

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

January 14, 2008

Meteorology

Meteorological Factual Report
by James T. Skeen, Jr.

A. ACCIDENT

Location: San Francisco Bay
Date: November 7, 2007
Time: 0830 Pacific Standard Time
Vessel: M/V Cosco Busan (container ship)
NTSB Number: DCA08MM004

B. GROUP

Chairman: James T. Skeen, Jr.
Senior Meteorologist
National Transportation Safety Board
Washington, D.C.

Member: None

C. SUMMARY

On November 7, 2007, about 0830 local time, the Hong Kong-registered, 901-foot container ship M/V *Cosco Busan* collided with the fendering system at the base of the delta tower of the San Francisco-Oakland Bay Bridge (Bay Bridge). The ship was outbound from berth 56 in the port of Oakland carrying a load of 2,529 containers, and was destined for Busan, Korea.

The Meteorological Group Chairman did not participate in the on-scene investigation.

D. DETAILS OF INVESTIGATION

Notes: Unless noted, in the report all times are PST based on the 24-hour clock. Coordinated Universal Time (UTC) = PST + 8 hours. UTC = Z.

1. Synoptic Situation

Figures 1 and 2 show portions of the Surface Analysis charts prepared by the National Weather Service (NWS) National Centers for Environmental Prediction (NCEP) for 0700 and 1000 November 7, respectively.

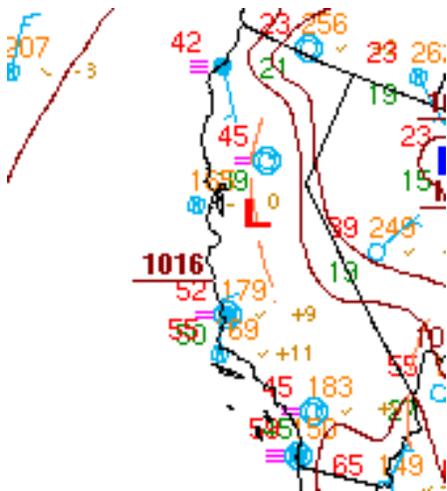


Figure 1. Surface chart for 0700 PST November 7

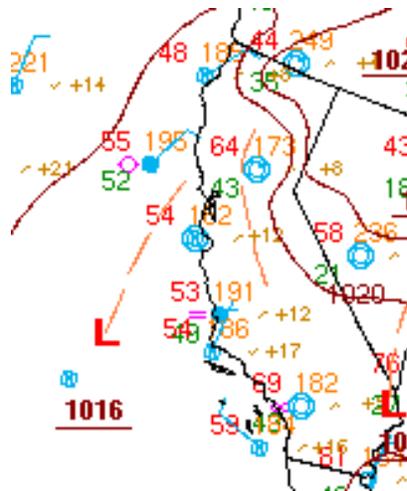


Figure 2. Surface chart for 1000 PST November 7

Figures 3 and 4 show portions of the NWS Weather Depiction and Radar Summary charts centered on California for 0800 and 0818, respectively.

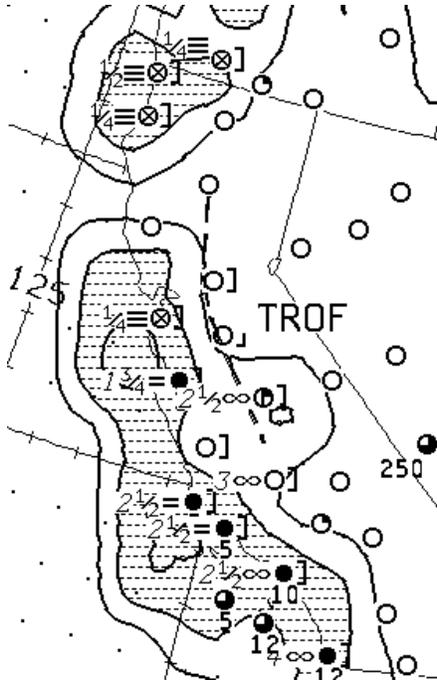


Figure 3. Weather Depiction chart for 0800 PST November 7



Figure 4. Radar Summary chart for 0818 PST November 7

2. Aviation surface weather observations (UTC) for area airports surrounding the accident time follow:

San Francisco International Airport (KSFO), San Francisco, California
field elevation 13 feet msl

KSFO 071130Z 0000KT 3SM BR FEW002 SCT011 08/08 A3002
 KSFO 071238Z 29003KT 1SM R28R/1800VP6000FT BR FEW002 BKN004 OVC009 09/09
 A3004
 KSFO 071350Z 25004KT 1 1/2SM BR FEW002 BKN004 OVC009 09/08 A3003
 KSFO 071356Z 25005KT 1 1/2SM BR FEW002 BKN004 OVC007 09/08 A3003
 KSFO 071532Z 0000KT M1/4SM R28R/1400V2000FT FG BKN001 OVC006 10/09
 A3005
 KSFO 071631Z VRB03KT 3/4SM R28R/2600V5000FT BR OVC001 11/10 A3007
 KSFO 071745Z 0000KT 2SM BR SCT001 BKN003 11/09 A3007

Metropolitan Oakland International Airport (KOAK), Oakland, California
field elevation 9 feet msl

KOAK 071153Z 0000KT 1/4SM FG VV001 10/10 A3004
 KOAK 071253Z 07003KT 1/8SM FG VV001 10/09 A3005
 KOAK 071353Z 07004KT 1/8SM FG VV001 10/09 A3004
 KOAK 071453Z 06003KT 1/4SM FG VV001 10/09 A3005
 KOAK 071553Z 06003KT 1/8SM FG VV001 10/09 A3006
 KOAK 071653Z 02004KT 1/8SM FG VV001 11/10 A3009
 KOAK 071833Z 0000KT 3/4SM BR OVC003 11/11 A3009

3. MesoWest¹ Weather Observations

MesoWest observations obtained through the Real-time Observation Monitor and Analysis Network (ROMAN) for the San Francisco Bay Shoreline for 0800 and 0900 follow in tables 1 and 2. Note: Additional information on the reporting stations can be found at <http://raws.wrh.noaa.gov/roman/>.

Table 1. San Francisco Bay Shoreline observations for 0800 PST November 7

CA508: San Francisco Bay Shoreline																	
Station	Elev	Time		Current					24 Hour				Precipitation				
		LOCAL	UTC	TEMP	RH	WIND	DRCT	PKWIND	MAX T	MIN T	MAX RH	MIN RH	MAX G	1 HR	3 HR	6 HR	24 HR
Alameda W6COZ-10	10 ft	0751PST	1551	52	98	0	SE	0	64	46	98	49	8	-	-	-	0
Belmont CW4751	358 ft	0800PST	1600	51	96	0	SSW	0	65	46	96	62	8	-	-	-	0
Berkeley CW1634	361 ft	0800PST	1600	51	95	0	WNW	3	59	50	95	75	11	-	-	-	-
CRYSTAL SPRINGS	343 ft	0800PST	1600	-	-	-	N	-	-	-	-	-	-	0	0	0	0
Chabot	171 ft	0800PST	1600	47	-	2	E	-	63	47	-	-	-	-	-	-	-
Emerald Hills	261 ft	0742PST	1542	50	80	2	WNW	2	60	49	82	60	7	0	0	0	0
Fremont CW0809	66 ft	0701PST	1501	50	100	0	NW	-	52	45	100	92	-	-	-	-	-
Fremont CW8685	581 ft	0751PST	1551	50	94	0	ENE	2	63	49	94	64	12	-	-	-	-
Hayward Air Term	46 ft	0754PST	1554	51	96	0	N	-	62	48	100	62	-	-	-	-	-
Hayward CW1362	33 ft	0645PST	1445	51	92	1	WNW	-	51	51	92	92	-	-	-	-	-
Hayward KF6JJP	22 ft	0749PST	1549	52	93	0	NE	0	61	49	93	68	13	-	-	-	-
LOS ALTOS	539 ft	0740PST	1540	48	99	0	SW	4	71	45	99	52	8	0	0	0	0
Los Alt KG6PPD-8	210 ft	0749PST	1549	51	95	0	SSE	0	63	46	95	69	6	-	-	-	-
Mountain View M	33 ft	0504PST	1304	54	88	0	N	-	62	48	89	62	-	-	-	-	-
OAKLAND SOUTH	1184 ft	0733PST	1533	60	48	6	NNE	12	65	48	100	0	12	0	0	0	0
Oakland Foothill	145 ft	0800PST	1600	49	100	2	WSW	-	64	44	100	64	-	0	0	0	0
PULGAS	644 ft	0738PST	1538	46	100	0	ESE	5	72	46	100	48	10	0	0	0	0
Palo Alto Airpor	7 ft	0747PST	1547	52	100	3	N	-	63	48	100	72	-	-	-	-	-
Palo Alto CW7418	12 ft	0750PST	1550	52	96	0	N	-	64	44	96	67	-	-	-	-	-
San Carlos	1 ft	0800PST	1600	51	94	3	S	-	62	48	94	65	-	-	-	-	-
San Carlos Airpo	3 ft	0747PST	1547	52	100	6	S	-	64	52	100	64	-	-	-	-	-
San Francisco In	10 ft	0756PST	1556	50	94	3	SE	-	59	46	100	67	29	-	-	-	-
Sunol CW6118	265 ft	0751PST	1551	46	94	0	WNW	0	67	41	94	56	7	-	-	-	-
Union Cit CW3109	10 ft	0746PST	1546	51	95	0	E	0	64	47	95	65	12	-	-	-	0
Union City	16 ft	0800PST	1600	51	95	1	ESE	-	63	44	95	64	-	0	0	0	0.06
W.Menlo Pa K6DJR	115 ft	0731PST	1531	49	93	0	SE	3	65	43	93	59	7	-	-	-	0
Woodside N6TTO	371 ft	0800PST	1600	47	97	0	SE	0	63	41	97	67	4	-	-	-	0

¹ MesoWest is a cooperative project between the University of Utah, NWS, and other agencies, universities, and commercial firms. MesoWest relies upon weather observing networks that are managed by federal, state, and local agencies and private firms.

Table 2. San Francisco Bay Shoreline observations for 0900 PST November 7

CA508: San Francisco Bay Shoreline																	
Station	Elev	Time		Current					24 Hour					Precipitation			
		LOCAL	UTC	TEMP	RH	WIND	DRCT	PKWIND	MAX T	MIN T	MAX RH	MIN RH	MAX G	1 HR	3 HR	6 HR	24 HR
Alameda W6CQZ-10	10 ft	0851PST	1651	53	98	2	WSW	0	64	46	98	49	8	-	-	-	0
Belmont CW4751	358 ft	0900PST	1700	50	96	0	WSW	3	65	46	96	62	8	-	-	-	0
Berkeley CW1634	361 ft	0841PST	1641	50	95	0	WNW	3	59	50	95	75	11	-	-	-	-
CRYSTAL SPRINGS	343 ft	0900PST	1700	-	-	-	N	-	-	-	-	-	-	0	0	0	0
Chabot	171 ft	0900PST	1700	49	-	2	WSW	-	63	47	-	-	-	-	-	-	-
Emerald Hills	261 ft	0842PST	1642	51	83	2	N	4	60	49	84	60	7	0	0	0	0
Fremont CW0809	66 ft	0701PST	1501	50	100	0	NW	-	50	45	100	96	-	-	-	-	-
Fremont CW8685	581 ft	0851PST	1651	51	94	0	NE	1	63	49	94	64	12	-	-	-	-
Hayward Air Term	46 ft	0854PST	1654	51	96	0	N	-	62	48	100	62	-	-	-	-	-
Hayward CW1362	33 ft	0645PST	1445	51	92	1	WNW	-	51	51	92	92	-	-	-	-	-
Hayward KF6JJP	22 ft	0848PST	1648	52	93	2	WNW	3	61	49	94	68	13	-	-	-	-
LOS ALTOS	539 ft	0840PST	1640	51	99	0	E	4	71	45	99	52	8	0	0	0	0
Los Alt KG6PPD-8	210 ft	0845PST	1645	51	96	0	SE	0	63	46	96	69	6	-	-	-	-
OAKLAND SOUTH	1184 ft	0833PST	1633	64	0	6	NNE	10	65	50	100	0	12	0	0	0	0
Oakland Foothill	145 ft	0900PST	1700	50	100	2	SW	-	64	44	100	64	-	0	0	0	0
PULGAS	644 ft	0838PST	1638	49	100	0	WNW	4	72	46	100	48	10	0	0	0	0
Palo Alto Airpor	7 ft	0847PST	1647	52	100	-	N	-	63	48	100	72	-	-	-	-	-
Palo Alto CW7418	12 ft	0849PST	1649	52	96	0	N	-	64	44	96	67	-	-	-	-	-
San Carlos	1 ft	0900PST	1700	51	94	2	S	-	62	48	94	65	-	-	-	-	-
San Carlos Airpo	3 ft	0847PST	1647	52	100	5	SE	-	64	52	100	64	-	-	-	-	-
San Francisco In	10 ft	0856PST	1656	50	100	0	N	-	59	46	100	67	29	-	-	-	-
Sunol CW6118	265 ft	0851PST	1651	50	94	0	WNW	1	67	41	94	56	7	-	-	-	-
Union Cit CW3109	10 ft	0846PST	1646	52	95	0	E	1	64	47	95	65	12	-	-	-	0
Union City	16 ft	0900PST	1700	51	95	1	NNW	-	63	44	95	64	-	0	0	0	0.06
W.Menlo Pa K6DJR	115 ft	0831PST	1631	50	93	0	S	1	65	43	93	59	7	-	-	-	0
Woodside N6TIO	371 ft	0900PST	1700	48	97	0	SE	1	63	41	97	67	4	-	-	-	0

Tables 3 and 4 show MesoWest observations for Alameda² and San Francisco Sewage³ surrounding the accident time. Note: Times are in UTC.

Table 3. Alameda weather observations for 0406-0851 PST November 7

Time (Z)	Temp °F	Dewpt °F	Wet Bulb °F	Relhum %	Windsdpd Mph	Wndgst Mph	Wnndir	QC	Pressure in	SLP In	Altimeter In	1500 m press In	Precip-24 in
16:51	53.0	52.5	52.8	98	2	0	WSW	OK	30.13	30.14	30.14	25.15	0.00
16:36	53.0	52.5	52.8	98	0	0		OK	30.10	30.11	30.11	25.13	0.00
16:21	52.0	51.5	51.8	98	0	0		OK	30.13	30.14	30.14	25.15	0.00
16:06	52.0	51.5	51.8	98	0	0		OK	30.10	30.11	30.11	25.13	0.00
15:51	52.0	51.5	51.8	98	0	0		OK	30.10	30.11	30.11	25.13	0.00
15:36	52.0	51.5	51.8	98	3	2	NE	OK	30.10	30.11	30.11	25.13	0.00
15:21	52.0	51.5	51.8	98	3	3	ESE	OK	30.10	30.11	30.11	25.13	0.00
15:06	52.0	51.5	51.8	98	0	0		OK	30.07	30.08	30.08	25.10	0.00
14:51	52.0	51.5	51.8	98	0	0		OK	30.07	30.08	30.08	25.10	0.00
14:36	52.0	51.5	51.8	98	0	0		OK	30.07	30.08	30.08	25.10	0.00
14:21	52.0	51.5	51.8	98	2	3	NNW	OK	30.07	30.08	30.08	25.10	0.00
14:06	52.0	51.5	51.8	98	0	0		OK	30.07	30.08	30.08	25.10	0.00
13:51	52.0	51.5	51.8	98	0	0		OK	30.07	30.08	30.08	25.10	0.00
13:36	52.0	51.5	51.8	98	0	0		OK	30.07	30.08	30.08	25.10	0.00
13:21	52.0	51.5	51.8	98	0	0		OK	30.07	30.08	30.08	25.10	0.00

² Alameda (AS562) is located at N37.7755 W122.2655 at a field elevation of 10 feet msl.

³ San Francisco Sewage (CQ147) is located at N37.7387 W122.3903 at a field elevation of 5 feet msl.

13:06	52.0	51.5	51.8	98	0	0		<u>OK</u>	30.07	30.08	30.08	25.10	0.00
12:51	52.0	51.5	51.8	98	0	0		<u>OK</u>	30.10	30.11	30.11	25.13	0.00
12:36	52.0	51.5	51.8	98	2	3	W	<u>OK</u>	30.10	30.11	30.11	25.13	0.00
12:21	52.0	51.5	51.8	98	0	0		<u>OK</u>	30.07	30.08	30.08	25.10	0.00
12:06	52.0	51.5	51.8	98	3	4	W	<u>OK</u>	30.07	30.08	30.08	25.10	0.00

Table 4. San Francisco Sewage weather observations for 0400-0900 PST November 7

Time (Z)	Temp ° F	Wndspd mph	Wnddir	QC
17:00	49.6	3	WNW	<u>OK</u>
16:00	49.0	3	SSE	<u>OK</u>
15:00	48.7	4	W	<u>OK</u>
14:00	49.5	3	W	<u>OK</u>
13:00	49.8	3	WNW	<u>OK</u>
12:00	49.6	3	WNW	<u>OK</u>

4. Marine Weather Observations

Marine weather observations for Alameda⁴, San Francisco⁵, Richmond⁶, San Francisco Bar⁷, and Tiburon Pier⁸ obtained from the National Data Buoy Office⁹ archive follow in tables 5 through 9. Note: Times are in UTC and winds are in meters per second (m/s).

Table 5. Alameda marine observations for 0800-0900 PST November 7

#YY	MM	DD	hh	mm	WDIR	WSPD	GST	WVHT	DPD	APD	MWD	PRES	ATMP	WTMP	DEWP	VIS	TIDE
#yr	mo	dy	hr	mn	degT	m/s	m/s	m	sec	sec	deg	hPa	degC	degC	degC	mi	ft
2007	11	07	16	00	89	0.2	0.5	99.00	99.00	99.00	999	1017.7	10.6	15.3	999.0	99.0	99.00
2007	11	07	16	06	64	0.1	0.4	99.00	99.00	99.00	999	1017.8	10.8	15.3	999.0	99.0	99.00
2007	11	07	16	12	212	0.8	2.3	99.00	99.00	99.00	999	1018.0	10.9	15.4	999.0	99.0	99.00
2007	11	07	16	18	280	1.1	1.4	99.00	99.00	99.00	999	1018.1	10.8	15.4	999.0	99.0	99.00
2007	11	07	16	24	326	1.5	2.2	99.00	99.00	99.00	999	1018.1	10.7	15.3	999.0	99.0	99.00
2007	11	07	16	30	301	1.1	1.5	99.00	99.00	99.00	999	1018.1	10.8	15.3	999.0	99.0	99.00
2007	11	07	16	36	284	1.1	1.5	99.00	99.00	99.00	999	1018.2	10.8	15.3	999.0	99.0	99.00
2007	11	07	16	42	302	1.0	1.7	99.00	99.00	99.00	999	1018.2	10.8	15.3	999.0	99.0	99.00
2007	11	07	16	48	351	1.7	2.4	99.00	99.00	99.00	999	1018.3	10.7	15.3	999.0	99.0	99.00
2007	11	07	16	54	360	1.2	1.6	99.00	99.00	99.00	999	1018.2	10.7	15.3	999.0	99.0	99.00

⁴ Alameda (AAMC1) is located at N37.77 W122.30.

⁵ San Francisco (FTPC1) is located at N37.81 W122.47.

⁶ Richmond (RCMC1) is located at N37.93 W122.40.

⁷ San Francisco Bar (46237) is located at N37.7814 W122.5990.

⁸ Tiburon Pier (TIBC1) is located at N37.89 W122.45.

⁹ The National Data Buoy Office (NDBO), a part of the NOAA, develops, operates, and maintains a network of buoy and C-MAN stations.

2007 11 07 17 00 24 1.2 1.9 99.00 99.00 99.00 999 1018.3 10.7 15.3 999.0 99.0 99.00

Table 6. San Francisco marine observations for 0800-0900 PST November 7

#YY	MM	DD	hh	mm	WDIR	WSPD	GST	WVHT	DPD	APD	MWD	PRES	ATMP	WTMP	DEWP	VIS	TIDE
#yr	mo	dy	hr	mn	degT	m/s	m/s	m	sec	sec	deg	hPa	degC	degC	degC	mi	ft
2007	11	07	16	00	210	0.8	1.6	99.00	99.00	99.00	999	1018.5	9.9	13.5	999.0	99.0	99.00
2007	11	07	16	06	329	1.0	2.0	99.00	99.00	99.00	999	1018.5	9.9	13.5	999.0	99.0	99.00
2007	11	07	16	12	329	1.0	2.0	99.00	99.00	99.00	999	1018.5	9.9	13.5	999.0	99.0	99.00
2007	11	07	16	18	255	0.6	1.3	99.00	99.00	99.00	999	1018.6	9.9	13.5	999.0	99.0	99.00
2007	11	07	16	24	295	1.2	1.6	99.00	99.00	99.00	999	1018.5	9.9	13.5	999.0	99.0	99.00
2007	11	07	16	30	221	1.3	1.6	99.00	99.00	99.00	999	1018.7	9.9	13.5	999.0	99.0	99.00
2007	11	07	16	36	212	1.8	2.7	99.00	99.00	99.00	999	1018.7	9.8	13.5	999.0	99.0	99.00
2007	11	07	16	42	212	1.8	2.7	99.00	99.00	99.00	999	1018.7	9.8	13.5	999.0	99.0	99.00
2007	11	07	16	48	206	1.6	2.3	99.00	99.00	99.00	999	1018.8	9.8	13.5	999.0	99.0	99.00
2007	11	07	16	54	241	1.7	2.5	99.00	99.00	99.00	999	1018.8	10.0	13.5	999.0	99.0	99.00
2007	11	07	17	00	241	1.7	2.5	99.00	99.00	99.00	999	1018.8	10.0	13.5	999.0	99.0	99.00

Table 7. Richmond marine weather observations for 0800-0900 PST November 7

#YY	MM	DD	hh	mm	WDIR	WSPD	GST	WVHT	DPD	APD	MWD	PRES	ATMP	WTMP	DEWP	VIS	TIDE
#yr	mo	dy	hr	mn	degT	m/s	m/s	m	sec	sec	deg	hPa	degC	degC	degC	mi	ft
2007	11	07	16	00	999	0.9	1.3	99.00	99.00	99.00	999	1018.4	10.9	999.0	999.0	99.0	99.00
2007	11	07	16	06	999	1.3	1.7	99.00	99.00	99.00	999	1018.5	10.7	999.0	999.0	99.0	99.00
2007	11	07	16	12	999	1.3	1.7	99.00	99.00	99.00	999	1018.5	10.7	999.0	999.0	99.0	99.00
2007	11	07	16	18	999	0.8	1.2	99.00	99.00	99.00	999	1018.6	10.8	999.0	999.0	99.0	99.00
2007	11	07	16	24	999	1.1	1.2	99.00	99.00	99.00	999	1018.6	10.8	999.0	999.0	99.0	99.00
2007	11	07	16	30	999	1.1	2.1	99.00	99.00	99.00	999	1018.7	10.5	999.0	999.0	99.0	99.00
2007	11	07	16	36	999	1.5	1.8	99.00	99.00	99.00	999	1018.7	10.6	999.0	999.0	99.0	99.00
2007	11	07	16	42	999	1.5	1.8	99.00	99.00	99.00	999	1018.7	10.6	999.0	999.0	99.0	99.00
2007	11	07	16	48	999	1.1	1.4	99.00	99.00	99.00	999	1018.7	10.7	999.0	999.0	99.0	99.00
2007	11	07	16	54	999	1.4	1.8	99.00	99.00	99.00	999	1018.7	10.7	999.0	999.0	99.0	99.00
2007	11	07	17	00	999	0.6	1.1	99.00	99.00	99.00	999	1018.7	10.8	999.0	999.0	99.0	99.00

Table 8. San Francisco Bar weather observations for 0400-0900 PST November 7

#YY	MM	DD	hh	mm	WDIR	WSPD	GST	WVHT	DPD	APD	MWD	PRES	ATMP	WTMP	DEWP	VIS	TIDE
#yr	mo	dy	hr	mn	degT	m/s	m/s	m	sec	sec	deg	hPa	degC	degC	degC	mi	ft
2007	11	07	12	00	999	99.0	99.0	1.10	18.00	99.00	999	9999.0	999.0	13.5	999.0	99.0	99.00
2007	11	07	13	00	999	99.0	99.0	1.00	18.00	99.00	999	9999.0	999.0	13.4	999.0	99.0	99.00

2007 11 07 14 00 999 99.0 99.0 1.10 18.00 99.00 999 9999.0 999.0 13.3 999.0 99.0 99.00
 2007 11 07 15 00 999 99.0 99.0 1.00 18.00 99.00 999 9999.0 999.0 13.2 999.0 99.0 99.00
 2007 11 07 16 00 999 99.0 99.0 1.00 18.00 99.00 999 9999.0 999.0 12.8 999.0 99.0 99.00
 2007 11 07 17 00 999 99.0 99.0 1.00 17.00 99.00 999 9999.0 999.0 12.8 999.0 99.0 99.00

Table 9. Tiburon Pier weather observations for 0800-0900 PST November 7

#YY MM DD hh mm WDIR WSPD GST WVHT DPD APD MWD PRES ATMP WTMP DEWP VIS TIDE
 #yr mo dy hr mn degT m/s m/s m sec sec deg hPa degC degC degC mi ft
 2007 11 07 16 00 217 0.9 1.7 99.00 99.00 99.00 999 1018.0 10.4 999.0 10.0 99.0 99.00
 2007 11 07 16 06 186 1.2 1.7 99.00 99.00 99.00 999 1018.0 10.5 999.0 10.1 99.0 99.00
 2007 11 07 16 12 192 1.5 1.9 99.00 99.00 99.00 999 1018.0 10.5 999.0 10.1 99.0 99.00
 2007 11 07 16 18 191 0.9 1.7 99.00 99.00 99.00 999 1018.0 10.6 999.0 10.2 99.0 99.00
 2007 11 07 16 24 204 1.1 1.7 99.00 99.00 99.00 999 1018.0 10.6 999.0 10.2 99.0 99.00
 2007 11 07 16 30 196 1.4 1.7 99.00 99.00 99.00 999 1018.0 10.5 999.0 10.1 99.0 99.00
 2007 11 07 16 36 206 0.7 1.2 99.00 99.00 99.00 999 1018.0 10.5 999.0 10.1 99.0 99.00
 2007 11 07 16 42 173 0.7 1.2 99.00 99.00 99.00 999 1018.0 10.6 999.0 10.2 99.0 99.00
 2007 11 07 16 48 136 0.1 0.6 99.00 99.00 99.00 999 1018.0 10.7 999.0 10.3 99.0 99.00
 2007 11 07 16 54 156 1.5 1.9 99.00 99.00 99.00 999 1018.0 10.7 999.0 10.3 99.0 99.00
 2007 11 07 17 00 155 1.5 2.2 99.00 99.00 99.00 999 1018.0 10.6 999.0 10.2 99.0 99.00

Water levels for Golden Gate¹⁰ obtained from the USGS Research Site for SFPORTS¹¹ for 0800 to 0900 are shown in table 10. The water levels for Golden Gate for the 24-hour period from 1200 November 6 to 1200 November 7 are shown in figure 5.

Table 10. Golden Gate water levels for 0800-0900 PST November 7

Golden Gate Sea Level, ft			Date
5.30	*****	*****	19 11/07 8:00
5.37	*****	*****	17 11/07 8:06
5.39	*****	*****	15 11/07 8:12
5.43	*****	*****	13 11/07 8:18
5.50	*****	*****	11 11/07 8:24
5.56	*****	*****	9 11/07 8:30
5.66	*****	*****	7 11/07 8:36
5.63	*****	*****	5 11/07 8:42

¹⁰ Golden Gate (9414290) is located at N37.8067 W122.4650.

¹¹ SFPORTS was created through a partnership of the National Ocean Service, NOAA, the U.S. Geological Survey, the California Office of Oil Spill Prevention and Response, and the Marine Exchange of San Francisco Bay.

5.68	*****	*****	3 11/07 8:48
5.73	*****	*****	1 11/07 8:54
5.78	*****	*****	99 11/07 9:00

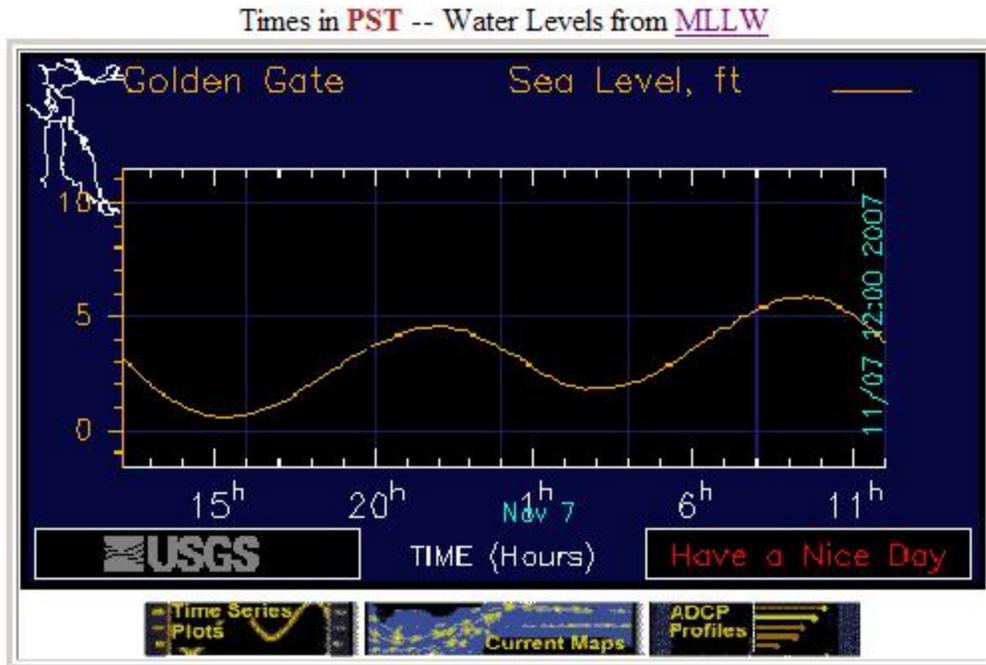


Figure 5. Golden Gate water levels for 1200 PST November 6 to 1200 PST November 7

5. GOES-11 (Geostationary Operational Environmental Satellite-11) Data

GOES-11 visible digital data centered on the accident location were obtained through the NOAA's Comprehensive Large Array-data Stewardship System (CLASS) and displayed on a NTSB McIDAS¹² workstation. Note: The nominal resolution of the visible data is 1.

Figure 6 shows a visible image centered on San Francisco Bay for the nominal time of 0830 (1630 UTC). The image is remapped to the Mercator projection and X 6 magnified.

Note: A map background, interstate highways, and aviation weather reporting stations are overlaid on the image.

¹² McIDAS is a meteorological and data analyses computer-based system developed by the Space Science and Engineering Center (SSEC) at the University of Wisconsin at Madison, Wisconsin.

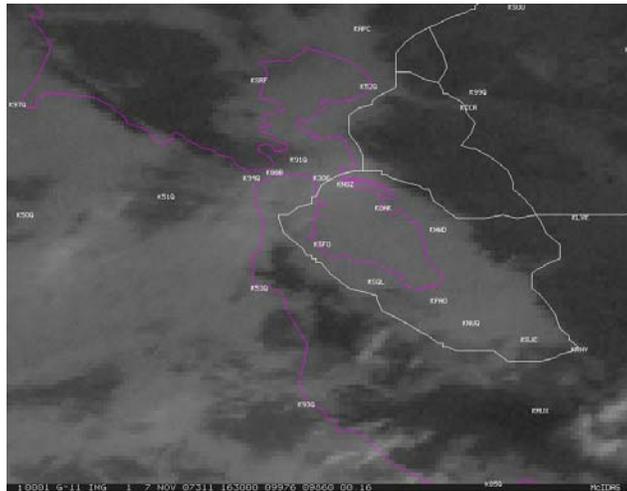


Figure 6. GOES-11 visible image for 0830 PST November 7

6. Tide and Current Data

Tide data for Yerba Buena Island for November 7, obtained from NOAA Center for Operational Oceanographic Products and Services (CO-OPS), follow:

Station	Latitude	Longitude	Mean Range (ft)	Spring Range (ft)	Mean Tide Level (ft)
Yerba Buena Island	37° 48.6'	122° 21.6'	4.43	6.16	3.34

Date	Day	Time	Height	Time	Height	Time	Height	Time	Height
11/07/2007	Wed	03:38AM	1.8 L	09:58AM	6.1 H	04:35PM	0.2 L	11:08PM	4.8 H

The only operational current meter in San Francisco Bay was located at the Martinez-AMORCO Pier (in the Suisun Strait/Suisun Bay area).

The two closest historical stations published in the NOAA CO-OPS 2007 Tidal Current Tables, were at Yerba Buena Island (west of mid-channel) and Rincon Point (0.57 nautical miles east of mid-channel), at 20 feet depth. These stations reported predicted tidal flow determined by the astronomical forcing of the water. Note: Wind and river runoff were not accounted for in the predictions.

The following data were extracted from the 2007 Tidal Current Tables for Yerba Buena Island, west of mid-channel, for November 1 to 8.

Predicted Tidal Current
Yerba Buena Island, W of (midchannel)

Predicted Tidal Current
November, 2007

Flood Direction, 168 True. Ebb (-) Direction, 316 True.

NOAA, National Ocean Service

Day	Slack Water			Maximum Current			Slack Water			Maximum Current			Slack Water		
	Time h.m.	Time h.m.	Veloc knots	Time h.m.	Time h.m.	Veloc knots	Time h.m.	Time h.m.	Veloc knots	Time h.m.	Time h.m.	Veloc knots	Time h.m.	Time h.m.	Veloc knots
1	45	410	1.5	708	1036	-1.8	1319	1451	1.1	1759	2138	-2.4			
2	156	510	1.6	802	1137	-2	1423	1558	1.1	1913	2249	-2.2			
3	259	602	1.6	851	1232	-2.4	1522	1708	1.2	2022					
4		1	-2.2	251	546	1.6	835	1220	-2.4	1516	1715	1.3	2024		
5		5	-2.2	336	623	1.6	915	1300	-2.6	1606	1814	1.4	2120		
6		56	-2.2	416	651	1.5	950	1333	-2.6	1652	1909	1.4	2214		
7		143	-2.2	454	712	1.4	1022	1400	-2.8	1734	2001	1.4	2306		
8		228	-2.2	531	734	1.3	1049	1426	-2.8	1810	2050	1.4	2357		

7. NWS Forecasts, Advisories, and Products

The NWS San Francisco Bay Area/Monterey Weather Forecast Office (MTR) issues marine and public weather products for the San Francisco Bay area. Figure 7 delineates the various marine forecast areas in the San Francisco Bay area.

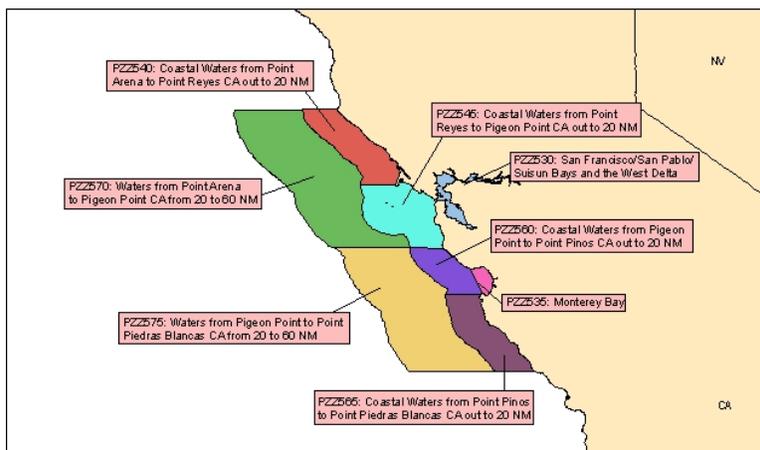


Figure 7. Coastal Waters Forecast zones

Following are the Coastal Waters Forecasts prepared by the MTR and valid during the periods beginning 0313 and 0842. Note: The forecast for the San Francisco Bay is annotated in bold type.

Issuance for 0313 PST November 7

FZUS56 KMTR 071113

2007311

1113

CWFMTR

COASTAL WATERS FORECAST

NATIONAL WEATHER SERVICE SAN FRANCISCO CA

313 AM PST WED NOV 7 2007

POINT ARENA TO POINT PIEDRAS BLANCAS AND OUT 60 NM INCLUDING THE SAN FRANCISCO BAY AREA AND MONTEREY BAY

PZZ500-071745-

313 AM PST WED NOV 7 2007

.SYNOPSIS FOR THE CENTRAL CALIFORNIA COAST AND BAYS INCLUDING MONTEREY BAY...GULF OF THE FARALLONES...AND CORDELL BANK NATIONAL MARINE SANCTUARIES...

LOW PRESSURE WAS LOCATED OFF THE CENTRAL CALIFORNIA COAST WILL REMAIN NEARLY STATIONARY OVER THE NEXT COUPLE DAYS. A FRONTAL SYSTEM WILL MOVE ACROSS THE NORTHERN AND CENTRAL WATERS FRIDAY AND SATURDAY WITH A CHANCE OF RAIN OVER THE NORTHERN WATERS SATURDAY. SEAS WILL GRADUALLY INCREASE DURING THE WEEKEND.

\$\$

PZZ540-545-570-071745-

/O.ROU.KMTR.MA.F.0000.000000T0000Z-000000T0000Z/

POINT ARENA TO POINT REYES TO 20 NM-

POINT REYES TO PIGEON POINT TO 20 NM-

POINT ARENA TO PIGEON POINT 20 TO 60 NM OFFSHORE-

313 AM PST WED NOV 7 2007

.TODAY...NW WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT. MIXED SWELL NW 2 FT AT 10 SECONDS AND S 3 FT AT 16 SECONDS. AREAS OF FOG IN THE MORNING...THEN PATCHY FOG IN THE AFTERNOON.

.TONIGHT...W WINDS 5 TO 10 KT...BECOMING S AFTER MIDNIGHT. WIND WAVES 1 TO 2 FT. MIXED SWELL NW 2 TO 4 FT AT 10 SECONDS AND S 4 FT AT 16 SECONDS. AREAS OF FOG.

.THU...S WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT. MIXED SWELL NW 2 TO 3 FT AT 11 SECONDS AND S 3 FT AT 15 SECONDS. AREAS OF FOG IN THE MORNING...THEN PATCHY FOG IN THE AFTERNOON.

.THU NIGHT...S WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT. MIXED SWELL NW 2 FT AND S 3 FT. AREAS OF FOG.

.FRI...S WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT. NW SWELL 5 TO 8 FT AND S 2 TO 3 FT. AREAS OF FOG. CHANCE OF RAIN.

.SAT...NW WINDS 15 TO 25 KT. WIND WAVES 3 TO 5 FT.

NW SWELL 5 TO 7 FT AND S 2 FT. CHANCE OF RAIN.

.VETERANS DAY...NW WINDS 10 TO 20 KT. WIND WAVES 2 TO 4 FT.

NW SWELL 7 TO 9 FT AND S 2 FT.

.....SAN FRANCISCO BAR/FOURFATHOM BANK FORECAST.....

IN THE DEEP WATER CHANNEL AND ACROSS THE BAR...COMBINED SEAS 3 TO 5 FEET AT 10 SECONDS. SEAS OCCASIONALLY TO 6 FEET DURING MAXIMUM EBB CURRENT OF 2.2 KNOTS AT 1:58 PM THIS AFTERNOON AND 1.4 KNOTS AT 2:19 AM THURSDAY MORNING.

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PZZ560-565-575-071745-

/O.ROU.KMTR.MA.F.0000.000000T0000Z-000000T0000Z/

PIGEON POINT TO POINT PINOS TO 20 NM-

POINT PINOS TO POINT PIEDRAS BLANCAS TO 20 NM-

PIGEON POINT TO POINT PIEDRAS BLANCAS 20 TO 60 NM OFFSHORE-

313 AM PST WED NOV 7 2007

.TODAY...NW WINDS 5 TO 10 KT...BECOMING W IN THE AFTERNOON. WIND WAVES 1 TO 2 FT. MIXED SWELL NW 2 FT AT 10 SECONDS

AND S 3 TO 4 FT AT 16 SECONDS. AREAS OF FOG IN THE MORNING...

THEN PATCHY FOG IN THE AFTERNOON.
.TONIGHT...S WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
MIXED SWELL NW 2 FT AT 10 SECONDS AND S 3 TO 4 FT AT 16 SECONDS.
AREAS OF FOG.
.THU...S WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
MIXED SWELL NW 2 TO 3 FT AT 12 SECONDS AND S 3 TO 4 FT AT 15
SECONDS. AREAS OF FOG IN THE MORNING...THEN PATCHY FOG IN THE
AFTERNOON.
.THU NIGHT...S WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT.
MIXED SWELL NW 2 TO 3 FT AND S 3 TO 4 FT. AREAS OF FOG.
.FRI...S WINDS 5 TO 10 KT. WIND WAVES 2 TO 3 FT.
MIXED SWELL NW 3 TO 5 FT AND S 2 TO 3 FT. AREAS OF FOG.
.SAT...W WINDS 15 TO 25 KT. WIND WAVES 3 TO 5 FT.
NW SWELL 4 TO 6 FT AND S 3 FT. CHANCE OF RAIN.
.VETERANS DAY...N WINDS 15 TO 25 KT. WIND WAVES 3 TO 5 FT.
NW SWELL 5 TO 7 FT AND S 2 FT.

\$\$

PZZ530-071745-

/O.ROU.KMTR.MA.F.0000.000000T0000Z-000000T0000Z/
SAN FRANCISCO SAN PABLO SUISUN BAY AND THE WEST DELTA-
313 AM PST WED NOV 7 2007

.TODAY...SW WINDS 5 KT.
.TONIGHT...SW WINDS 5 TO 10 KT.
.THU...SW WINDS 5 TO 10 KT.
.THU NIGHT...SW WINDS 5 TO 10 KT.
.FRI...SW WINDS 5 TO 10 KT...BECOMING S AFTER MIDNIGHT.
.SAT...SW WINDS 5 TO 10 KT. CHANCE OF RAIN.
.VETERANS DAY...NW WINDS 5 TO 10 KT.

\$\$

PZZ535-071745-

/O.ROU.KMTR.MA.F.0000.000000T0000Z-000000T0000Z/
MONTEREY BAY-
313 AM PST WED NOV 7 2007

.TODAY...W WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
NW SWELL 1 TO 2 FT AT 10 SECONDS. AREAS OF FOG IN THE
MORNING...THEN PATCHY FOG IN THE AFTERNOON.
.TONIGHT...SW WINDS 5 KT...BECOMING E AFTER MIDNIGHT. WIND WAVES
1 FT OR LESS. NW SWELL 1 TO 2 FT AT 10 SECONDS. AREAS OF FOG.
.THU...SW WINDS 5 KT. WIND WAVES 1 FT OR LESS.
NW SWELL 1 TO 2 FT AT 12 SECONDS. AREAS OF FOG IN THE MORNING...
THEN PATCHY FOG IN THE AFTERNOON.
.THU NIGHT...SW WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
NW SWELL 2 TO 3 FT. AREAS OF FOG.
.FRI...E WINDS 5 KT...BECOMING SW IN THE AFTERNOON...THEN...
BECOMING SE AFTER MIDNIGHT. WIND WAVES 1 FT OR LESS.
NW SWELL 2 TO 4 FT. AREAS OF FOG.
.SAT...SW WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT.
NW SWELL 3 TO 5 FT. CHANCE OF RAIN.
.VETERANS DAY...N WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
NW SWELL 4 TO 6 FT.

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Issuance for 0842 PST November 7

FZUS56 KMTR 071642
1642
CWFMT
COASTAL WATERS FORECAST

2007311

NATIONAL WEATHER SERVICE SAN FRANCISCO CA
842 AM PST WED NOV 7 2007
POINT ARENA TO POINT PIEDRAS BLANCAS AND OUT 60 NM INCLUDING THE SAN
FRANCISCO BAY AREA AND MONTEREY BAY
PZZ500-080030-

842 AM PST WED NOV 7 2007
.SYNOPSIS FOR THE CENTRAL CALIFORNIA COAST AND BAYS INCLUDING
MONTEREY BAY...GULF OF THE FARALLONES...AND CORDELL BANK NATIONAL
MARINE SANCTUARIES...
PERSISTENT LOW PRESSURE LOCATED OFF THE CENTRAL CALIFORNIA COAST
WILL REMAIN NEARLY STATIONARY OVER THE NEXT COUPLE DAYS. A FRONTAL
SYSTEM WILL MOVE ACROSS THE NORTHERN AND CENTRAL WATERS FRIDAY AND
SATURDAY WITH A CHANCE OF RAIN OVER THE NORTHERN WATERS SATURDAY.
SEAS WILL GRADUALLY INCREASE DURING THE WEEKEND.

\$\$
PZZ540-545-570-080030-
/O.ROU.KMTR.MA.F.0000.000000T0000Z-000000T0000Z/
POINT ARENA TO POINT REYES TO 20 NM-
POINT REYES TO PIGEON POINT TO 20 NM-
POINT ARENA TO PIGEON POINT 20 TO 60 NM OFFSHORE-
842 AM PST WED NOV 7 2007

.TODAY...NW WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT.
MIXED SWELL NW 2 FT AT 10 SECONDS AND S 3 FT AT 16 SECONDS.
AREAS OF FOG IN THE MORNING...THEN PATCHY FOG IN THE AFTERNOON.
.TONIGHT...W WINDS 5 TO 10 KT...BECOMING S AFTER MIDNIGHT.
WIND WAVES 1 TO 2 FT. MIXED SWELL NW 2 TO 4 FT AT 10 SECONDS AND
S 3 TO 4 FT AT 16 SECONDS. AREAS OF FOG.
.THU...S WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT.
MIXED SWELL NW 2 TO 3 FT AT 11 SECONDS AND S 3 FT AT 15 SECONDS.
AREAS OF FOG IN THE MORNING...THEN PATCHY FOG IN THE AFTERNOON.
.THU NIGHT...S WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT.
MIXED SWELL NW 2 FT AND S 3 FT. AREAS OF FOG.
.FRI...S WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT.
NW SWELL 5 TO 8 FT AND S 2 TO 3 FT. AREAS OF FOG. CHANCE OF RAIN.
.SAT...NW WINDS 15 TO 25 KT. WIND WAVES 3 TO 5 FT.
NW SWELL 5 TO 7 FT. CHANCE OF RAIN.
.VETERANS DAY...NW WINDS 10 TO 20 KT. WIND WAVES 2 TO 4 FT.
NW SWELL 7 TO 9 FT.

.....SAN FRANCISCO BAR/FOURFATHOM BANK FORECAST.....
IN THE DEEP WATER CHANNEL AND ACROSS THE BAR...COMBINED SEAS
3 TO 5 FEET AT 10 SECONDS. SEAS OCCASIONALLY TO 6 FEET DURING
MAXIMUM EBB CURRENT OF 2.2 KNOTS AT 1:58 PM THIS AFTERNOON AND
1.4 KNOTS AT 2:19 AM THURSDAY MORNING.

\$\$
PZZ560-565-575-080030-
/O.ROU.KMTR.MA.F.0000.000000T0000Z-000000T0000Z/
PIGEON POINT TO POINT PINOS TO 20 NM-
POINT PINOS TO POINT PIEDRAS BLANCAS TO 20 NM-
PIGEON POINT TO POINT PIEDRAS BLANCAS 20 TO 60 NM OFFSHORE-
842 AM PST WED NOV 7 2007

.TODAY...NW WINDS 5 TO 10 KT...BECOMING W IN THE AFTERNOON.
WIND WAVES 1 TO 2 FT. MIXED SWELL NW 2 FT AT 10 SECONDS AND
S 3 TO 4 FT AT 16 SECONDS. AREAS OF FOG IN THE MORNING...THEN
PATCHY FOG IN THE AFTERNOON.
.TONIGHT...S WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
MIXED SWELL NW 2 FT AT 10 SECONDS AND S 3 TO 4 FT AT 16 SECONDS.
AREAS OF FOG.
.THU...S WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
MIXED SWELL NW 2 TO 3 FT AT 12 SECONDS AND S 3 TO 4 FT AT 15
SECONDS. AREAS OF FOG IN THE MORNING...THEN PATCHY FOG IN THE

AFTERNOON.

.THU NIGHT...S WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT.
MIXED SWELL NW 2 TO 3 FT AND S 3 TO 4 FT. AREAS OF FOG.
.FRI...S WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
MIXED SWELL NW 3 TO 5 FT AND S 2 TO 3 FT. AREAS OF FOG.
.SAT...W WINDS 15 TO 25 KT. WIND WAVES 3 TO 5 FT.
NW SWELL 4 TO 6 FT AND S 3 FT. CHANCE OF RAIN.
.VETERANS DAY...N WINDS 15 TO 25 KT. WIND WAVES 3 TO 5 FT.
NW SWELL 5 TO 7 FT.
\$\$

PZZ530-080030-

/O.ROU.KMTR.MA.F.0000.000000T0000Z-000000T0000Z/

SAN FRANCISCO SAN PABLO SUISUN BAY AND THE WEST DELTA-
842 AM PST WED NOV 7 2007

.TODAY...SW WINDS 5 KT...BECOMING W 5 TO 10 KT IN THE AFTERNOON.
.TONIGHT...W WINDS 5 TO 10 KT...BECOMING SW 5 KT OVERNIGHT.
.THU...SW WINDS 5 TO 10 KT.
.THU NIGHT...SW WINDS 5 TO 10 KT.
.FRI...SW WINDS 5 TO 10 KT...BECOMING S AFTER MIDNIGHT.
.SAT...SW WINDS 5 TO 10 KT. CHANCE OF RAIN.
.VETERANS DAY...NW WINDS 5 TO 10 KT.

\$\$

PZZ535-080030-

/O.ROU.KMTR.MA.F.0000.000000T0000Z-000000T0000Z/

MONTEREY BAY-
842 AM PST WED NOV 7 2007

.TODAY...W WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
NW SWELL 1 TO 3 FT AT 10 SECONDS. AREAS OF FOG IN THE MORNING.
.TONIGHT...SW WINDS 5 KT...BECOMING E AFTER MIDNIGHT.
WIND WAVES 1 FT OR LESS. NW SWELL 1 TO 2 FT AT 10 SECONDS.
AREAS OF FOG.
.THU...SW WINDS 5 KT. WIND WAVES 1 FT OR LESS.
NW SWELL 1 TO 2 FT AT 12 SECONDS. AREAS OF FOG IN THE MORNING.
.THU NIGHT...SW WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
NW SWELL 2 TO 3 FT. AREAS OF FOG.
.FRI...E WINDS 5 KT...BECOMING SW IN THE AFTERNOON.
WIND WAVES 1 FT OR LESS. NW SWELL 2 TO 4 FT. AREAS OF FOG.
.SAT...SW WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT.
NW SWELL 3 TO 5 FT. CHANCE OF RAIN.
.VETERANS DAY...N WINDS 5 TO 10 KT. WIND WAVES 1 TO 2 FT.
NW SWELL 4 TO 6 FT.
\$\$

Following are the Public Zone Forecasts for the San Francisco Bay Shoreline prepared by the MTR and valid during the periods beginning 0509 and 0842:

Issuance for 0509 PST November 7

CAZ006-508>510-513-080515-

SAN FRANCISCO-SAN FRANCISCO BAY SHORELINE-
SAN FRANCISCO PENINSULA COAST-EAST BAY INTERIOR VALLEYS-
SANTA CLARA VALLEY...INCLUDING SAN JOSE-
509 AM PST WED NOV 7 2007

...DENSE FOG ADVISORY IN EFFECT UNTIL 9 AM PST THIS MORNING...
.TODAY...MORNING LOW CLOUDS AND AREAS OF DENSE FOG ALONG THE COAST
EXTENDING LOCALLY INLAND. OTHERWISE PARTLY CLOUDY. HIGHS IN THE
UPPER 50S AT THE COAST TO THE 70S INLAND. WEST AFTERNOON WINDS 10
TO 20 MPH.

.TONIGHT...MOSTLY CLEAR EXCEPT COASTAL LOW CLOUDS AND FOG SPREADING LOCALLY INLAND. LOWS IN THE MID 40S TO LOWER 50S. WEST EVENING WINDS 5 TO 15 MPH.
 .THURSDAY...MORNING LOW CLOUDS AND FOG ALONG THE COAST EXTENDING LOCALLY INLAND. OTHERWISE MOSTLY SUNNY. HIGHS IN THE UPPER 50S AT THE COAST TO THE LOWER 70S INLAND. SOUTHWEST WINDS 5 TO 15 MPH.
 .THURSDAY NIGHT...MOSTLY CLEAR IN THE EVENING THEN BECOMING MOSTLY CLOUDY. AREAS OF FOG. LOWS IN THE MID 40S TO LOWER 50S. SOUTHWEST WINDS 5 TO 15 MPH.
 .FRIDAY...MOSTLY CLOUDY IN THE MORNING THEN BECOMING PARTLY CLOUDY. AREAS OF FOG IN THE MORNING. HIGHS IN THE 60S. SOUTH WINDS 5 TO 10 MPH.
 .FRIDAY NIGHT...MOSTLY CLOUDY. LOWS IN THE MID 40S TO LOWER 50S.
 .SATURDAY...MOSTLY CLOUDY. CHANCE OF RAIN. HIGHS IN THE UPPER 50S TO MID 60S.
 .SATURDAY NIGHT...PARTLY CLOUDY. CHANCE OF RAIN. LOWS IN THE MID 40S TO LOWER 50S.
 .VETERANS DAY THROUGH TUESDAY...PARTLY CLOUDY. HIGHS IN THE 60S TO LOWER 70S. LOWS IN THE MID 40S TO LOWER 50S.
 &&

Issuance for 0906 PST November 7

CAZ006-508-509-513-080815-
 SAN FRANCISCO-SAN FRANCISCO BAY SHORELINE-
 SAN FRANCISCO PENINSULA COAST-
 SANTA CLARA VALLEY...INCLUDING SAN JOSE-
 906 AM PST WED NOV 7 2007
 ...DENSE FOG ADVISORY IN EFFECT UNTIL 10 AM PST THIS MORNING...
 .TODAY...MORNING LOW CLOUDS AND AREAS OF DENSE FOG ALONG THE COAST EXTENDING LOCALLY INLAND. OTHERWISE PARTLY CLOUDY. HIGHS IN THE UPPER 50S AT THE COAST TO THE 70S INLAND. WEST AFTERNOON WINDS 10 TO 20 MPH.
 .TONIGHT...MOSTLY CLEAR EXCEPT COASTAL LOW CLOUDS AND FOG SPREADING LOCALLY INLAND. LOWS IN THE MID 40S TO LOWER 50S. WEST EVENING WINDS 5 TO 15 MPH.
 .THURSDAY...MORNING LOW CLOUDS AND FOG ALONG THE COAST EXTENDING LOCALLY INLAND. OTHERWISE MOSTLY SUNNY. HIGHS IN THE UPPER 50S AT THE COAST TO THE LOWER 70S INLAND. SOUTHWEST WINDS 5 TO 15 MPH.
 .THURSDAY NIGHT...MOSTLY CLEAR IN THE EVENING THEN BECOMING MOSTLY CLOUDY. AREAS OF FOG. LOWS IN THE MID 40S TO LOWER 50S. SOUTHWEST WINDS 5 TO 15 MPH.
 .FRIDAY...MOSTLY CLOUDY IN THE MORNING THEN BECOMING PARTLY CLOUDY. AREAS OF FOG IN THE MORNING. HIGHS IN THE 60S. SOUTH WINDS 5 TO 10 MPH.
 .FRIDAY NIGHT...MOSTLY CLOUDY. LOWS IN THE MID 40S TO LOWER 50S.
 .SATURDAY...MOSTLY CLOUDY. CHANCE OF RAIN. HIGHS IN THE UPPER 50S TO MID 60S.
 .SATURDAY NIGHT...PARTLY CLOUDY. CHANCE OF RAIN. LOWS IN THE MID 40S TO LOWER 50S.
 .VETERANS DAY THROUGH TUESDAY...PARTLY CLOUDY. HIGHS IN THE 60S TO LOWER 70S. LOWS IN THE MID 40S TO LOWER 50S.
 &&

Following are Dense Fog Advisories for the San Francisco area prepared by the MTR and valid during the periods beginning 0300, 0504, and 0852:

Issuance for 0300 PST November 7

WWUS76 KMTR 071100
1100

2007311

NPWMTR

URGENT - WEATHER MESSAGE

NATIONAL WEATHER SERVICE SAN FRANCISCO CA

300 AM PST WED NOV 7 2007

...AREAS OF DENSE FOG AROUND THE SAN FRANCISCO AND MONTEREY BAY
AREAS UNTIL 9 AM...

CAZ006-505-506-508>510-514-515-071700-

/O.NEW.KMTR.FG.Y.0007.071107T1100Z-071107T1700Z/

SAN FRANCISCO-

COASTAL NORTH BAY...INCLUDING POINT REYES NATIONAL SEASHORE-

NORTH BAY INTERIOR VALLEYS-SAN FRANCISCO BAY SHORELINE-

SAN FRANCISCO PENINSULA COAST-EAST BAY INTERIOR VALLEYS-

MONTEREY BAY...NORTHERN SALINAS VALLEY...HOLLISTER VALLEY...AND

CARMEL VALLEY-BIG SUR COAST-

300 AM PST WED NOV 7 2007

...DENSE FOG ADVISORY IN EFFECT UNTIL 9 AM PST THIS MORNING...

THE NATIONAL WEATHER SERVICE IN SAN FRANCISCO HAS ISSUED A DENSE

FOG ADVISORY...WHICH IS IN EFFECT UNTIL 9 AM PST THIS MORNING.

AT 3 AM A NUMBER OF WEATHER STATIONS ARE REPORTING VISIBILITIES OF

1/4 MILE. THIS INCLUDES SAN FRANCISCO OAKLAND AND HAYWARD AIRPORTS

IN THE SAN FRANCISCO BAY AREA...SANTA ROSA AIRPORT IN THE NORTH

BAY...AND WATSONVILLE AIRPORT IN THE MONTEREY BAY AREA. AREAS OF

VISIBILITIES 1/4 MILE OR LESS CAN BE EXPECTED THROUGH 9 AM THIS

MORNING.

A DENSE FOG ADVISORY MEANS VISIBILITIES WILL FREQUENTLY BE

REDUCED TO LESS THAN ONE QUARTER MILE. IF DRIVING...SLOW DOWN...

USE YOUR HEADLIGHTS...AND LEAVE PLENTY OF DISTANCE AHEAD OF YOU.

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Issuance for 0504 PST November 7

WWUS76 KMTR 071304
1304

2007311

NPWMTR

URGENT - WEATHER MESSAGE

NATIONAL WEATHER SERVICE SAN FRANCISCO CA

504 AM PST WED NOV 7 2007

...AREAS OF DENSE FOG AROUND THE SAN FRANCISCO AND MONTEREY BAY
AREAS UNTIL 9 AM...

CAZ513-071700-

/O.EXA.KMTR.FG.Y.0007.000000T0000Z-071107T1700Z/

SANTA CLARA VALLEY...INCLUDING SAN JOSE-

504 AM PST WED NOV 7 2007

...DENSE FOG ADVISORY IN EFFECT UNTIL 9 AM PST THIS MORNING...

THE NATIONAL WEATHER SERVICE IN SAN FRANCISCO HAS ISSUED A DENSE

FOG ADVISORY...WHICH IS IN EFFECT UNTIL 9 AM PST THIS MORNING.

AT 5 AM...A WEATHER SPOTTER REPORTS DENSE FOG IN THE SAN JOSE

AREA. AREAS OF VISIBILITIES 1/4 MILE OR LESS CAN BE EXPECTED

THROUGH 9 AM THIS MORNING.

A DENSE FOG ADVISORY MEANS VISIBILITIES WILL FREQUENTLY BE

REDUCED TO LESS THAN ONE QUARTER MILE. IF DRIVING...SLOW DOWN...

USE YOUR HEADLIGHTS...AND LEAVE PLENTY OF DISTANCE AHEAD OF YOU.

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CAZ006-505-506-508>510-514-515-071700-

/O.CON.KMTR.FG.Y.0007.000000T0000Z-071107T1700Z/

SAN FRANCISCO-

COASTAL NORTH BAY...INCLUDING POINT REYES NATIONAL SEASHORE-
NORTH BAY INTERIOR VALLEYS-SAN FRANCISCO BAY SHORELINE-
SAN FRANCISCO PENINSULA COAST-EAST BAY INTERIOR VALLEYS-
MONTEREY BAY...NORTHERN SALINAS VALLEY...HOLLISTER VALLEY...AND
CARMEL VALLEY-BIG SUR COAST-
504 AM PST WED NOV 7 2007

...DENSE FOG ADVISORY REMAINS IN EFFECT UNTIL 9 AM PST THIS
MORNING...

A NUMBER OF WEATHER STATIONS HAVE REPORTED VISIBILITIES OF 1/4
MILE. THIS INCLUDES SAN FRANCISCO OAKLAND AND HAYWARD AIRPORTS IN
THE SAN FRANCISCO BAY AREA...SANTA ROSA AND NAPA AIRPORTS IN THE
NORTH BAY...AND WATSONVILLE AIRPORT IN THE MONTEREY BAY AREA.
AREAS OF VISIBILITIES 1/4 MILE OR LESS CAN BE EXPECTED THROUGH 9
AM THIS MORNING.

A DENSE FOG ADVISORY MEANS VISIBILITIES WILL FREQUENTLY BE
REDUCED TO LESS THAN ONE QUARTER MILE. IF DRIVING...SLOW DOWN...
USE YOUR HEADLIGHTS...AND LEAVE PLENTY OF DISTANCE AHEAD OF YOU.
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Issuance for 0852 PST November 7

WWUS76 KMTR 071652
1652

2007311

NPWMTR

URGENT - WEATHER MESSAGE

NATIONAL WEATHER SERVICE SAN FRANCISCO CA

852 AM PST WED NOV 7 2007

...AREAS OF DENSE FOG AROUND THE SAN FRANCISCO AND MONTEREY BAY
AREAS UNTIL 9 AM...

CAZ510-514-515-071800-

/O.EXP.KMTR.FG.Y.0007.000000T0000Z-071107T1700Z/

EAST BAY INTERIOR VALLEYS-

MONTEREY BAY...NORTHERN SALINAS VALLEY...HOLLISTER VALLEY...AND
CARMEL VALLEY-BIG SUR COAST-

852 AM PST WED NOV 7 2007

...DENSE FOG ADVISORY WILL EXPIRE AT 9 AM PST THIS MORNING...

THE DENSE FOG ACROSS THE REGION THIS MORNING IS DIMINISHING AND
VISIBILITIES ARE GRADUALLY IMPROVING. THEREFORE...THE DENSE FOG
ADVISORY WILL BE ALLOWED TO EXPIRE. HOWEVER...PATCHY FOG WILL
REMAIN THROUGH THE MORNING HOURS WITH VISIBILITIES GENERALLY ONE
TO THREE MILES.

MOTORISTS TRAVELING ON AREA ROADWAYS THIS MORNING SHOULD STILL USE
CAUTION.

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CAZ006-505-506-508-509-513-071800-

/O.EXT.KMTR.FG.Y.0007.000000T0000Z-071107T1800Z/

SAN FRANCISCO-

COASTAL NORTH BAY...INCLUDING POINT REYES NATIONAL SEASHORE-

NORTH BAY INTERIOR VALLEYS-SAN FRANCISCO BAY SHORELINE-

SAN FRANCISCO PENINSULA COAST-

SANTA CLARA VALLEY...INCLUDING SAN JOSE-

852 AM PST WED NOV 7 2007

...DENSE FOG ADVISORY NOW IN EFFECT UNTIL 10 AM PST THIS
MORNING...

AREA OBSERVATIONS...WEATHER SPOTTERS AND SATELLITE IMAGERY
INDICATE THAT DENSE FOG STILL REMAINS OVER MUCH OF THE SAN
FRANCISCO BAY AREA. VISIBILITIES WILL REMAIN AT ONE QUARTER OF A
MILES OR LESS AT TIMES.

A DENSE FOG ADVISORY MEANS VISIBILITIES WILL FREQUENTLY BE
REDUCED TO LESS THAN ONE QUARTER MILE. IF DRIVING...SLOW DOWN...

USE YOUR HEADLIGHTS...AND LEAVE PLENTY OF DISTANCE AHEAD OF YOU.
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8. Astronomical Data

Astronomical data for San Francisco for November 7 follow below:

U.S. Naval Observatory
Astronomical Applications Department

The following information is provided for San Francisco, San Francisco
County, California (longitude W122.4, latitude N37.8):

Wednesday
7 November 2007 Pacific Standard Time

SUN

Begin civil twilight	6:14 a.m.
Sunrise	6:41 a.m.
Sun transit	11:53 a.m.
Sunset	5:05 p.m.
End civil twilight	5:33 p.m.

MOON

Moonset	3:21 p.m. on preceding day
Moonrise	4:40 a.m.
Moon transit	10:16 a.m.
Moonset	3:44 p.m.
Moonrise	5:39 a.m. on following day

James T. Skeen, Jr.
Senior Meteorologist