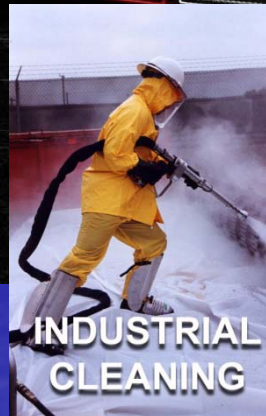
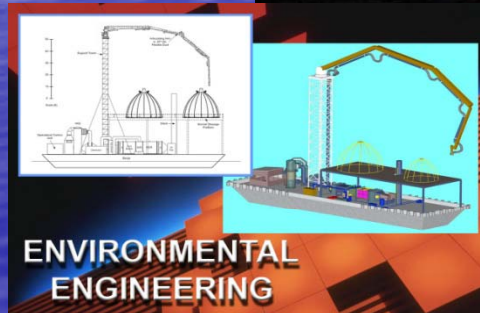
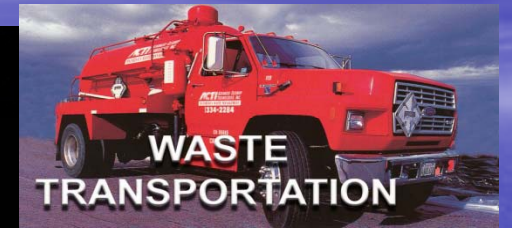


# Advanced *Locomotive* Emissions Control System (ALECS<sup>®</sup>)

Advanced Cleanup Technologies, Incorporated  
Pollution Control Specialists

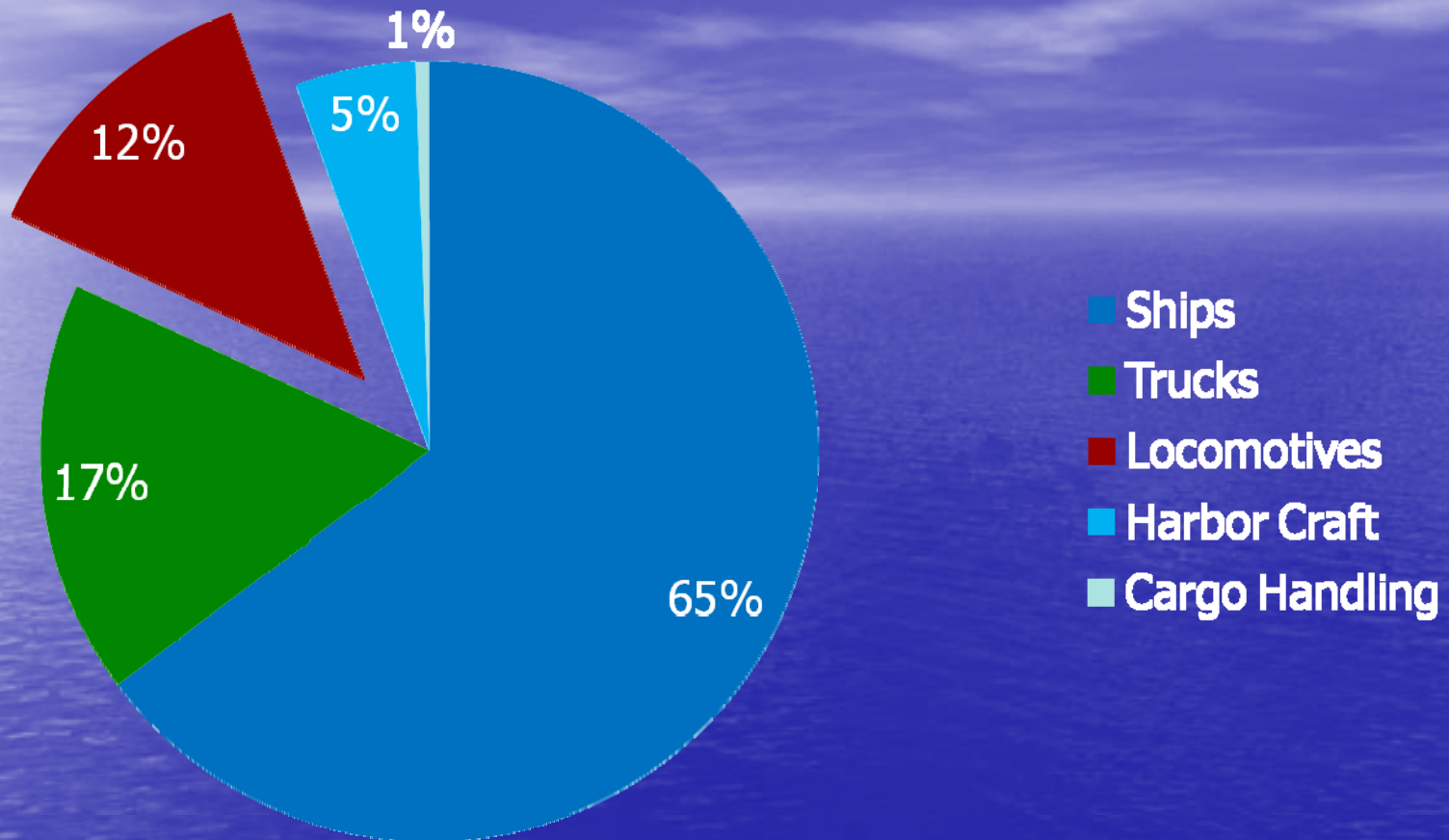


# SERVICE CAPABILITIES



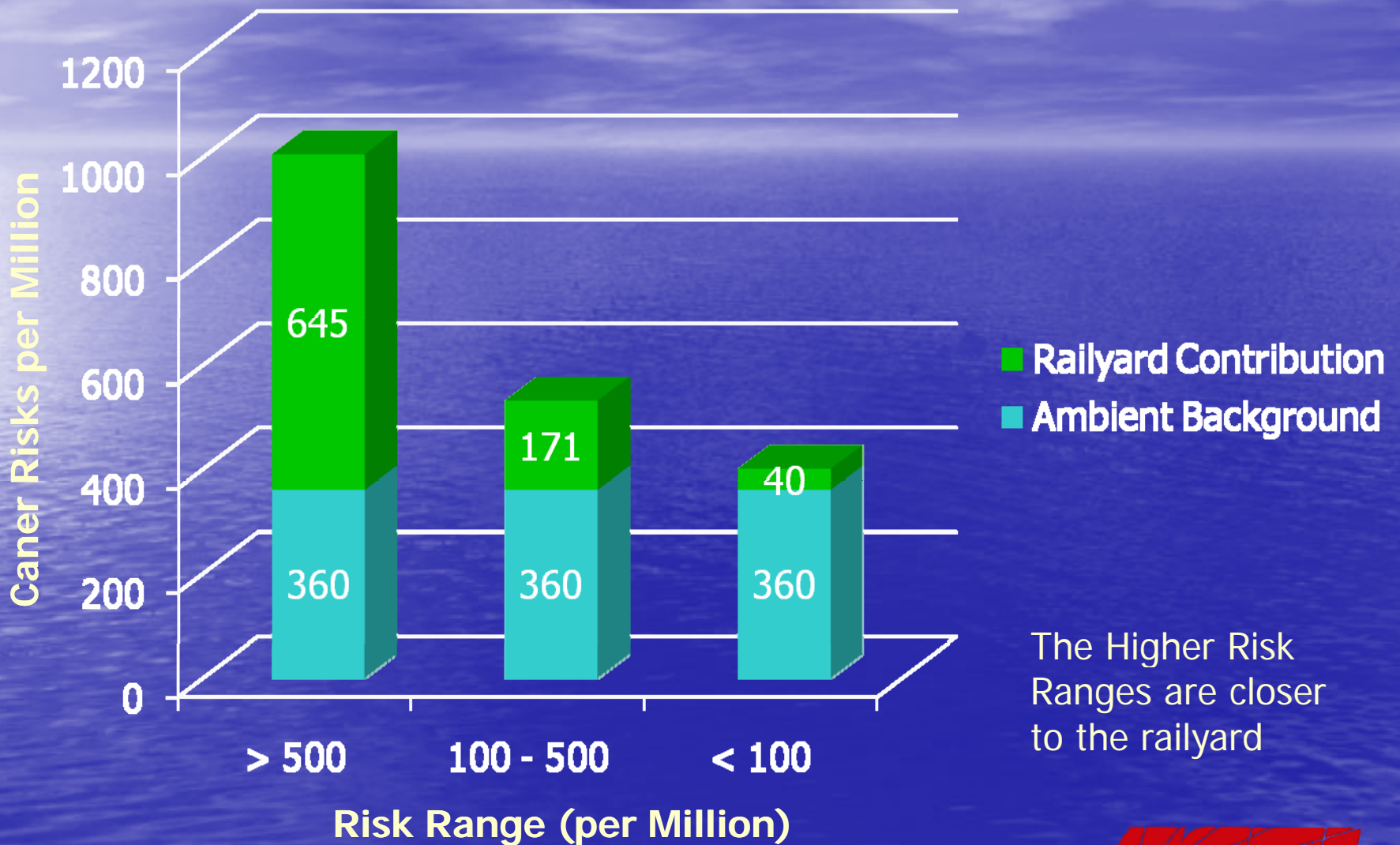


## 2020 Projected PM Statewide Emissions



ARB 2006 Emission Reduction Plan  
for Ports and Goods Movement

# Elevated Cancer Risks Near Railyards



Roseville Railyard Study 2004

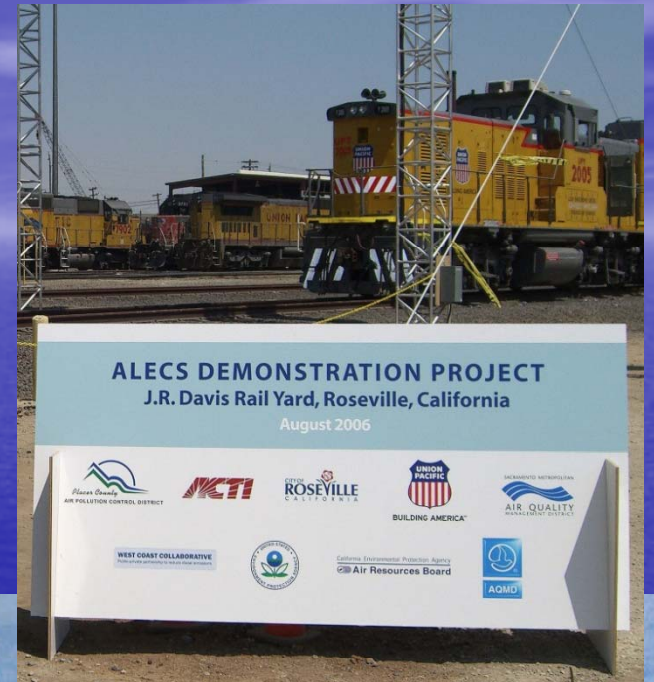


# Government Efforts

- Locomotives are subject to *federal* standards (EPA) and memoranda of mutual understanding (MOU) negotiated with the ARB
  - 1998 – SCAQMD MOU Early Introduction of Tier 2 Clean Locomotives by 2010
  - 2004 – ARB Low Sulfur Diesel Rule
  - 2005 – ARB MOU to cut PM Statewide
  - 2006 – Idle Enforcement Training
  - 2007 – Intrastate traffic must use CARB fuel
  - 9/9/2009 – Staff recommended Further Reductions
  - 2011 – 2010 – Concentrate Tier 3 Locos in Southern CA



# Successful Demonstration Program (2005)



# Emissions Treatment Subsystem

Picture of the Actual System  
Demonstrated and Tested in Roseville,  
California





# Successful Demonstration Program (continued)

- The objective of the test at Union Pacific Railroad's J. R. Davis rail-yard in Roseville, California was to demonstrate ALECS capability to:
  - Remotely attach to a railroad locomotive around the exhaust opening
  - Capture the exhaust gas and direct it via an overhead manifold system into the Emissions Treatment Subsystem

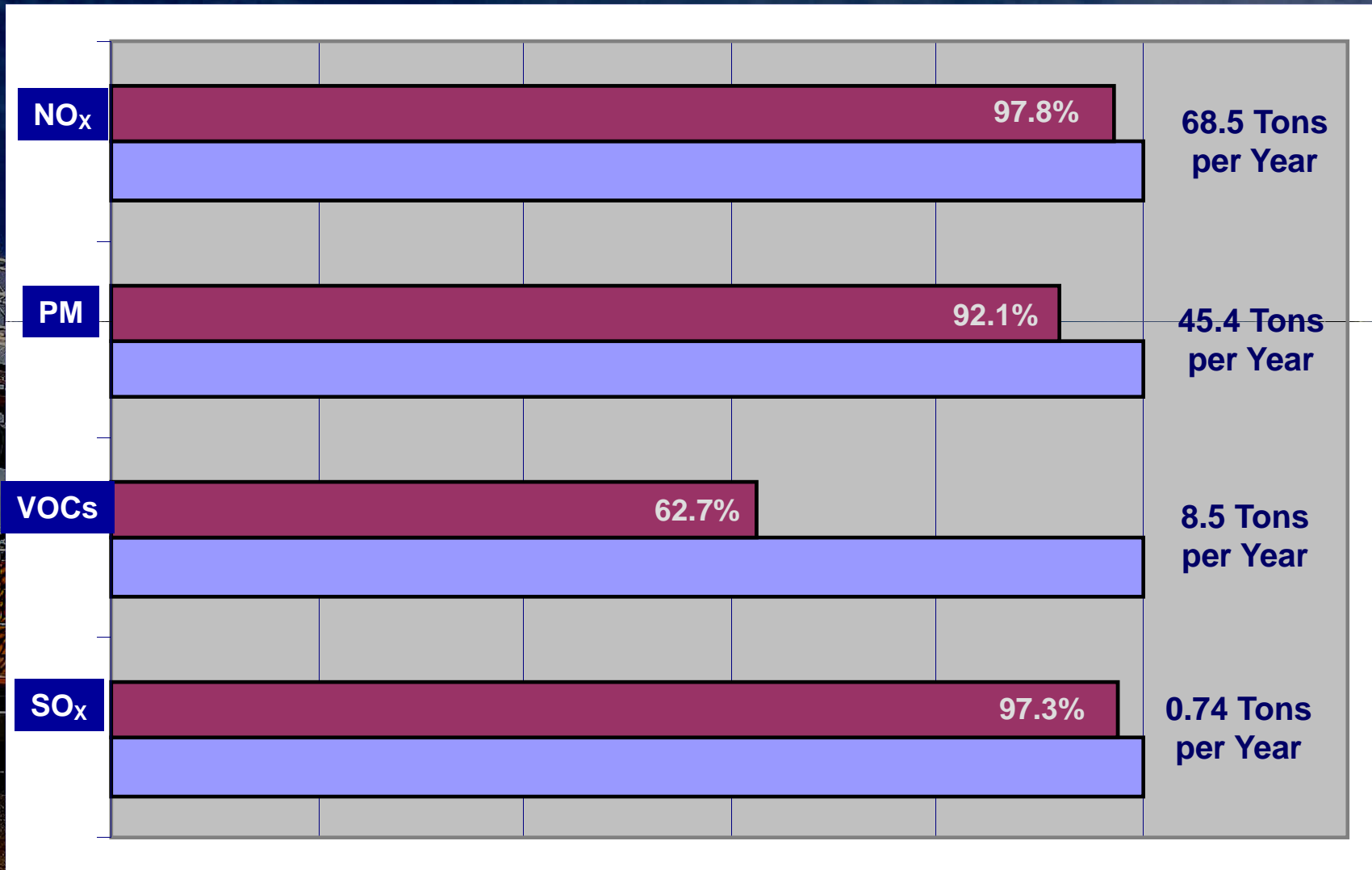


# Successful Demonstration Program (continued)

- Maintain attachment and exhaust capture while the railroad locomotive is underway within designated area
- The test of ALECS was a success, meeting all the goals described above and more
- The same treatment system has also been tested on AMECS



# Pollutants Removed in Tons per Year



# Cancer Risk in South Coast Air Basin

Data from AQMD Draft 2007 AQMP, Appendix 1

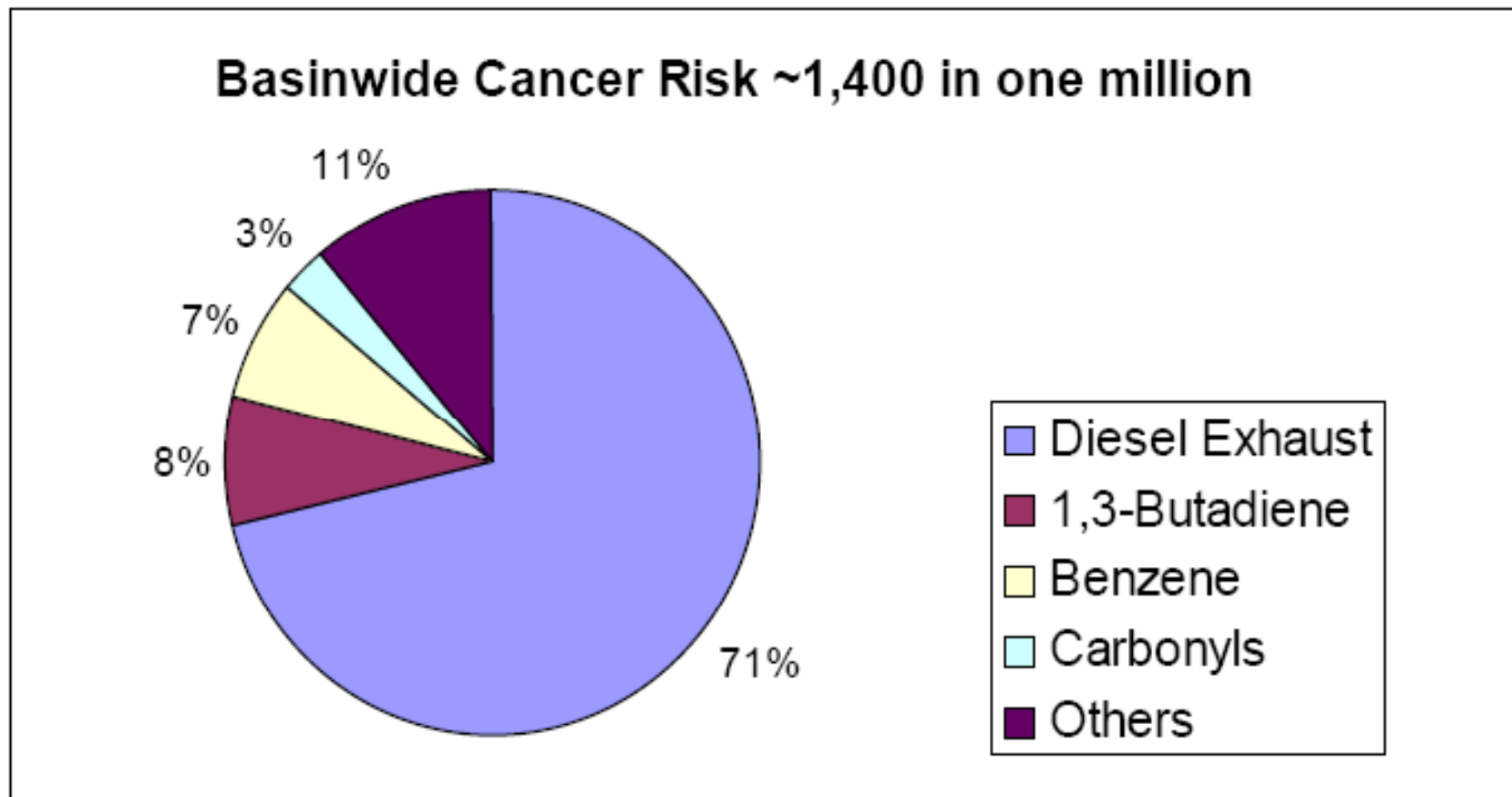


Figure 1. Major pollutants contributing to Air Toxics Cancer Risk in the South Coast Air Basin

# Annual California PM2.5 and O3 Health Impacts

CARB Data for 2009 in 2007 dollars

Health Outcome	Cases per Year	Uncertainty Range <sup>1</sup> (Cases per Year)	Valuation <sup>2</sup> (Millions)	Uncertainty Range <sup>3</sup> (Valuation - Millions)
Premature Death	19,000	6,000 to 33,000	\$170,000	\$55,000 to \$300,000
Hospital Admissions (Respiratory & Cardiovascular)	9,400	5,600 to 14,000	\$370	\$220 to \$540
Asthma and Other Lower Respiratory Symptoms	280,000	110,000 to 430,000	\$5.6	\$2.3 to \$8.6
Acute Bronchitis	22,000	0 to 44,000	\$10	\$0 to \$20
Work Loss Days	1,900,000	1,600,000 to 2,100,000	\$370	\$310 to \$420
Minor Restricted Activity Days	13,000,000	9,700,000 to 16,000,000	\$830	\$620 to \$1,000
<b>TOTAL VALUATION</b>	NA	NA	\$170,000	\$56,000 to \$300,000

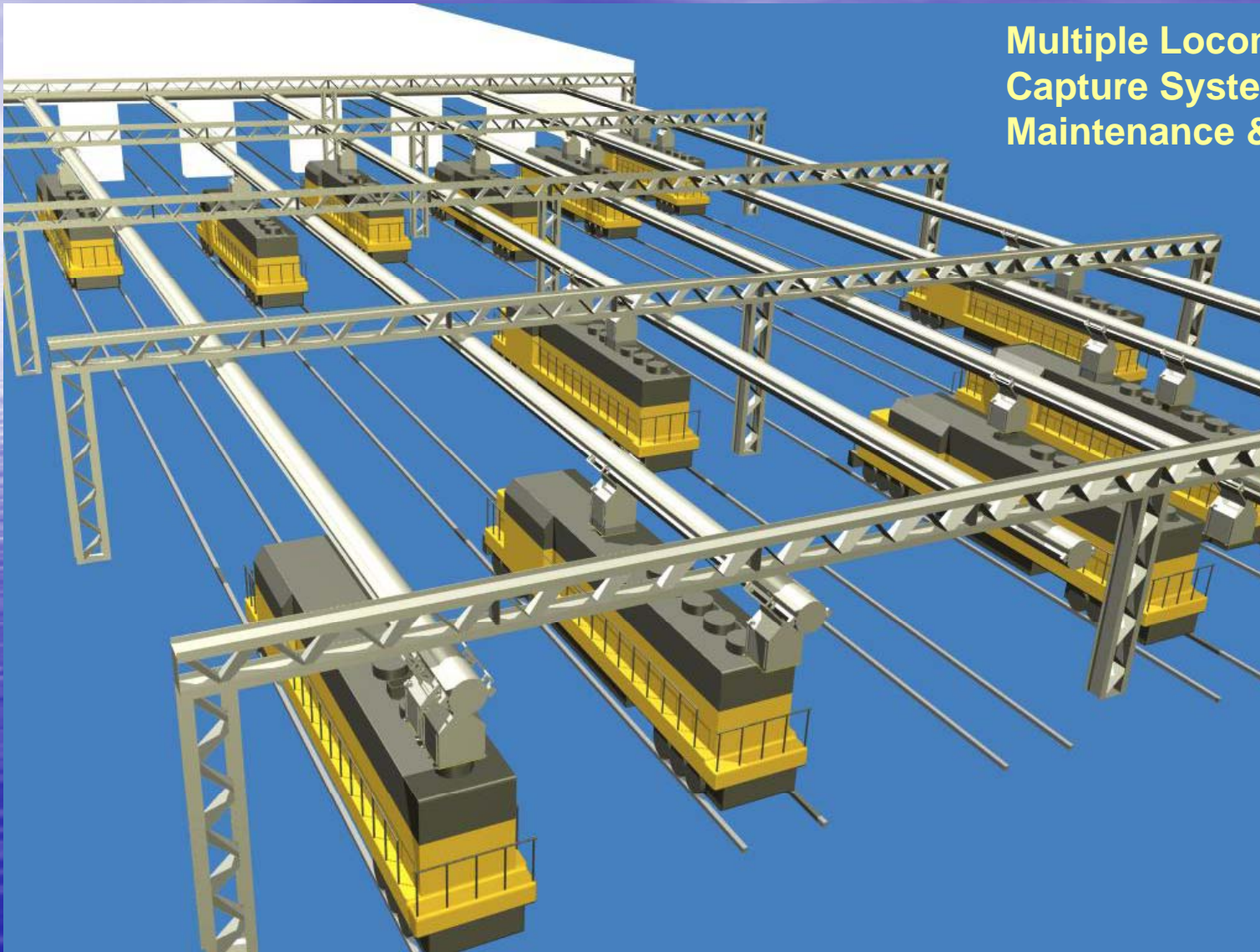
# ALECS Production System

- Located at maintenance and testing locations
- ALECS attaches to multiple locomotives, in multiple locations, and directs exhaust to a single, centrally located ETS
- ALECS operates automatically and does not interfere with railyard operations



# Example Application

**Multiple Locomotive Exhaust  
Capture System – Railroad  
Maintenance & Service Facility**

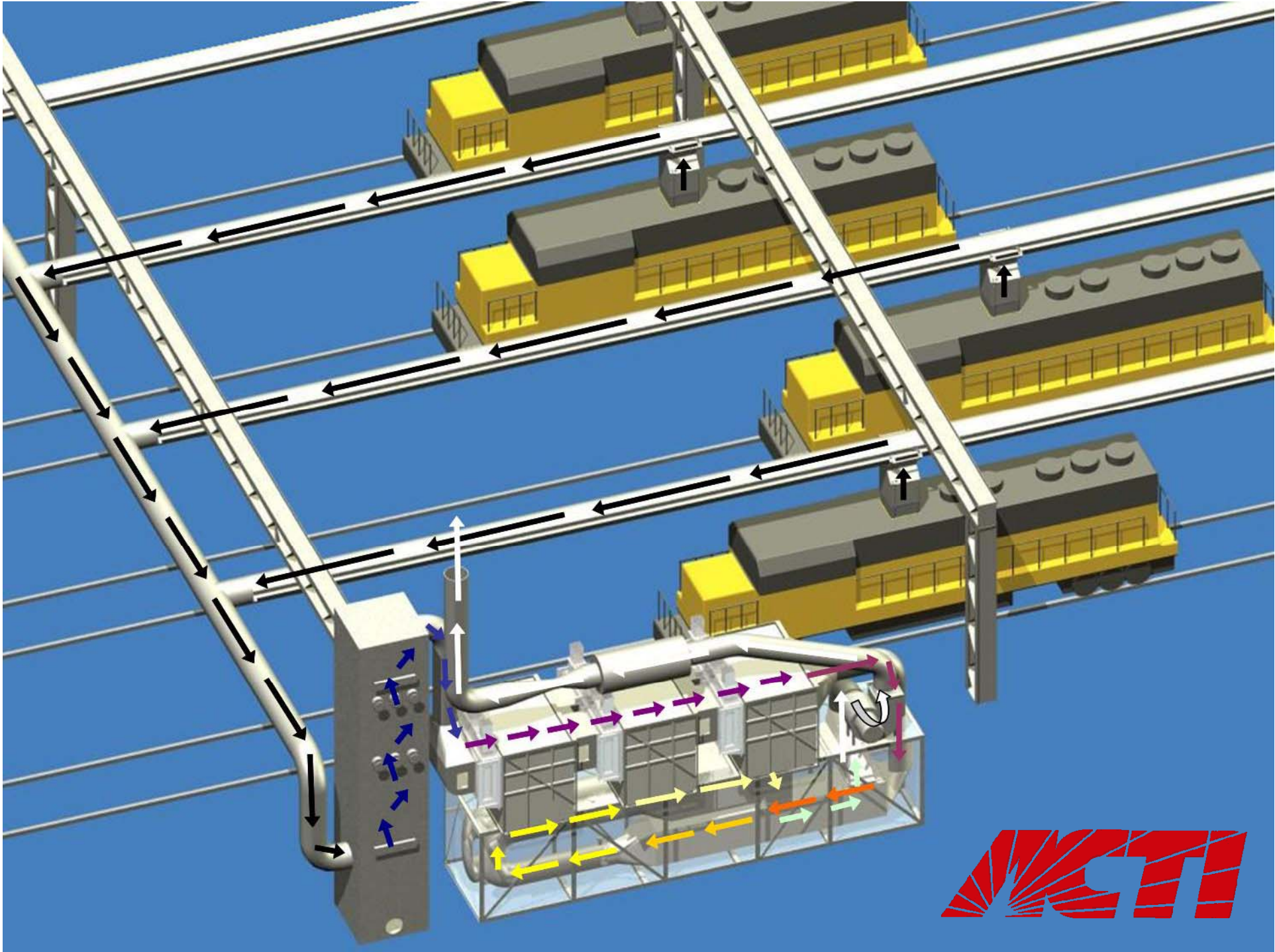


# Automated Operation

- A Locomotive enters the treatment zone
- ALECS detects the locomotive, locates the stack, and attaches automatically
- ALECS treats exhaust during idling and testing
- When the locomotive moves away, ALECS automatically disconnects







# Initial Market Potential

- Initial Markets
  - UP Roseville 22 Stations
  - BNSF Barstow 8 Stations
  - BNSF Sheila Mechanical 6 Stations
  - UP Colton 6 Stations
  - UP Commerce 4 Stations
  - UP ICTF 3 Stations



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*Creating a better Environment through Science*



# Questions & Answers

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