/B733/I 385 LAS P2245 200
LAS.OASYS2.DAG.LYNXX7.BUR/0044 :

MEL/CDL NO ITEMS

	Fuel	Time	Plan		Structural Limit	
TAXI	0005					
ENROUTE BURN	0046	00:44	OEW	071947		
CONTINGENCY	0027	00:30	PLYD	030100		
ALTERNATE	0046	00:45	ZFW	102000	MZFW	1065
FAR RESERVE	0045	00:45	FOB	016400	MFW	0356
**********						
MINIMUM FUEL	0169	02:44	TOW	118400	MTOW	1385
**********						
TANKER	0000	00:00	BURN	004600		
PLAN FOB	0169	02:44	LGW	113800	MLGW	1140

PLANNED ARRIVAL FUEL 0118 ESTIMATED MAX QUICK TURN WGT 1209

AVG WIND M033 MXSH 2/RIFFE CRZ M74/

FUEL BURN ADJUSTMENT FOR 1000LBS INCREASE IN TOW : 0-12 LBS

TAKEOFF

WIND	TEMP	QNH	R/W	BLEEDS	ENG A/I	RWY	WT	FP	LMT
CALM	15	29.65	WET-GOOD	ON	OFF	25R	125.3	1	OBS04

LANDING

WIND	TEMP	QNH	R/W	BLEEDS	ENG/WNG A/I	ICE	RWY	WT	FP	LMT
CALM	13	29.56	WET-GOOD	ON	OFF/OFF	NO	08	118.6	30	STRUC

CAPTAIN _____ SIGNATURE _____

DISPATCHER W. DAVE BENGE desk15 PHONE 6115 800-447-9291

Attachment 13

Flight Release

Flight 1455 From LAS To BUR

TO FRQ/ELEV	NM	MC	FL	OAT D/T	TRP SHR	WIND COM	TAS	G/S	DSTR	TME	TLTM	RMTM TRF	B/O TLF
KLAS 2179FT													
LAS07	017	211	CL	...	...	.....	...	...	0217	005	0/05	0/39	012
..				...	...							152	012
TOC	007	213	18	024	31	20042M037	385	348	0210	001	0/06	0/38	003
..				M03	001							149	015
OASYS	001	213	18	024	31	20042M037	385	348	0209	000	0/06	0/38	000
..				M03	001							149	015
RIFFE	055	213	20	029	31	20045M041	396	355	0154	010	0/16	0/28	010
..				M04	002							139	025
DAG	026	212	20	030	31	20044M040	395	355	0128	004	0/20	0/24	004
113.2				M05	002							135	029
WOOLI	066	240	20	030	30	20040M024	395	371	0062	011	0/31	0/13	011
..				M05	002							124	040
TOD	009	246	20	031	30	20035M017	394	377	0053	001	0/32	0/12	001
..				M06	002							122	042
PMD	001	246	DC	...	...	.....	...	...	0052	000	0/32	0/12	000
114.5				...	...							122	042
JANNY	015	240	DC	...	...	.....	...	...	0037	004	0/36	0/08	001
..				...	...							121	043
EIFEL	007	241	DC	...	...	.....	...	...	0030	001	0/37	0/07	001
..				...	...							121	043
LYNXX	005	240	DC	...	...	.....	...	...	0025	001	0/38	0/06	000
..				...	...							120	044
VNY	018	149	DC	...	...	.....	...	...	0007	005	0/43	0/01	001
113.1				...	...							119	045
KBUR	007	087	..	...	...	.....	...	...	0000	001	0/44	0/00	001
..				...	...							118	046

0775FT

POINT	LAT-LON	RADIO FREQ
KLAS	N36048W11509	131.70
LAS07	N35599W11515	...
OASYS	N35543W11523	...
RIFFE	N35162W11611	...
DAG	N34577W11634	...
WOOLI	N34396W11751	...
PMD	N34379W11803	...
JANNY	N34340W11821	...
EIFEL	N34322W11829	...
LYNXX	N34307W11835	...
VNY	N34134W11829	...
KBUR	N34120W11821	...

..	FL	B/O	TIME
M74	0200	0046	00/44
M74	0160	0048	00/45
M74	0140	0049	00/46

ALTERNATE DATA

		ELEV	MSA	TTK	DIST	FL	W/C	TIME	FUEL
ALTERNATE	- 1	KLAS 2179 FT		143	054	0254	310	M028	00/45	4600

KBUR VNY7 DAG CRESO3 KLAS

COMPANY NOTAMS

GENERAL: NONE

LAS:
OPERATIONS FREQUENCY IS INCORRECT IN JEPP. SHOULD READ 131.87 EFF:
02/27/00 TIME 0600 UNTIL FURTHER NOTICE
Feb 27 14:47 CST
MAINTENANCE FREQUENCY MISSING FROM JEPP PAGE. MAINTENANCE MONITORS 131.87
EFF: 02/27/00 TIME: 0600 UNTIL: FURTHER NOTICE Feb 27 14:54 CST

BUR: NONE

* END OF FLIGHT RELEASE *

* STATION OPERATIONS DATA *

AVAILABLE LOCAL NOTAMS

LAS:
NBR: L1208 EFF: 01/01/00 TIME: 0400 TIL: 12/31/00 TIME:0400
LAS PTN RAMP, BTWN GATES C-16 & C-18, EXTNDG 720 FT W OF C-GATES
CLSD

NBR: L1005 EFF: 01/01/00 TIME: 0400 TIL: 12/31/00 TIME: 0400
LAS PAEW NEAR A CONCOURSE

NBR: L1201 EFF: 01/01/00 TIME: 0400 TIL: 12/31/00 TIME: 0400
LAS TWY G2 CLSD WEF 9912011400

NBR: L1202 EFF: 01/01/00 TIME: 0400 TIL: 12/31/00 TIME: 0400
LAS TWY G1 CLSD WEF 9912011400. TEMP TWY G1 LCTD S OF CLSD TWY.

NBR: L1203 EFF: 01/01/00 TIME: 0400 TIL: 12/31/00 TIME: 0400
LAS A SXN OF RAMP 135FT N OF TEMP TWY G1 AND S OF TWY S CLSD
WEF 9912011400

NBR: L1204 EFF: 01/01/00 TIME: 0400 TIL: 12/31/00 TIME: 0400
LAS TMPRY TWY GOLF-ONE RE-DESIGNATED TAXILANE GOLF-ONE WEF 9912021400

NBR: L1210 EFF: 01/01/00 TIME: 0400 TIL: 12/31/00 TIME: 0400
LAS TWY G, N OF TWY C, THE INT OF TWY W AND G, AND THE INT OF D, S,AND G
ARE REDESIGNATED TAXILANES.
NRB: L0101 EFF: 01/01/00 TIME: 0400 TIL: 12/21/00 TIME: 0400
LAS SEGMENT E RAMP BTWN GATES C16 AND C24 TP 720 W OF C GATE
CONCOURSE PAEW CTN ADZD.

BUR:
NBR: EFF: / / TIME: TIL: / / TIME:

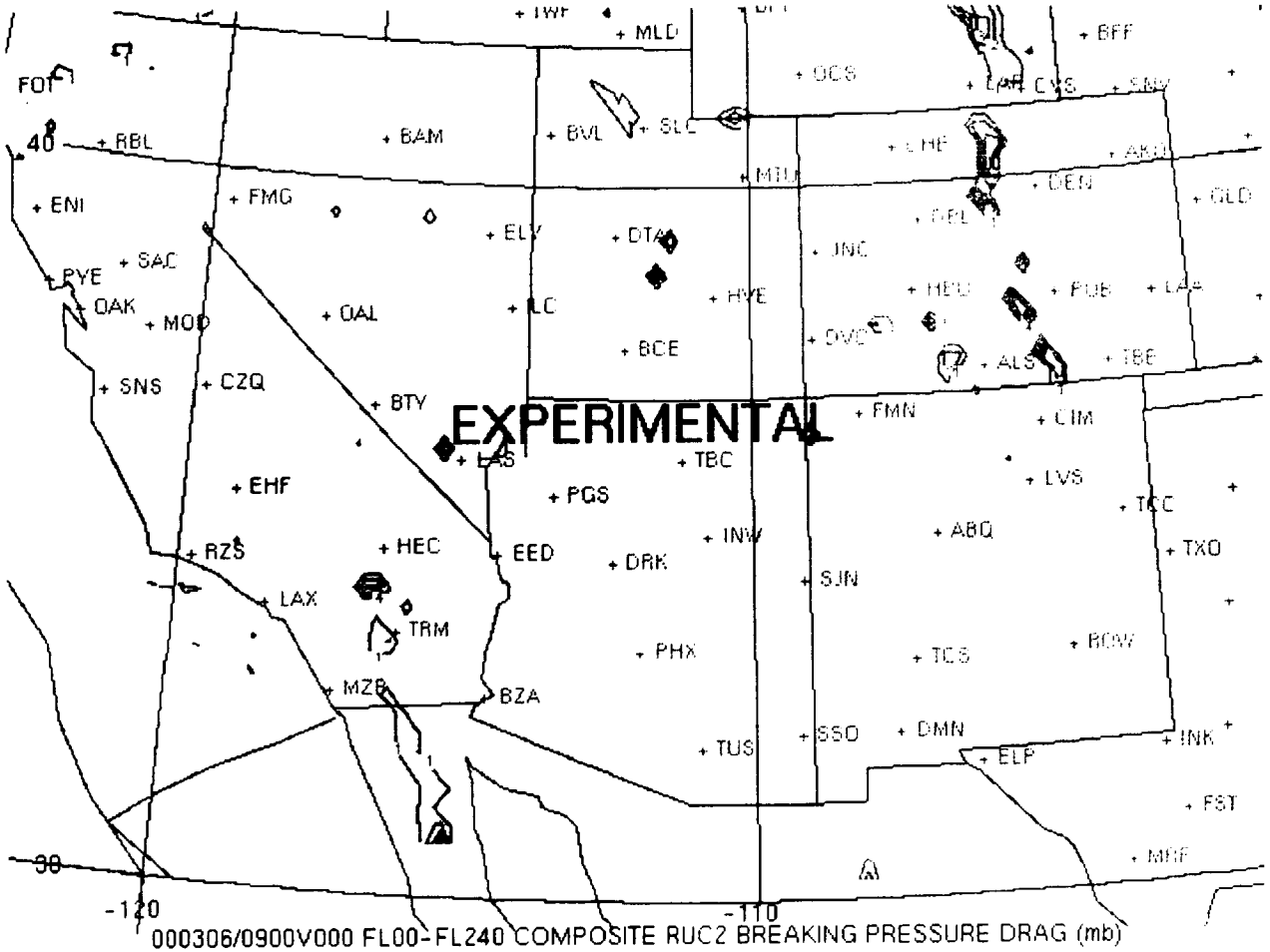
FIELD CONDITIONS

CONTACT YOUR DISPATCHER FOR CURRENT FIELD CONDITIONS

LAS:
DATE: 03/5/00 DAY: SUNDAY TIME (L): 0500 EMP NBR: 17143
ACTIVE RUNWAY(S): 25L, 25R, 19L, 19R
CONDITION (WET/DRY): DRY
BRAKING ACTION (IF WET):
ACTVE TAXIWAY(S): ALL
CONDITION (WET/DRY): DRY
BRAKING ACTION (IF WET):
RAMP AREAS
CONDITION (WET/DRY): DRY
BRAKING ACTION (IF WET):
REMARKS: AFTER 2300, ALL FLIGHTS MUST CALL RAMP CONTROL
GOOD MORNING....LAS OPS

BUR:
ATE: 03 /05/00 DAY: SUNDAY TIME (L): 0530 EMP NBR: 17150
ACTIVE RUNWAY(S): ALL
CONDITION (WET/DRY): WET
BRACKING ACTION (IF WET): GOOD
ACTIVE TAXIWAY(S): ALL
CONDITION (WET/DRY): WET
BRACKING ACTION (IF WET): GOOD
WN RAMP AREAS
CONDITION (WET/DRY): WET
BRACKING ACTION (IF WET): GOOD
REMARKS: NONE

****
********** END OF MESSAGE **********
****



000306/0900V000 FL00-FL240 COMPOSITE RUC2 BREAKING PRESSURE DRAG (mb)

U.S. Naval Observatory
Astronomical Applications Department

Sun and Moon Data for One Day

The following information is provided for Burbank, Los Angeles County, California (longitude W118.3, latitude N34.2):

Sunday
5 March 2000 Pacific Standard Time

SUN	
Begin civil twilight	5:51 a.m.
Sunrise	6:16 a.m.
Sun transit	12:05 p.m.
Sunset	5:53 p.m.
End civil twilight	6:18 p.m.

MOON	
Moonset	4:37 p.m. on preceding day
Moonrise	6:13 a.m.
Moon transit	11:52 a.m.
Moonset	5:37 p.m.
Moonrise	6:48 a.m. on following day

New Moon on 5 March 2000 at 9:17 p.m. Pacific Standard Time.

Census Bureau map of Burbank area

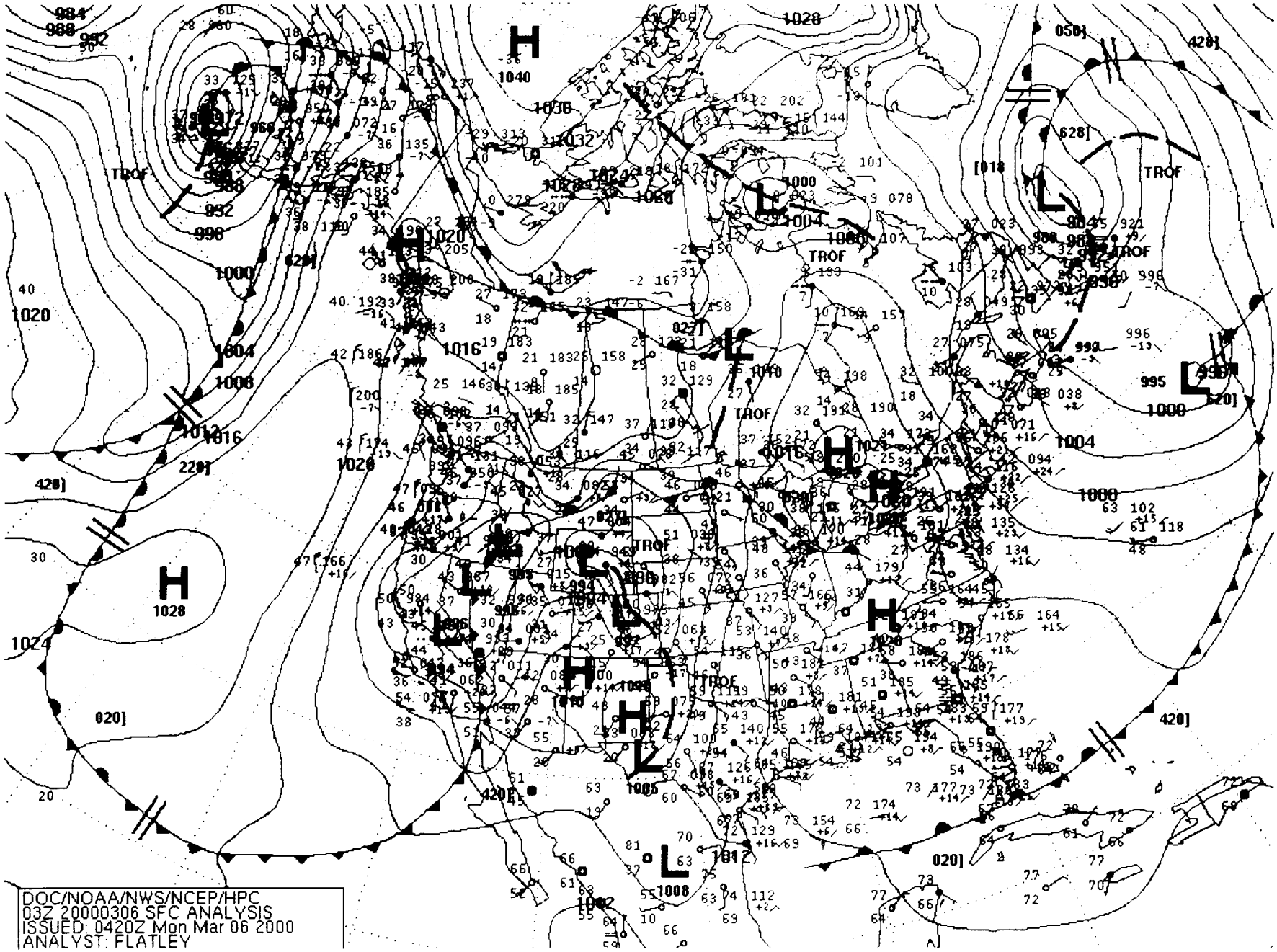
Astronomical Applications Dept.
U.S. Naval Observatory
Washington, DC 20392-5420

BURBANK, CALIFORNIA
° , ° ,
W118 20, N34 11

Altitude and Azimuth of the Sun
Mar 5, 2000
Pacific Standard Time

	Altitude	Azimuth (E of N)
h m	°	°
05:30	-10.4	90.0
05:40	-8.4	91.4
05:50	-6.3	92.7
06:00	-4.2	94.1
06:10	-2.2	95.5
06:20	0.4	96.9
06:30	2.2	98.3
06:40	4.2	99.8
06:50	6.2	101.2
07:00	8.2	102.6
07:10	10.2	104.1
07:20	12.1	105.6
07:30	14.1	107.2
07:40	16.1	108.7
07:50	18.0	110.4
08:00	19.9	112.0
08:10	21.9	113.7
08:20	23.7	115.5
08:30	25.6	117.3
08:40	27.4	119.2
08:50	29.2	121.2
09:00	30.9	123.2
09:10	32.7	125.3
09:20	34.3	127.5
09:30	35.9	129.9
09:40	37.5	132.3
09:50	39.0	134.8
10:00	40.4	137.4
10:10	41.8	140.2
10:20	43.1	143.1
10:30	44.3	146.1
10:40	45.4	149.2
10:50	46.4	152.5
11:00	47.3	155.9
11:10	48.1	159.4
11:20	48.8	163.0
11:30	49.3	166.7
11:40	49.7	170.5
11:50	50.0	174.3
12:00	50.1	178.2
12:10	50.1	182.1
12:20	50.0	185.9
12:30	49.7	189.8
12:40	49.3	193.5
12:50	48.7	197.2
13:00	48.1	200.9

13:10	47.3	204.4
13:20	46.4	207.7
13:30	45.4	211.0
13:40	44.2	214.1
13:50	43.0	217.2
14:00	41.8	220.0
14:10	40.4	222.8
14:20	39.0	225.4
14:30	37.4	228.0
14:40	35.9	230.4
14:50	34.3	232.7
15:00	32.6	234.9
15:10	30.9	237.0
15:20	29.1	239.1
15:30	27.4	241.0
15:40	25.5	242.9
15:50	23.7	244.7
16:00	21.8	246.5
16:10	19.9	248.2
16:20	18.0	249.9
16:30	16.0	251.5
16:40	14.1	253.1
16:50	12.1	254.6
17:00	10.1	256.1
17:10	8.1	257.6
17:20	6.1	259.0
17:30	4.1	260.5
17:40	2.2	261.9
17:50	0.4	263.3
18:00	-2.2	264.7
18:10	-4.3	266.1
18:20	-6.3	267.5
18:30	-8.4	268.9
18:40	-10.5	270.3


DOC/NOAA/NWS/NCEP/HPC
03Z 20000306 SFC ANALYSIS
ISSUED: 0420Z Mon Mar 06 2000
ANALYST: FLATLEY