

Plume Rise : Observations and Model

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The Kwinana Shoreline Fumigation Experiment(KSFE) took place in Fremantle, WA, Australia between 23 January and 8 February, 1995. The CSIRO DAR(Division of Atmospheric Research) LIDAR measured plume sections from near the Kwinana Power Station(KPS) stacks to up to about 5 km downstream. Determination of the final plume rise in a neutral/stable environment of a plume prior to its interception by the TIBL is an important modelling component.

Over 53,921 shots or laser firing during three days, i.e. on 30 and 31 January and 2 February 1995, yielded 647 scans for the various azimuth angles which were combined both stages A and C. The SIDAR scans of plume cross-sections at various downwind distances provided information on instantaneous plume characteristics. Hourly averaged values of plume properties were calculated from multiple scans made during the period of interest.

Data from three days, 30, 31 January and 2 February, were selected for analysis and modeling exercises. During the three days that we are modeling, the Stage A(stack height 114m) plume were released in neutral environment while the Stage C(stack height 189m) plume initially travelled in neutral conditions and then in stable conditions before fumigation.

On average the model results agree reasonably well with the observations under neutral conditions indicating that the present plume rise schemes are satisfactory but there is no skill in predicting the variation in plume rise on different occasions. The model under predicts plume rise under stable conditions(Stage C), but not severely.