



**FREEPORT-McMoRAN  
OIL & GAS**

**METEOROLOGICAL  
STATION 2014 ANNUAL  
REPORT**

**Inglewood Oil Field  
Meteorological Station  
Annual Audit and Data Validation**

**Baldwin Hills CSD Condition E.2.j**

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## 1.0 INTRODUCTION

### 1.1 BACKGROUND, CSD CONDITIONS

Freeport-McMoRan Oil & Gas (FMOG), formerly PXP, installed and operates a Meteorological Station at the Inglewood Oil Field. Installation and operation of the station is a requirement of the Baldwin Hills Community Standards District (CSD). The station design was approved by the South Coast Air Quality Management District (SCAQMD) that has authority over air quality in the South Coast Air Basin. The SCAQMD approval was provided to the Los Angeles County Regional Planning Division, who oversees implementation of the CSD.

The CSD Section E.2.j states:

*“j. Meteorological Station. The operator shall maintain and operate a meteorological station at the oil field in good operating condition and in compliance with all applicable Environmental Protection Agency ("EPA") and SCAQMD rules, regulations, and guidelines, and to the satisfaction of the director. The operator shall conduct an audit of the meteorological station on an annual basis and submit the results of the audit to the SCAQMD and the director. The operator shall maintain the data files for the meteorological station for a period of not less than 10 years. All such data shall be available upon request to the SCAQMD and the director.”*

The CSD Section L.2.d further defines the schedule for the project:

*“d. Meteorological Station. Within 120 days following the effective date, or at such later date as may be approved by the director for good cause shown, the operator shall submit to the SCAQMD a design for the installation of a meteorological station at the oil field that shall meet all the requirements of the United States Environmental Protection Agency ("EPA") guidelines on meteorological data as outlined in EPA Publication "Meteorological Monitoring Guidance for Regulatory Modeling Applications" (EPA-454/R-99-005) as published in February 2000. The operator shall take such actions as may be necessary to promptly secure SCAQMD approval of such design. The meteorological station shall be installed and fully operational within 180 days of receipt of approval of the design from the SCAQMD, or at such later date as may be approved by the director for good cause shown.”*

### 1.2 PURPOSE OF THE METEOROLOGICAL STATION

Meteorological data from the West Los Angeles station for 1981 was used in the preparation of the health risk assessment (HRA) for the Baldwin Hills CSD Environmental Impact Report (EIR), in conjunction with the five-year (1985-1989) meteorological dataset from Los Angeles International Airport inherent to the Hotspots Analysis and Reporting Program (HARP) Model. FMOG's meteorological station collects data representative of the local conditions at the oil field, so that after a five-year period a determination can be made if the oil field meteorological conditions are significantly different warranting a rerun of the HRA, per the CSD Condition E.2.k:

*“k. Updated Health Risk Assessment. After every five years of operation of the meteorological station, the operator shall provide the previous five years of meteorological data to the SCAQMD and the director. If the SCAQMD or the director determines that the previous five years of meteorological data from the oil field could result in significant changes to the health risk assessment that was conducted as part of the Baldwin Hills Community Standards District Environmental Impact Report, then the county may elect to re-run the health risk assessment using the previous five years of meteorological data from the meteorological station.”*

The purpose of the Meteorological Station is therefore two-fold:

1. To provide local representative wind speed and direction data in order to efficiently and effectively resolve potential odor complaints; and,
2. To collect representative data to determine if Inglewood Oil Field meteorological conditions are significantly different warranting a re-run of the HRA performed for the Baldwin Hills CSD EIR.

### **1.3 COMPLIANCE**

The required Meteorological Station design was submitted to the County and the SCAQMD on March 25, 2009, which was within the CSD required deadline of 120 days of the CSD effective date. The design of the station is compliant with the United States Environmental Protection Agency (EPA) guidelines on meteorological data as outlined in EPA Publication "Meteorological Monitoring Guidance for Regulatory Modeling Applications" (EPA-454/R-99-005, February 2000). The station design was approved by the County and the SCAQMD on July 21, 2009.

The station was installed per the approved design, including the sensor sensitivities and accuracies. The station was fully operational within the CSD deadline: within 180 days after the approval of the design. The station installation started at the end of December 2009 and the station operation and meteorological data collection in full compliance started on Jan. 21, 2010.

The station collects the necessary data to enable preparation of a field-specific HRA, if a rerun of the EIR HRA is determined necessary as discussed above. The primary meteorological parameters that are measured by FMOG's meteorological station, per the EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV (1995), are as follows:

- Wind speed (horizontal);
- Wind direction;
- Temperature
- Temperature difference (delta temperature); and,
- Solar radiation.

This report presents the required annual audit and data analysis per the CSD Section E.2.j requirements, for the data collected during 2014, the fifth year of the station operation.

## 2.0 METEOROLOGICAL STATION INSTALLATION & OPERATION

### 2.1 METEOROLOGICAL STATION LOCATION AND INSTRUMENTATION



**Figure 1**  
**Meteorological**  
**Station at**  
**Inglewood Oil Field**

The station is comprised of a 10-meter (33 feet) tall tower, with meteorological sensors mounted on the tower, and a data logger at the base. Figure 1 shows a photo of the meteorological station in April 2010.

The meteorological station is located on the well pad of well #129 on Vickers Lease (see the maps on Figure 2 “Field view” and Figure 3 “Close-up view”). Geographic Coordinates of the station are 34° 00’ 32.00”N, 118° 22’ 43.30” W. The location is at an elevation of 122 meters (400 ft) above sea level, is free from vegetation, and is over 100 m (330 feet) away from the closest obstruction. The distance from the nearest obstruction meets the EPA requirement that the station is at least 10 times the height of the closest obstruction.

The station tower is mounted on a secure foundation and equipped with a lightning rod grounding system. The tower is specifically designed to support meteorological instruments. The station is powered from the grid. The sensors are secured to the station tower with mounting arms specifically designed to support meteorological instruments.

There are five required sensors mounted on the station tower:

- one wind direction sensor,
- one wind speed sensor,
- two temperature sensors to measure ambient temperature and temperature difference (delta temperature) at 2 meters and 10 meters, and
- one solar radiation sensor.

The two temperature sensors are shielded from direct sun with air-aspirated shields. These shields prevent heating of the temperature sensors by direct sun exposure and thus distorting the actual temperature measurement.

### 2.2 METEOROLOGICAL STATION OPERATION AND MAINTENANCE

The 2014 data was reviewed on a monthly basis for correct ranges, orders of magnitude, gaps, and that it was being continuously recorded.

Throughout 2014, the EHS Department conducted regular visual inspections for the following parameters:

- proper rotation (no noise or off-center rotation) of the wind anemometer and wind direction vane,
- that there are no obstructions to the sensors, and
- overall cleanliness and orderly appearance of the instruments, tower, and data logger.

FMOG maintains identical sensor duplicates for each of the sensors installed on the station. This is done so that when it is time for the scheduled calibration, an identical calibrated sensor can be installed quickly, while the one that needs to be calibrated is sent to the vendor facility. A FMOG technician is assigned to maintain the station and the instruments.

Met One Instruments Inc. (Met One), the vendor who provided the station and its instruments, will be contacted if a sensor needs maintenance or repair. Met One also calibrates the sensors, in their specialized laboratory. The vendor specified that calibration is recommended every 12 months of use. FMOG follows the recommended schedule. The sensors were replaced with newly calibrated sensors in November 2014, and the sensors that were in use were sent to the vendor for re-calibration. The next calibration is scheduled for November 2015 per the vendor's recommendation.

FMOG maintains logs of all meteorological station events, as follows. The EHS Department maintains a log of sensor malfunctions (one in 2014), repairs (one in 2014), maintenance (one in 2014), and calibration events (November 19<sup>th</sup>, 2014), including shipments to the vendor for calibration, as required.

The sensor for delta temperature recorded inconsistent measurements from September 7, 2014 through October 14, 2014. During this period FMOG identified that the inconsistent measurements were the result of malfunctioning sensor fans. FMOG attempted to repair the sensor fans, but the repairs were unsuccessful and ultimately the sensor fans were replaced.

### **2.3 DATA COLLECTION, ANALYSIS AND ARCHIVING**

Data from the sensors is transmitted to a datalogger mounted at the base of the tower. The datalogger is located in a weatherproof case, equipped with a lock for security and to prevent data tampering. The datalogger computes and records hourly averages from all the station sensors. The data stored in the data logger is transmitted to the FMOG computer system in real time, via the radio system available at the Inglewood Oil Field. Therefore, the collected meteorological data can be viewed in real time by the facility operators in the control room or the EHS personnel on an office computer. Additionally, the data can be transferred directly from the data logger to a laptop computer at the tower and then transferred to a different data storage means.

Between April 22, 2014 and May 2, 2014 FMOG installed a new datalogger and datalogging software. Measurements for all five parameters were unavailable from April 22, 2014 to April 30, 2014. Additionally immediately following installation of the new datalogger and datalogging

software there were occasional inconsistent measurements as the new system was being tuned and calibrated.

During January through December 2014, the assigned FMOG personnel observed the met station real time data and visually checked for proper operation and any anomalies (such as “zero” readings, power outages, too high or too low values or out of normal range data points). Every month, the data was reviewed for anomalies and out-of-range or missing data by an independent contractor (InterAct). Any missing or anomalous data was flagged. The wind speed and seasonal wind direction data was also plotted as wind roses (see Attachment 2).

The data stored in the data logger is retrieved on a regular basis. This is done to ensure that the data logger memory does not fill up and start recording over the earlier recorded and un-retrieved data. A software package compatible with the station data logger is used to interface with the data logger. The software allows the meteorological data to be viewed, evaluated, printed, and exported in comma-separated values (CSV) format, which is accessible via Microsoft Excel software. When data is received from the datalogger in real time remotely, the software automatically collects the data from the station, and stores averaged hourly values from each meteorological instrument in a database. This enables the data to be viewed at any time and used to generate various meteorological charts and graphs from the collected data.

The data collected is sent to an off-site storage and back-up on a monthly basis, to prevent accidental deletion or damage. This data will be stored for a period of five years. After the first five years, the data will be evaluated and the County may elect to re-run the health risk assessment (HRA) if the meteorological data could result in significant changes to the HRA conducted as part of the CSD. The overall storage time of the collected data will be 10 years from the collection time.

### 3.0 ANALYSIS OF DATA COLLECTED IN 2014

Meteorological data was collected from January 1 to December 31, 2014. The data points that were flagged on a monthly basis throughout the year were reviewed in more detail. At the end of the year, the collected data was analyzed for errors and inconsistencies per the EPA specifications on meteorological data validation.

#### 3.1 DATA VALIDATION TECHNIQUES

The data was also compared to the AQMD's meteorological contractor T&B Systems data from a station located at the Los Angeles Airport (LAX) and available on the Internet at <http://tbsys.serveftp.net/tbsysnet/pamsdata.htm>; this set of data was QAQC'ed and recommended for use in the FMOG data validation effort by Kevin Durkee of the AQMD. The AQMD LAX data set for 2014 is from 1/1/14 to 12/31/14

Data validation was performed per the EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements (1995). The method included

- evaluating minimum, maximum and average for the whole data set for each meteorological parameter
- plotting the data versus time and looking for anomalies, data outliers such as too high or too low values, "no-activity", zero data, unusual spikes, unusual inactivity or repeated data for prolonged time periods, etc.
- comparisons with the upper and/or lower limit on the allowed data ranges, normal changes/variations in parameters, see Attachment 1 for the details on the various data validation techniques
- plotting wind roses and comparing with wind roses from other weather stations in Los Angeles area, see Attachment 2
- comparison with the validated/QCQA'ed data for the same period of time from the AQMD meteorological station which is located near LAX (T&B Systems).

#### 3.2 DATA GAPS AND ANOMALIES

Using the techniques described above, several data gaps and anomalies were identified in the 2014 data, see Table 1 for the summary of the data gaps.

There were several power outages throughout the year when all sensors were not operational and did not record data. After the power outages, several sensors were showing out of range data, these data points were deleted. In several instances (see Table 1) sensors were showing out of range data, these values were deleted.

The anomalous data values were discarded, with the location in the data sheet flagged. For the solar radiation missing data or data that was above zero at night – the night data was filled in with zeros. Table 1 summarizes the identified data gaps and anomalies.

**Table 1 Summary of 2014 Data Anomalies and Gaps**

<b>Gap/Anomaly date, time</b>	<b>Data description</b>	<b>Action on the station or data</b>
2/6; 7:00-15:00 (7am to 3pm)	Low solar radiation, possibly a cloudy day.	Compared to SCAQMD data and considered an error, discarded
3/2; 8:00-19:00 (8am to 7pm)	Low solar radiation, possibly a cloudy day	Compared to SCAQMD data and considered an error, discarded
4/11; 15:00 (3pm)	Wind speed of 92.0 was considered an error (too high)	Discarded
4/14; 15:00 (3pm)	Wind speed of 65.8 was considered an error (too high)	Discarded
4/15; 8:00 (8am)	Wind speed of 54.9 was considered an error (too high)	Compared to SCAQMD data and considered an error, discarded
5/1; 8:00 (8am)	Temperature of 193.5 was considered an error (too high)	Discarded
5/1; 8:00 (8am)	High solar radiation of 2042 considered an error (too high)	Compared to SCAQMD data and considered an error, discarded
8/28 and 8/29; 8:00-1:00 (8am to 1am)	High Delta Temperatures	Discarded
9/7-9/14; 15:00-12:00 (3pm to 12pm)	High Delta Temperatures	Discarded
9/15-9/29; 17:00-11:00 (5pm to 11am)	High Delta Temperatures	Discarded
9/29-10/10; 20:00-7:00 (8pm to 7am)	High Delta Temperatures	Discarded
10/10; 17:00-21:00 (5pm to 9pm)	High Delta Temperatures	Discarded
10/11; 6:00-9:00 (6am to 9am)	High Delta Temperatures	Discarded
10/11-10/13; 12:00-6:00 (12pm to 6am)	High Delta Temperatures	Discarded
10/13; 13:00 (1pm)	Temperature of 35.3 was considered an error (too low)	Compared to SCAQMD data and considered an error, discarded
10/13 and 10/14; 12:00-13:00 (12pm to 1pm)	High Delta Temperatures	Discarded
10/14; 9:00 (9am)	Temperature of 59.0 considered an error (too low)	Compared to SCAQMD data and considered an error, discarded
10/25; 8:00 (8am)	Low Delta Temperature	Discarded
10/30; 8:00 (8am)	Low Delta Temperature	Discarded
11/2; 10:00-11:00 (10am to 11 am)	Low Delta Temperature	Discarded
11/4; 7:00-9:00 (7am to 9am)	Low Delta Temperature	Discarded

Gap/Anomaly date, time	Data description	Action on the station or data
11/4; 22:00 (10pm)	High Delta Temperature	Discarded
11/5; 3:00-4:00 (3am to 4am)	High Delta Temperature	Discarded
11/5; 19:00 (7pm)	High Delta Temperature	Discarded
11/6; 12:00 (12pm)	High Delta Temperature	Discarded
11/8; 3:00 (3am)	High Delta Temperature	Discarded
11/8; 9:00-11:00 (9am to 11am)	Low Delta Temperature	Discarded
11/8; 7:00-16:00 (7am to 4pm)	Solar Radiation of 0 considered an error	Discarded
11/9; 10:00-12:00 (10am to 12 pm)	Low Delta Temperature	Discarded
11/9; 7:00-16:00 (7am to 4pm)	Low Solar Radiation, possibly a cloudy day	Compared to SCAQMD data and considered an error, discarded
11/10; 7:00-16:00 (7am to 4pm)	Solar Radiation of 0 considered an error	Discarded
11/11; 7:00-16:00 (7am to 4pm)	Solar Radiation of 0 considered an error	Discarded
11/12; 10:00 (10am)	Low Delta Temperature	Discarded
11/12; 7:00-16:00 (7am to 4pm)	Solar Radiation of 0 considered an error	Discarded
11/13; 7:00-10:00 (7am to 10am)	Solar Radiation of 0 considered an error	Discarded
11/14; 6:00-7:00 (6am to 7am)	Solar Radiation of 0 considered an error	Discarded
11/14; 9:00 (9am)	High Delta Temperature	Discarded
12/2; 7:00-16:00 (7am to 4pm)	Low Solar Radiation, possibly a cloudy day	Compared to SCAQMD data and considered an error, discarded
12/3; 7:00-16:00 (7am to 4pm)	Low Solar Radiation, possibly a cloudy day	Compared to SCAQMD data and considered an error, discarded
12/12; 7:00-8:00 (7am to 8am)	Low Solar Radiation, possibly a cloudy day	Compared to SCAQMD data and considered an error, discarded
12/16; 7:00-16:00 (7am to 4pm)	Low Solar Radiation, possibly a cloudy day	Compared to SCAQMD data and considered an error, discarded
12/25; 7:00-15:00 (7am to 3pm)	Solar Radiation of 0 considered an error	Discarded
12/26; 7:00-16:00 (7am to 4pm)	Solar Radiation of 0 considered an error	Discarded
12/27; 7:00-16:00 (7am to 4pm)	Solar Radiation of 0 considered an error	Discarded
12/28; 7:00-16:00 (7am to 4pm)	Solar Radiation of 0 considered an error	Discarded
12/29; 8:00-9:00 (8am to 9am)	High Delta Temperature	Discarded

Gap/Anomaly date, time	Data description	Action on the station or data
12/29; 9:00-14:00 (9am to 2 pm)	Temperatures considered an error, too low and too high	Discarded
12/29; 12:00-13:00 (12pm to 1pm)	Low Delta Temperatures	Discarded
12/29; 7:00-16:00 (7am to 4pm)	High Solar Radiation, possibly an error	Compared to SCAQMD data and considered an error, discarded
12/30; 7:00-16:00 (7am to 4pm)	Low Solar Radiation, possibly a cloudy day	Compared to SCAQMD data and kept
1/1; 16:00-17:00 (4pm to 5pm)  2/6-2/7; 18:00-1:00 (6pm to 1am)  3/25; 9:00-14:00 (9am to 2pm)  4/11; 11:00-14:00 (11am to 2pm)  4/14; 10:00-14:00 (10am to 2pm)  4/22-4/30; 11:00-23:00 (11am to 11pm)  5/1-5/2; 17:00-7:00 (5pm to 7am)  5/28; 11:00-19:00 (11am to 7pm)  11/21; 3:00-12:00 (3am to 12pm)	Data from all 5 sensors missing for a total of 266 hours	Data from all sensors were missing. Data discarded.

The data falls within the following data ranges and averages, see Table 2, which also contains the 2014 SCAQMD at LAX station data ranges (data validated by T&B Systems) for comparison purposes.

**Table 2 2014 Data Summary and Comparison to AQMD Met Station Data**

Parameter	Range	AQMD	FMOG	Notes / Conclusions
Wind Speed, mph	Avg	7.8	7.9	The FMOG station shows a slightly higher average wind speed, a slightly higher minimum wind speed and a slightly lower maximum wind speed. Overall the two data sets are well correlated.
	Min	0.4	1.0	
	Max	35.9	33.0	
Wind Direction, degrees	Avg	190.4	181.3	LAX winds have a stronger west-southwest component while the FMOG station received wind predominantly from the southwest (see wind roses in Attachment 2).
	Min	0.2	0.3	
	Max	359.7	359.9	
Temp., deg F	Avg	63.9	67.8	The slightly higher maximum temperature and average temp. at the FMOG station is a result of its location further inland away from the coast where temperatures can be higher. The two data sets are well correlated.
	Min	47.3	46.2	
	Max	89.7	98.3	
Delta Temp., deg F	Avg	No AQMD data	-0.4	No data on temperature difference is provided for the AQMD station, thus no comparison. After discarding the flagged temperature difference data for 2014, the 2014 data is well correlated with data from previous years.
	Min		-5.0	
	Max		5.5	
Solar Radiation, w/m <sup>2</sup>	Avg	236.6	218.5	Solar radiation is slightly higher at the AQMD station as a result of its location near the coast where conditions are less cloudy. The two data sets are well correlated.
	Min	0.0	0.0	
	Max	1083.0	1086.2	

FMOG wind speed and direction data was plotted as wind roses (see Attachment 2), and compared to the AQMD weather station wind roses. Attachment 2 presents the resulting graphs. It can be seen that the winds have similar patterns. The maximum wind speed at the LAX station is slightly stronger, as compared to the winds at the FMOG station. The patterns of the wind directions vary slightly. The wind direction at the LAX station varies more than that at the FMOG location. This can be explained by the fact that the FMOG station is located in the area that is shielded somewhat by terrain. The wind direction pattern at the FMOG station appears to be in-line with the terrain, while at the coastal open location of the AQMD station at the LAX, is not influenced or obstructed by the terrain.

The wind patterns were also compared to the ones from 2013, and the two year winds – 2013 and 2014 correlate well.

Temperatures obtained from the two stations exhibit a strong correlation. Minimum temperature readings are closely related. The FMOG station registered a slightly higher maximum temperature reading and slightly higher average temperature reading in comparison to the AQMD station, approximately 10% and 6% respectively. Inland temperatures are typically higher than coastal temperatures and the data between the two stations demonstrates this trend.

Obtained solar radiation data correlates well with the sunrise and sunset times in the area during the various seasons. The solar radiation data is within the similar ranges as the AQMD data for 2014. The instances where the FMOG station recorded solar lower than expected reading, the values were compared to the AQMD data and either discarded (if found inconsistent), or kept. Low solar radiation readings are most likely a result of cloud cover.

Overall the AQMD station exhibits slightly higher average solar radiation readings than the FMOG station. This can be attributed to the location of the AQMD station at the coast where there is typically greater sun exposure and conditions are sunnier.

The EPA allows for 10% missing or erroneous data, to consider the data valid for further studies. Table 3 below summarizes the missing data. For all the sensors the missing or discarded data is significantly less than 10%, at 5.4%, and thus meets the EPA requirement.

Delta T data for the year is above the EPA allowed anomalous data. This means that delta T data is not valid for the year. This occurred for the following reasons:

- FMOG replaced datalogger and its software and readings were not collected during the replacement, setup and tuning time
- the sensor fans for delta T malfunctioned and recorded data points collected during the malfunction, troubleshooting and fan replacement were discarded.

**Table 3 Year 2014 FMOG Met Station Missing Data**

Parameter	Value	Notes
Total hours recorded per sensor	24 x 365 = 8,760	Jan 1 – Dec 31, 2014 hourly averages recorded. (note: 2014 is not a leap year)
% of missing or discarded data points for wind speed	269 / 8760 = 0.0307 0.0307 x 100 = 3.1%	Missing or discarded data points for wind speed less than 10%
% of missing or discarded data points for wind direction	266 / 8760 = 0.0303 0.0303 x 100 = 3.0%	Missing or discarded data points for wind direction less than 10%
% of missing or discarded data points for temperature	275 / 8760 = 0.0313 0.0313 x 100 = 3.1%	Missing or discarded data points for temperature less than 10%
% of missing or discarded data points for delta T	1120 / 8760 = 0.1278 0.1278 x 100 = 12.8%	Missing or discarded data points for delta T greater than 10%
% of missing or discarded data points for solar radiation	426 / 8760 = 0.0485 0.0485 x 100 = 4.9%	Missing or discarded data points for solar radiation less than 10%
TOTAL combined for all parameters	5.4%	Meets EPA Requirement

## 4.0 CONCLUSIONS

The FMOG station was collecting the CSD-required data during the entire year: Jan. 1 – Dec. 31, 2014. The process of maintaining the station in good working condition is being practiced per the CSD requirements. The collected data is being stored as required. All parameters except for delta T have fewer than 10% missing or anomalous data. However, for all the sensors, the missing or discarded data is significantly less than 10%, at 5.4%, and thus meets the EPA requirement.

## **5.0 REFERENCES**

1. EPA. 1995. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements.
2. EPA. 2000. Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-005.

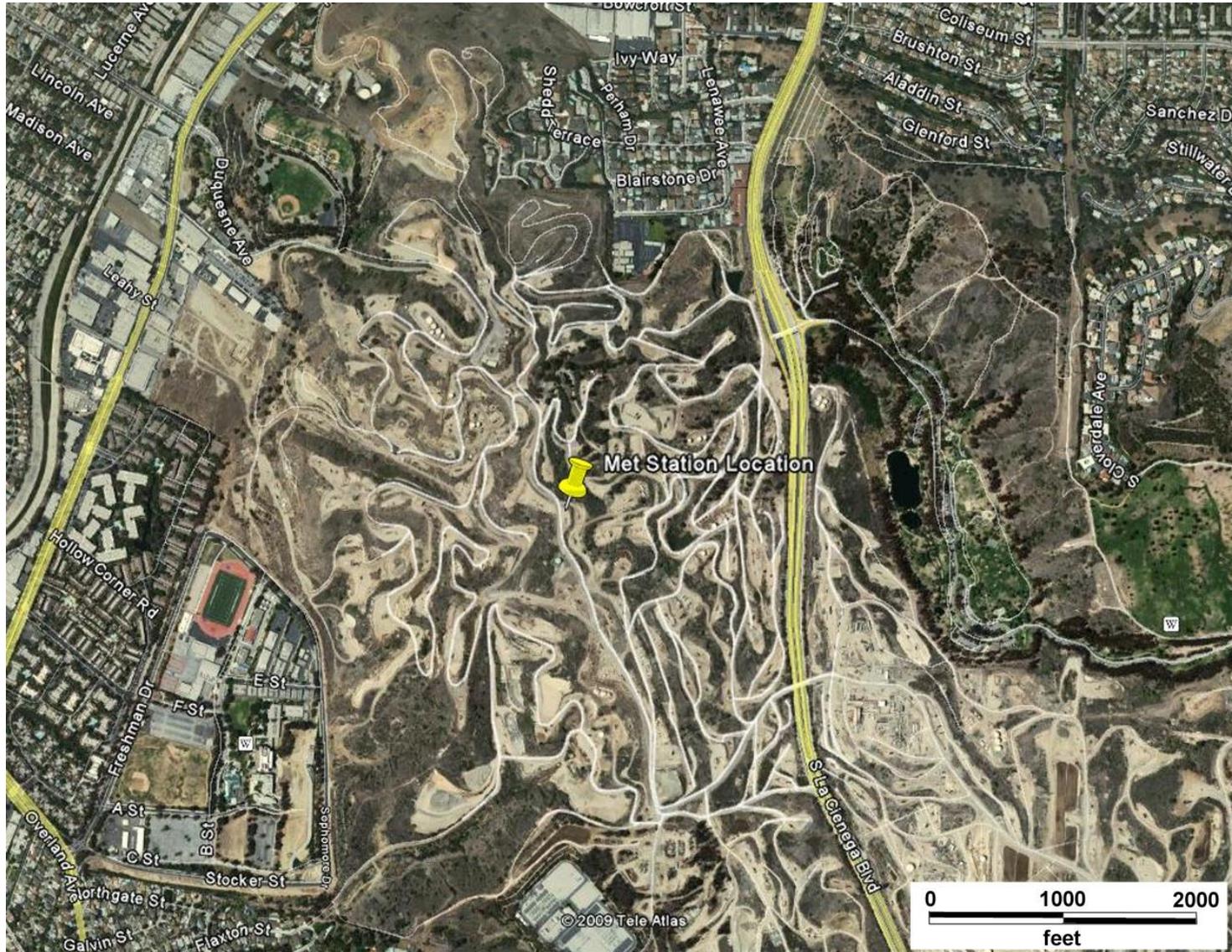


Figure 2 FMOG Meteorological Station Location – Field View

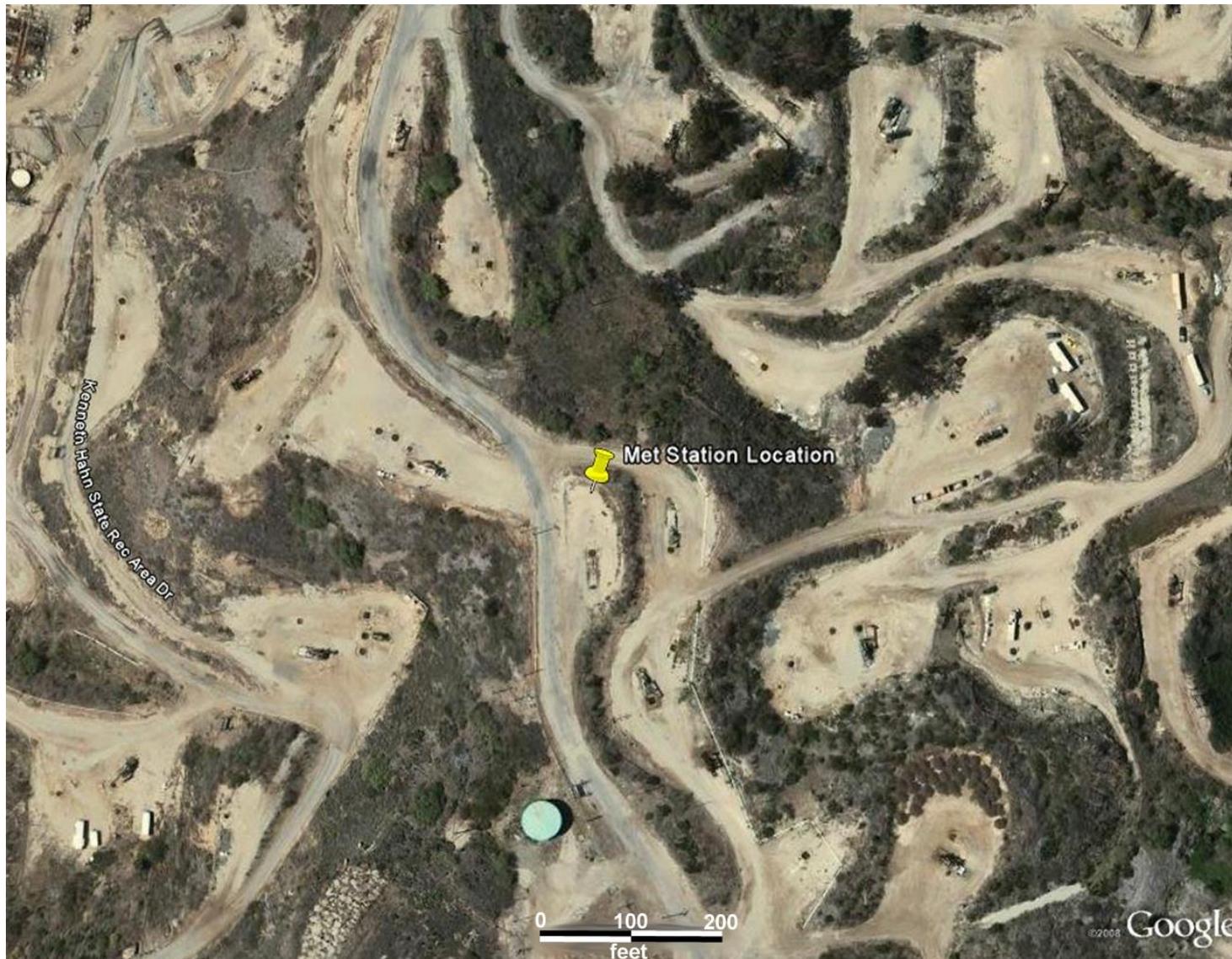


Figure 3 FMOG Meteorological Station Location – Close-up View

## ATTACHMENT 1

## Data Validation Techniques

Variable	Criteria: flag data if the value
Wind Speed	<ul style="list-style-type: none"> <li>- is less than zero or greater than 25 m/s (56 mph)</li> <li>- does not vary by more than 0.1 m/s (0.22 mph) for 3 consecutive hours</li> <li>- does not vary by more than 0.5 m/s (1.1 mph) for 12 consecutive hours</li> <li>- correlates well with data from other stations in the same area</li> </ul>
Wind Direction	<ul style="list-style-type: none"> <li>- is less than zero or greater than 360°</li> <li>- does not vary by more than 1 degree for more than 3 consecutive hours</li> <li>- does not vary by more than 10 degrees for 18 consecutive hours</li> <li>- correlates well with data from other stations in the same area</li> </ul>
Temperature	<ul style="list-style-type: none"> <li>- is greater than the local record high</li> <li>- is less than the local record low</li> <li>- is greater than a 5 °C (9 °F) change from the previous hour</li> <li>- does not vary by more than 0.5 °C (0.8 °F) for 12 consecutive hours</li> <li>- correlates well with data from other stations in the same area</li> </ul>
Temperature Difference	<ul style="list-style-type: none"> <li>- is greater than 0.1 °C/m (1.8 °F for 10 m or 5.4 °F for 30 m) during daytime</li> <li>- is less than -0.1 °C/m (-1.8 °F for 10 m or -5.4 °F for 30 m) during night time</li> <li>- is greater than 5.0 °C (9.0 °F) or less than -3.0 °C (-5.4 °F)</li> </ul>
Radiation	<ul style="list-style-type: none"> <li>- is greater than zero at night</li> <li>- is greater than the maximum possible for the season and latitude</li> <li>- correlates well with data from other stations in the same area</li> </ul>

Source: [http://www.webmet.com/met\\_monitoring/863.html](http://www.webmet.com/met_monitoring/863.html)

## **ATTACHMENT 2**

### **Wind Roses: T&B Systems, PAMS Monitoring Network Surface Wind Data, 2014 as compared with FMOG Wind Data, 2014**

**IMPORTANT NOTE** on reading the wind roses:

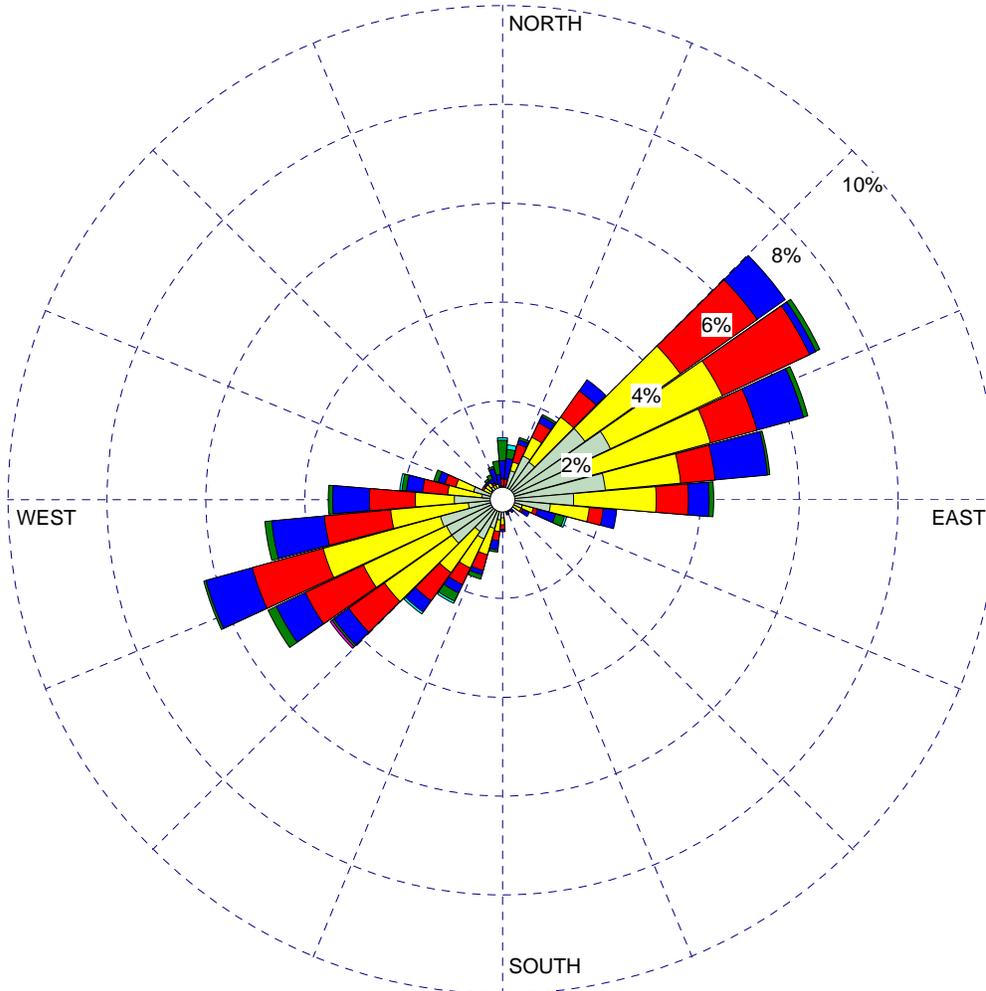
The graphs' colored segments show the winds as **BLOWING FROM** that direction.

WIND ROSE PLOT:

**WINTER - December-February - 2014**  
**LAX AQMD Meteorological Station**

DISPLAY:

**Wind Speed**  
**Direction (blowing from)**



WIND SPEED  
(m/s)

- >= 10.0
- 8.5 - 10.0
- 7.0 - 8.5
- 5.5 - 7.0
- 3.9 - 5.5
- 2.4 - 3.9
- 1.9 - 2.4
- 1.4 - 1.9
- 1.0 - 1.4

Calms: 16.11%

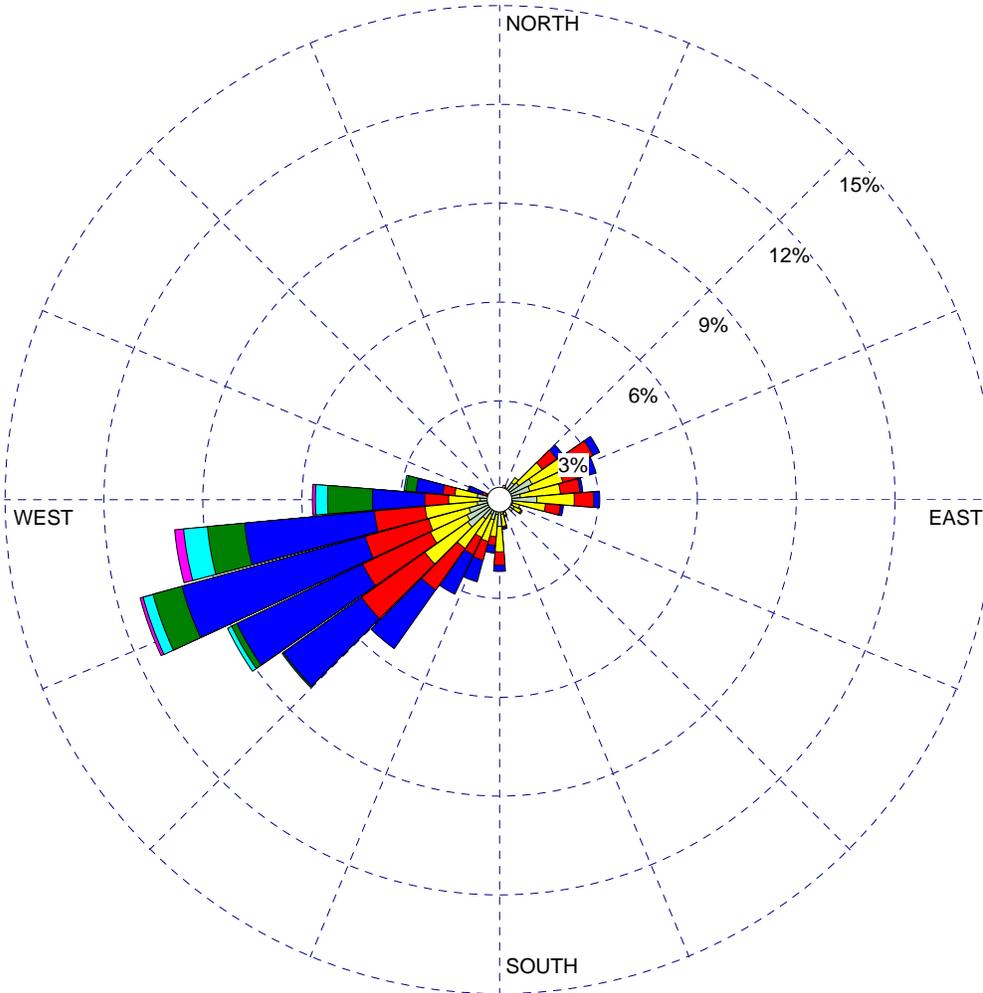
COMMENTS:	DATA PERIOD:	AGENCY NAME:	
	<b>Start Date: 1/1/2014 - 00:00</b> <b>End Date: 12/31/2014 - 23:00</b>	<b>South Coast Air Quality Management District (AQMD)</b>	
	CALM WINDS:	MODELER:	
	<b>16.11%</b>	<b>InterAct, tel. 805-658-5600</b>	
AVG. WIND SPEED:	TOTAL COUNT:	DATE:	PROJECT: <b>Met Data Validation-CSD</b>
<b>1.50 m/s</b>	<b>2160 hrs.</b>	<b>2/16/2015</b>	

WIND ROSE PLOT:

**SPRING- March-May - 2014**  
**LAX AQMD Meteorological Station**

DISPLAY:

**Wind Speed**  
**Direction (blowing from)**



WIND SPEED  
(m/s)

- >= 10.0
- 8.5 - 10.0
- 7.0 - 8.5
- 5.5 - 7.0
- 3.9 - 5.5
- 2.4 - 3.9
- 1.9 - 2.4
- 1.4 - 1.9
- 1.0 - 1.4

Calms: 7.98%

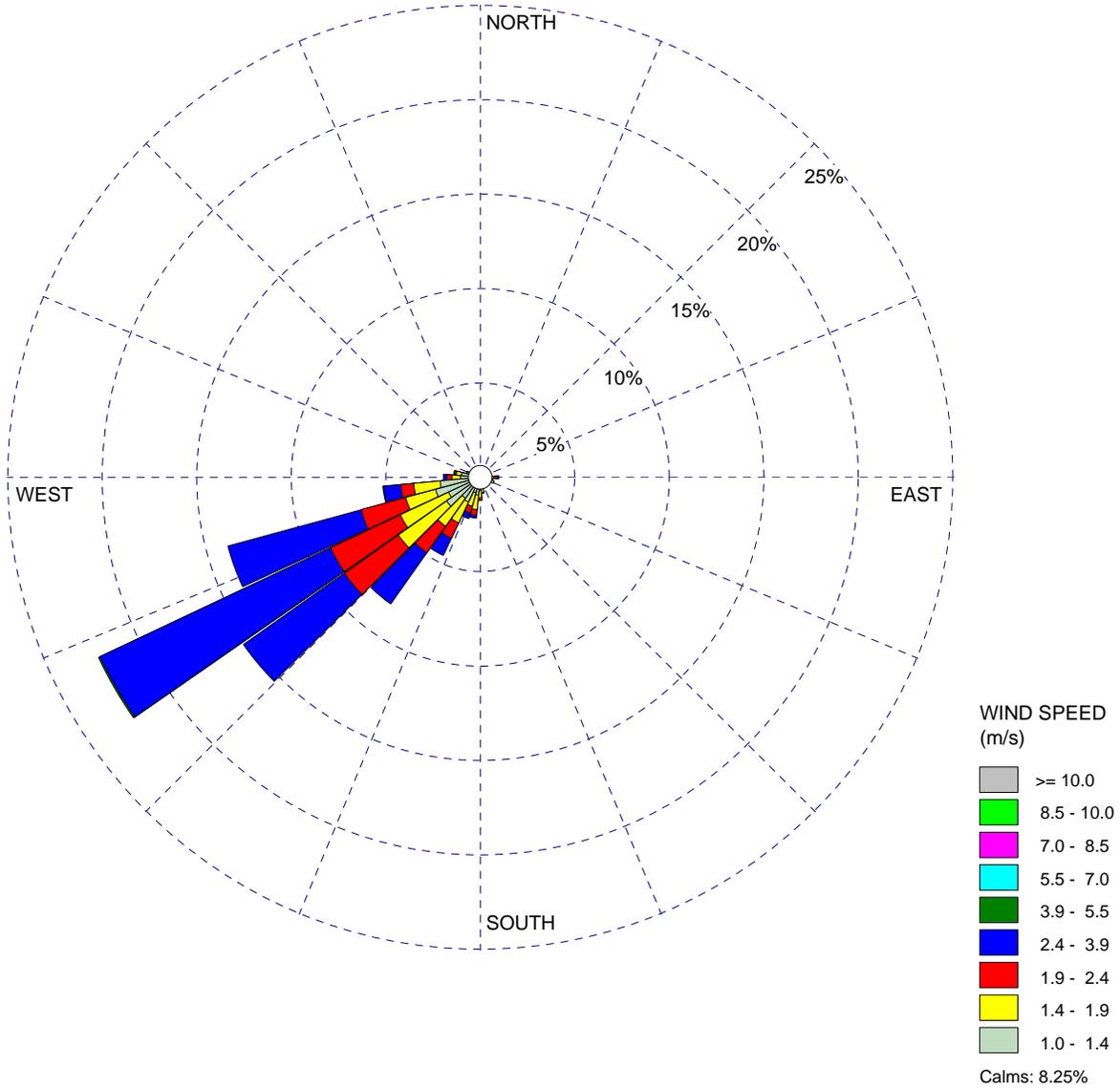
COMMENTS:	DATA PERIOD: <b>Start Date: 3/1/2014 - 00:00</b> <b>End Date: 5/31/2014 - 23:00</b>	AGENCY NAME: <b>South Coast Air Quality Management District (AQMD)</b>	
	CALM WINDS: <b>7.98%</b>	MODELER: <b>InterAct, tel. 805-658-5600</b>	
	AVG. WIND SPEED: <b>1.89 m/s</b>	TOTAL COUNT: <b>2208 hrs.</b>	
	DATE: <b>1/13/2015</b>	PROJECT: <b>Met Data Validation-CSD</b>	

WIND ROSE PLOT:

**SUMMER- June-August - 2014**  
**LAX AQMD Meteorological Station**

DISPLAY:

**Wind Speed**  
**Direction (blowing from)**



COMMENTS:

DATA PERIOD:

**Start Date: 6/1/2014 - 00:00**  
**End Date: 8/31/2014 - 23:00**

AGENCY NAME:

**South Coast Air Quality Management District (AQMD)**

MODELER:

**InterAct, tel. 805-658-5600**



CALM WINDS:

**8.25%**

TOTAL COUNT:

**2208 hrs.**

AVG. WIND SPEED:

**1.74 m/s**

DATE:

**1/13/2015**

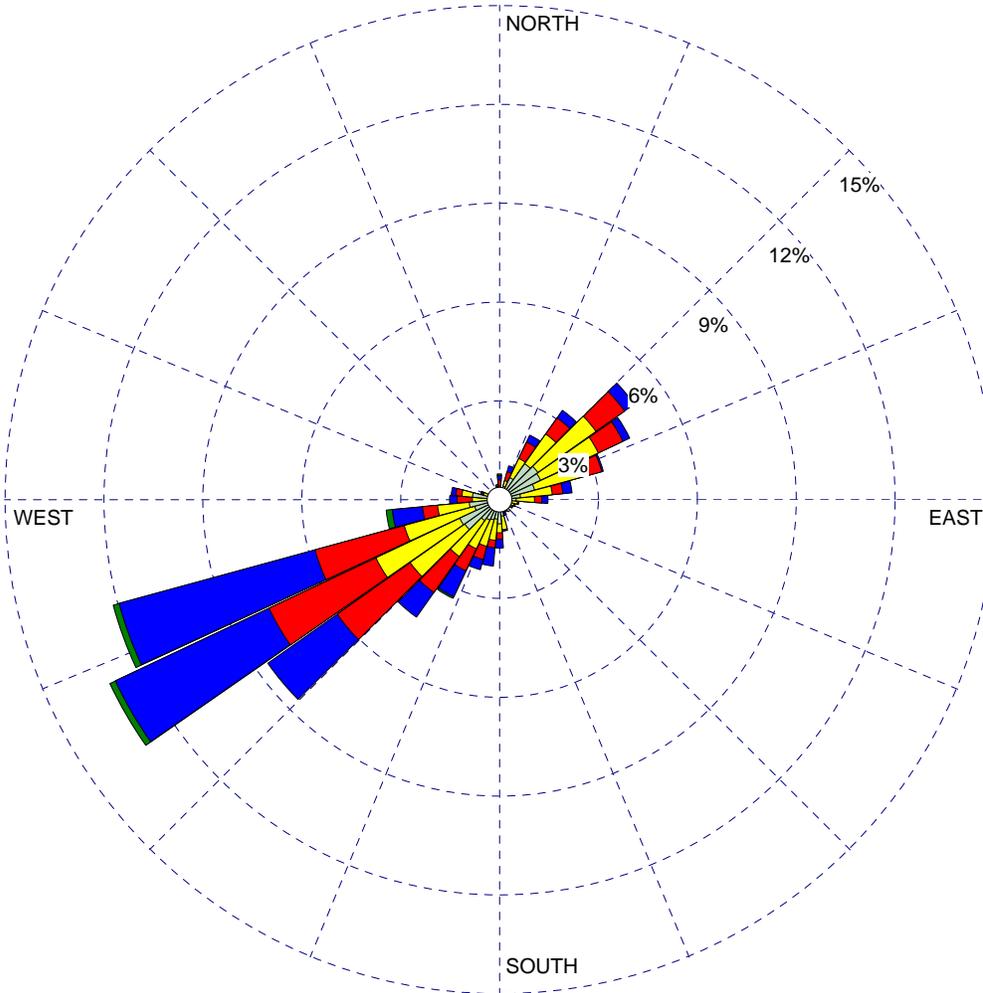
PROJECT: **Met Data Validation-CSD**

WIND ROSE PLOT:

**FALL - September-November - 2014**  
**LAX AQMD Meteorological Station**

DISPLAY:

**Wind Speed**  
**Direction (blowing from)**



WIND SPEED  
(m/s)

- >= 10.0
- 8.5 - 10.0
- 7.0 - 8.5
- 5.5 - 7.0
- 3.9 - 5.5
- 2.4 - 3.9
- 1.9 - 2.4
- 1.4 - 1.9
- 1.0 - 1.4

Calms: 16.30%

COMMENTS:

DATA PERIOD:

**Start Date: 9/1/2014 - 00:00**  
**End Date: 11/30/2014 - 23:00**

AGENCY NAME:

**South Coast Air Quality Management District (AQMD)**

MODELER:

**InterAct, tel. 805-658-5600**

CALM WINDS:

**16.30%**

TOTAL COUNT:

**2178 hrs.**

AVG. WIND SPEED:

**1.56 m/s**

DATE:

**2/16/2015**

PROJECT: **Met Data Validation-CSD**

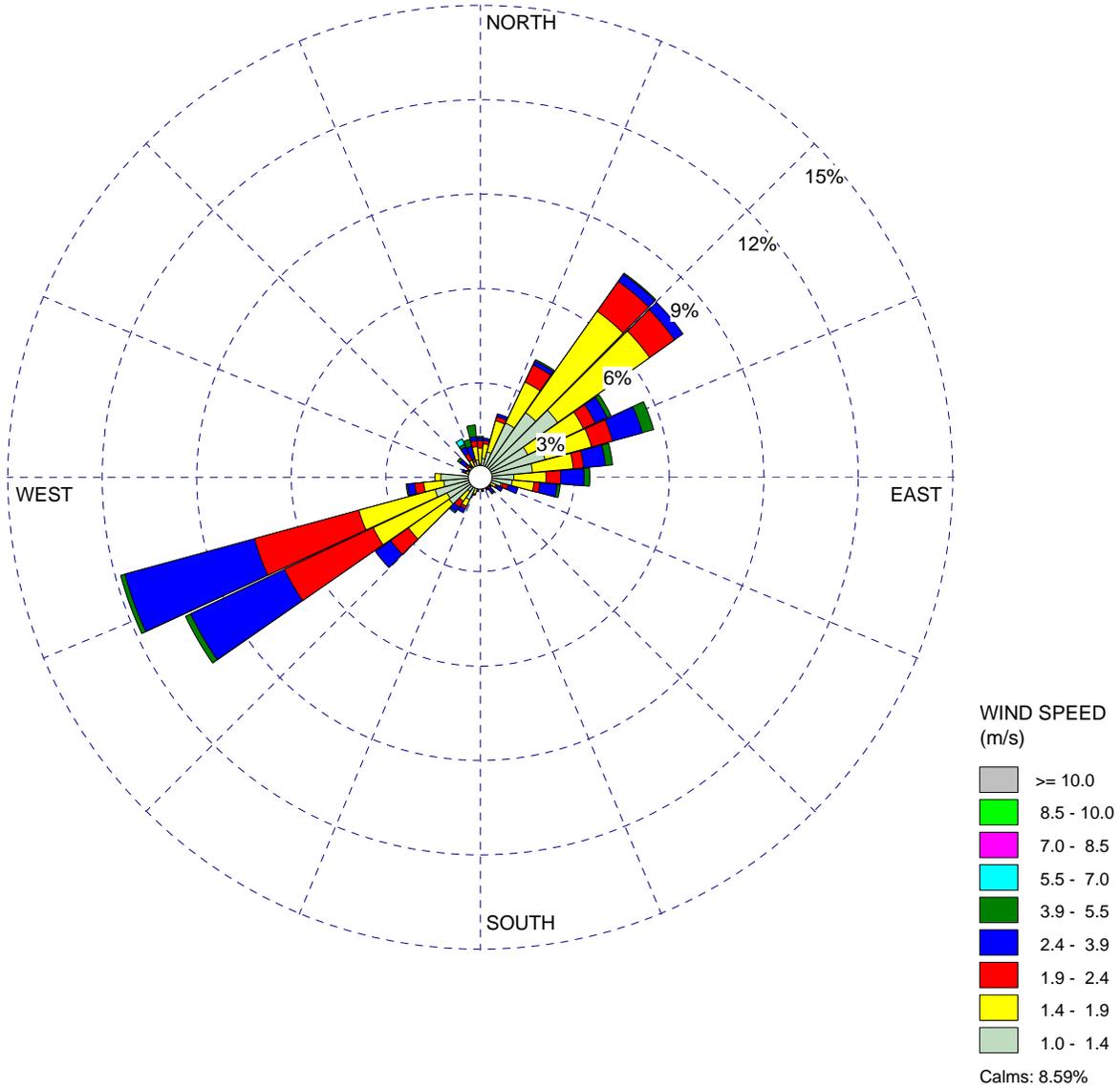
**InterAct**

WIND ROSE PLOT:

**WINTER- December-February - 2014**  
**FMOG Inglewood Meteorological Station**

DISPLAY:

**Wind Speed**  
**Direction (blowing from)**



COMMENTS:

DATA PERIOD:

**Start Date: 1/1/2014 - 00:00**  
**End Date: 12/31/2014 - 23:00**

AGENCY NAME:

**FMOG, 5640 S. Fairfax ave., Los Angeles, CA**

MODELER:

**InterAct, tel. 805-658-5600**

CALM WINDS:

**8.59%**

TOTAL COUNT:

**2160 hrs.**

AVG. WIND SPEED:

**1.61 m/s**

DATE:

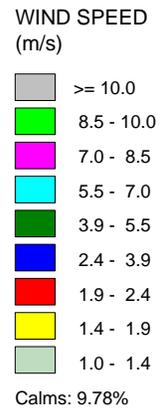
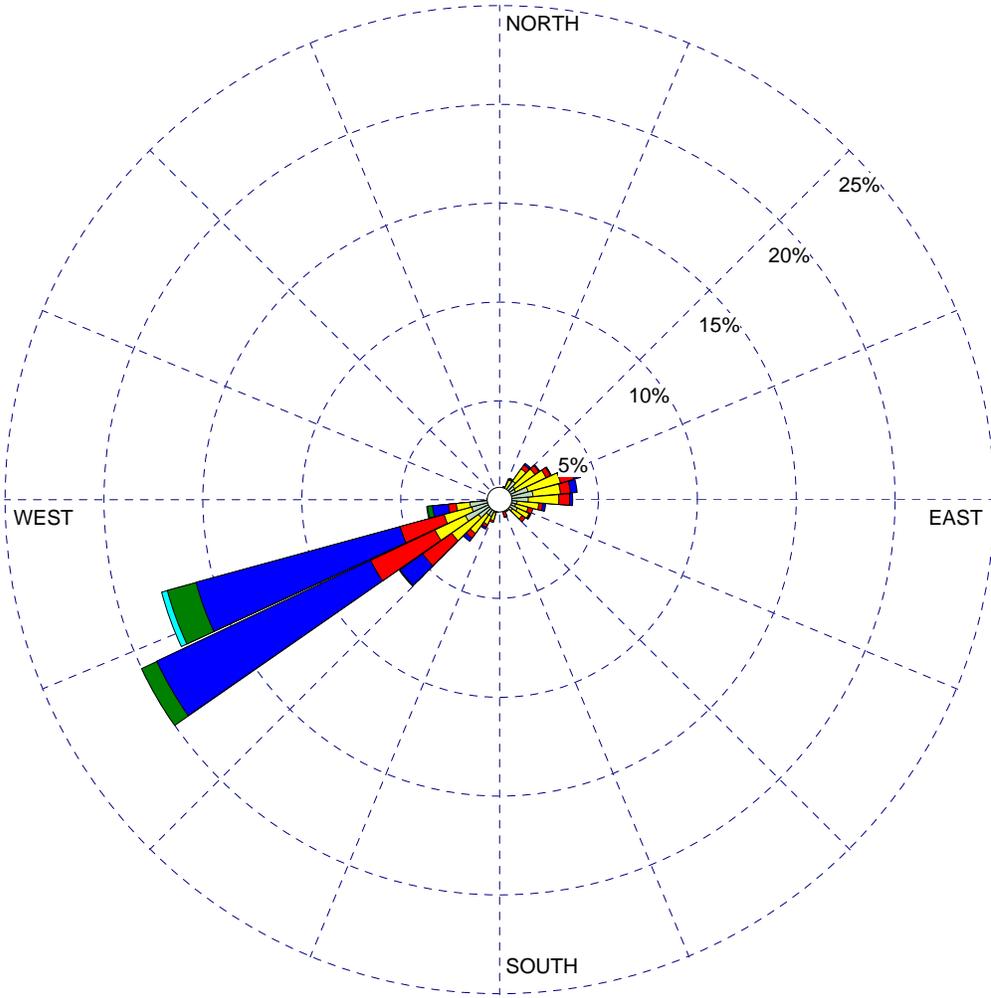
**1/12/2015**

PROJECT: **Met Data Validation-CSD**



WIND ROSE PLOT:  
**SPRING - March-May - 2014**  
**FMOG Inglewood Meteorological Station**

DISPLAY:  
**Wind Speed**  
**Direction (blowing from)**



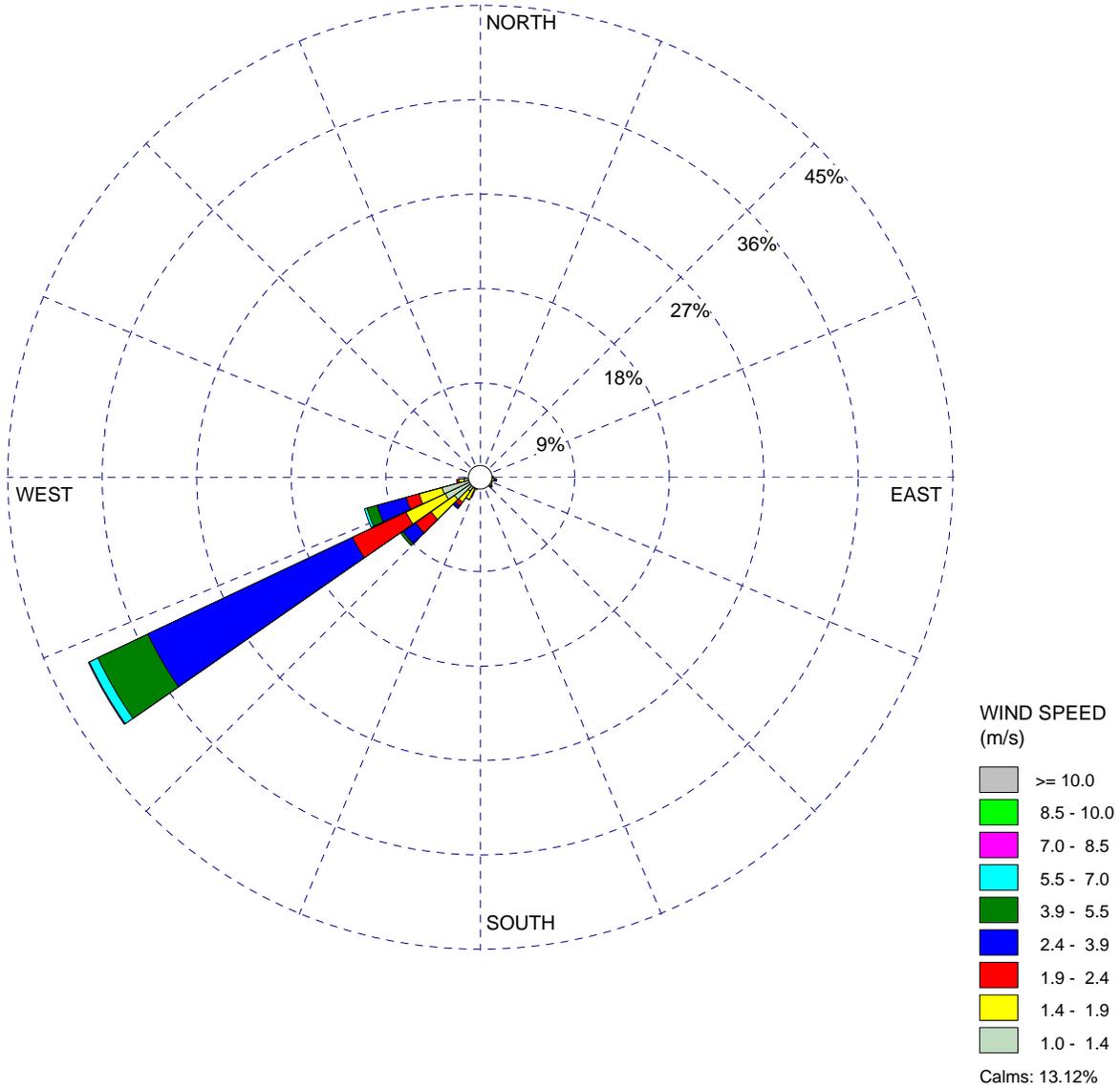
COMMENTS:	DATA PERIOD:	AGENCY NAME:	
	Start Date: 3/1/2014 - 00:00 End Date: 5/31/2014 - 23:00	FMOG, 5640 S. Fairfax ave., Los Angeles, CA	
	CALM WINDS:	MODELER:	
	9.78%	InterAct, tel. 805-658-5600	
AVG. WIND SPEED:	TOTAL COUNT:	PROJECT: Met Data Validation-CSD	
1.79 m/s	2003 hrs.		
	DATE:		
	1/12/2015		

WIND ROSE PLOT:

**SUMMER - June-August - 2014 FMOG**  
**FMOG Inglewood Meteorological Station**

DISPLAY:

**Wind Speed**  
**Direction (blowing from)**



COMMENTS:

DATA PERIOD:

**Start Date: 6/1/2014 - 00:00**  
**End Date: 8/31/2014 - 23:00**

AGENCY NAME:

**FMOG, 5640 S. Fairfax ave., Los Angeles, CA**

MODELER:

**InterAct, tel. 805-658-5600**

CALM WINDS:

**13.12%**

TOTAL COUNT:

**2208 hrs.**

AVG. WIND SPEED:

**1.88 m/s**

DATE:

**1/12/2015**

PROJECT: **Met Data Validation-CSD**

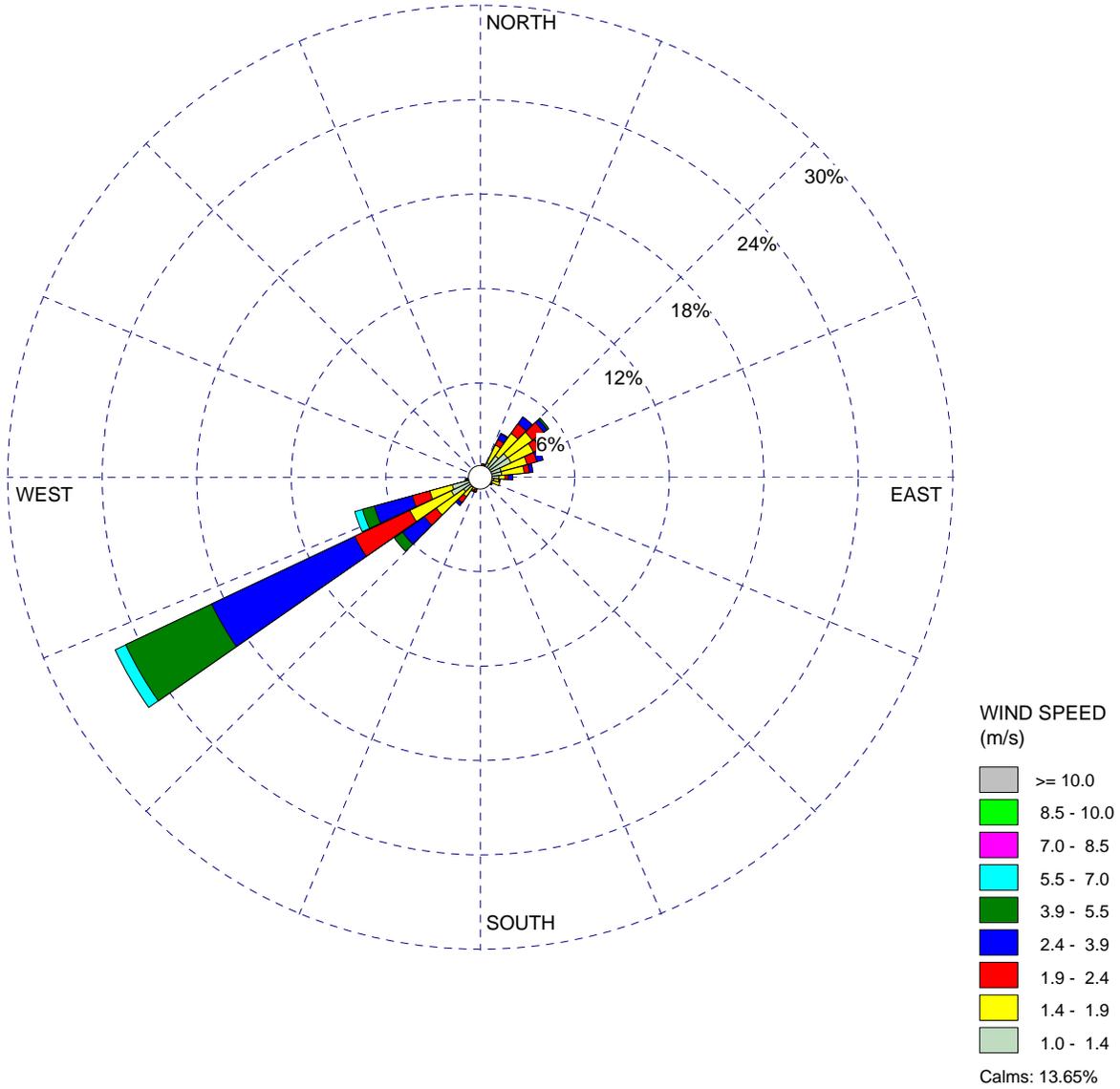


WIND ROSE PLOT:

**FALL - September-November - 2014**  
**FMOG Inglewood Meteorological Station**

DISPLAY:

**Wind Speed**  
**Direction (blowing from)**



COMMENTS:

DATA PERIOD:

**Start Date: 9/1/2014 - 00:00**  
**End Date: 11/30/2014 - 23:00**

AGENCY NAME:

**FMOG, 5640 S. Fairfax ave., Los Angeles, CA**

MODELER:

**InterAct, tel. 805-658-5600**

CALM WINDS:

**13.65%**

TOTAL COUNT:

**2174 hrs.**

AVG. WIND SPEED:

**1.77 m/s**

DATE:

**1/12/2015**

PROJECT: **Met Data Validation-CSD**

**InterAct**