

A nighttime photograph of a city skyline, likely San Francisco, with the Transamerica Pyramid prominently lit in green. The lights of the buildings are reflected in the water in the foreground. The sky is dark, and the overall scene is illuminated by the city lights.

# AERSCREEN

EPA Regional, State, Local Dispersion Modeling  
Workshop May 16-18, 2006

# AERSCREEN Finalization Workgroup

- Jim Haywood, Chair, Michigan
- Roger Brode, MACTEC
- Bob Paine, ENSR
- Warren Peters, EPA
- Lloyd Schulman, TRC
- Karen Wesson, EPA
- Acknowledge Herman Wong, EPA Region 10  
and Annamaria Coulter, EPA Region 2

# AERSCREEN Status

- Draft AERSCREEN Package Submitted to EPA Regions on 4/25/06 for Internal (Alpha) Review and Testing
- Regional comments will be collected and addressed
- Public Release of Draft AERSCREEN Package for Beta Testing ASAP after this RSL Workshop

# Description of AERSCREEN

- SCREEN Option Added to AERMOD in 1995
  - SCREEN option forces AERMOD to calculate centerline concentration for each source/receptor/meteorology combination
  - Turns on NOCHKD option to eliminate date sequence checking on input met data
  - Limits output to 1-hour averages
- AERSCREEN Consists of Two Components
  - **MAKEMET** program generates matrix of meteorological conditions based on user-specified surface characteristics, formatted for input to AERMOD (.sfc and .pfl files)
  - **ASCREEN** (formerly known as AERSCRN) program provides interface to run AERMOD in SCREEN mode, incorporates MAKEMET, BPIPPRM and AERMAP

# Description of AERSCREEN

- MAKEMET Includes Loops Through Meteorological Parameters:
  - Wind speed (stable and convective)
  - Cloud cover (stable and convective)
  - Max/Min ambient temp (stable and convective)
  - Solar elevation angle (stable and convective)
  - Convective velocity scale ( $w^*$ ) (convective only)
  - Mechanical mixing heights (stable only)
- Uses AERMET Subroutines to Calculate  $u^*$  and  $L$ , also Calculated Convective Mixing Heights
- Generates Surface and Profile Files for Running AERMOD in Stand-alone Mode

# Description of AERSCREEN

- ASCREEN Command-prompt Program
  - Interactive data entry (DOS Screen)
  - Single point or volume source only
  - Flat and Complex terrain (DEM 1-degree files (automatically) or user-specified list of 7.5-minute DEM files)
  - PRIME building downwash (specific stack location)
  - MAKEMET meteorology with site-specific surface characteristics
  - Search routine to locate worst-case impact location
  - Re-Use of previous AERSCREEN Run Files
  - Includes source-dependent factors for 3-hour, 8-hour, 24-hour and annual averages – similar to SCREEN3 factors

# AERSCREEN Tests: Workgroup

- Significant Testing to Date Shows Good Results Across Wide Range of Applications
- “Good” Defined as Reasonable Conservatism Compared to AERMOD Refined Estimates

Database	Type	No. of sources	Max. Ratio	Min. Ratio	Median Ratio
Jim Haywood	Miscellaneous	7	5.20	1.09	2.35
Karen Wesson	Stack downwash	32	2.54	0.96	1.17
Karen Wesson	Stack non-downwash	26	2.18	0.97	1.49
Roger Brode	Flat Terrain Non-downwash Rural & Urban	168	2.98	0.98	1.05
Roger Brode	Complex Terrain Varying Source/ Terrain Distance	168	4.56	0.96	1.18
Bob Paine	Complex Terrain	28	7.46	1.08	2.23

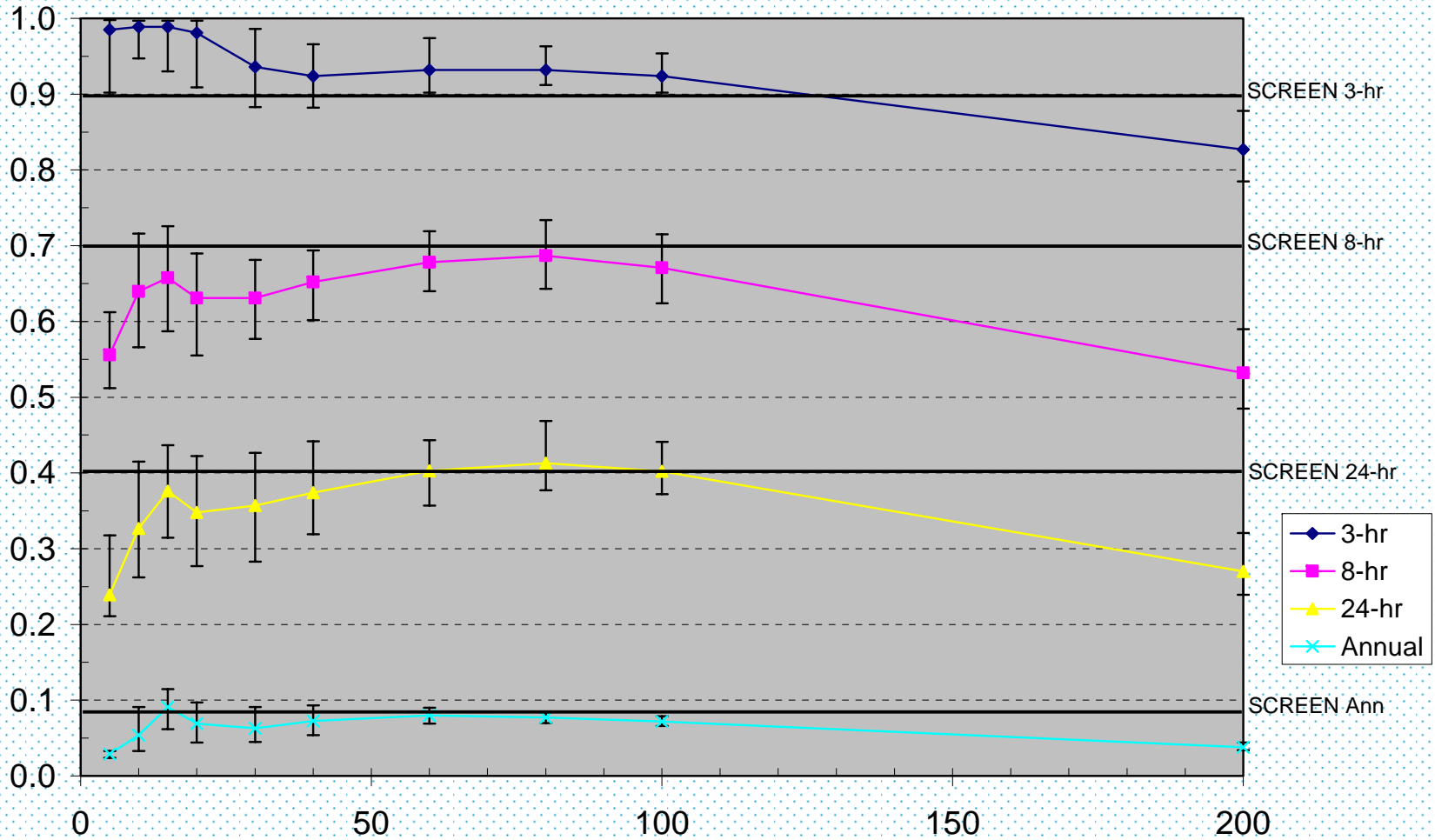
# More AERSCREEN Tests

- Recent Testing Performed for Rugged Terrain Applications with Downwash – Minor Modifications to MAKEMET
- Overall results were “Good”
- The results from the Workgroup’s test scenarios should not change too much but have not yet been re-run

# Averaging Factors

- 3-hour: fixed ratio of 0.95 (*SCREEN3* – 0.90 ± 0.10);
- 8-hour: fixed ratio of 0.70 (*SCREEN3* – 0.70 ± 0.20);
- 24-hour : fixed ratio of 0.40 for plume heights up to 60m, then linearly interpolated to a ratio of 0.30 for plume heights above 200m (*SCREEN3* – 0.40 ± 0.20)
- Annual: fixed ratio of 0.10 for plume heights up to 60m, then linearly interpolated to a ratio of 0.04 for plume heights above 200m (*SCREEN3* – 0.08 ± 0.02).

**Figure 1: AERSCREEN Averaging Period Ratios vs. Plume Height**  
(line shows 95<sup>th</sup>-percentile and error bars show 90<sup>th</sup> and 98<sup>th</sup> percentiles)



# Topics for Discussion

- Results from testing
- Experiences with ASCREEN versus operating AERMOD with MAKEMET alone
- Averaging factors: Results? Fixed vs varying?
- Multiple sources? Area source?
- MAKEMET and “site-specific” minimum wind speed and anemometer height? Defaults?
- Building downwash and dependency on direction-specific building dimensions.