Salton Sea Air Quality Monitoring Project

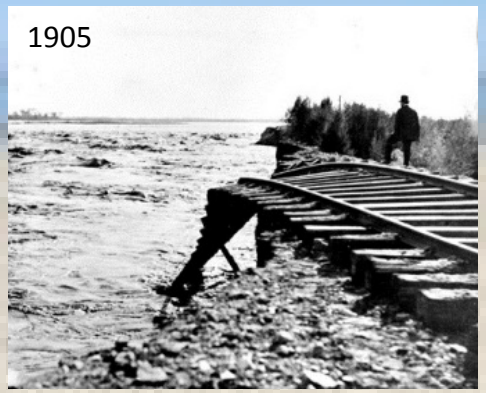
PQAO Training 2017
Kellogg West Conference Center
CalPoly Pomona
January 26, 2017

Earl Withycombe
California Air Resources Board

Presentation Outline

- History of Salton Sea and QSA Water Transfer
- Monitoring Objectives
- Monitoring Network Design Process
- Instrument Selection Process
- Equipment and Construction Procurement Process
- Network Construction Sequence
- Initial Air Quality Findings

Paradise Boom and Bust



2016

10 Lake View Acreage:

$175.00 Down,

$175.00 Monthly,

$17,495.00 Cash!

2003 Quantification Settlement Agreement

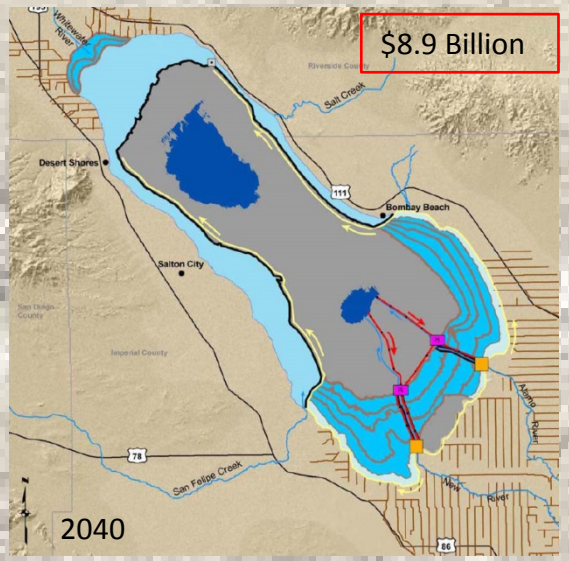
Signatories:

- Imperial Irrigation District
- Coachella Valley Water District
- San Diego County Water Authority
- Metropolitan Water District
- Palo Verde Irrigation District
- Vista Irrigation District
- City of Escondido
- California Department of Water Resources
- California Department of Fish and Game
- La Jolla, Pala, Pauma, Rincon and San Pasqual Bands of Mission Indians
- United States Department of Interior
- United States Bureau of Reclamation
- United States Fish and Wildlife Service

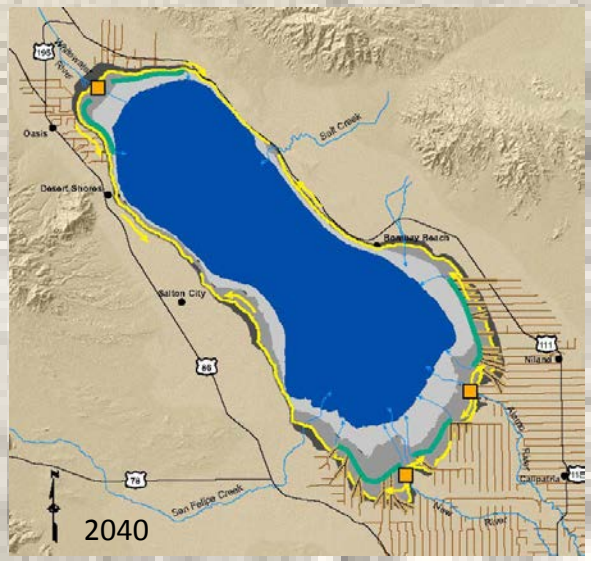
Air Quality Monitoring Requirement

(e) Implement a meteorological, PM10, and toxic air contaminant monitoring program to begin under existing conditions and continue as the Proposed Project is implemented. Monitoring would take place both near the sources (exposed shoreline caused by the Project) and near the receptors (populated areas) in order to assess the source-receptor relationship. The goal of the monitoring program would be to observe PM10 problems or incremental increases in toxic air contaminant concentrations associated with the Proposed Project and to provide a basis for mitigation efforts.

Range of Alternative Ecosystem Restoration Projects Evaluated in QSA Mitigation Analyses



Preferred Alternative



No Action Alternative

Air Pollutant/Parameter Selection Process – Funding-Driven

- Stakeholders Wanted:
  - Ammonia
  - Carbon Monoxide
  - Hydrogen Sulfide
  - Oxides of Nitrogen
  - Ozone
  - PM10
  - PM2.5
  - PM Deposition
  - PM Toxics
  - Sulfur Dioxide
  - Surface Meteorology

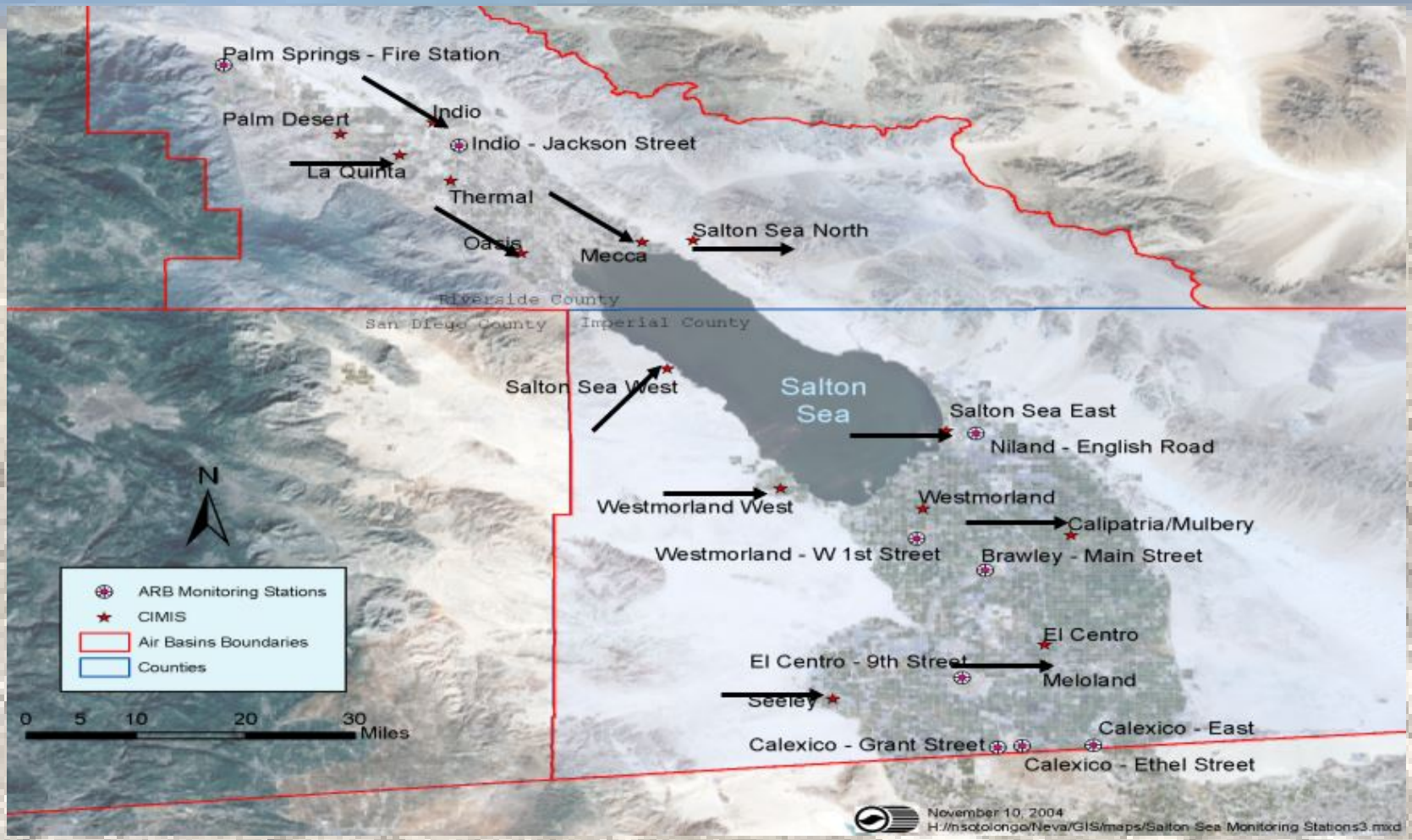
- Mitigation Plan Required:
  - PM_{10}
  - $PM_{2.5}$
  - PM Toxics
  - Surface Meteorology

- Joint Powers Agency Funded:
  - PM_{10}
  - $PM_{2.5}$
  - Surface Meteorology

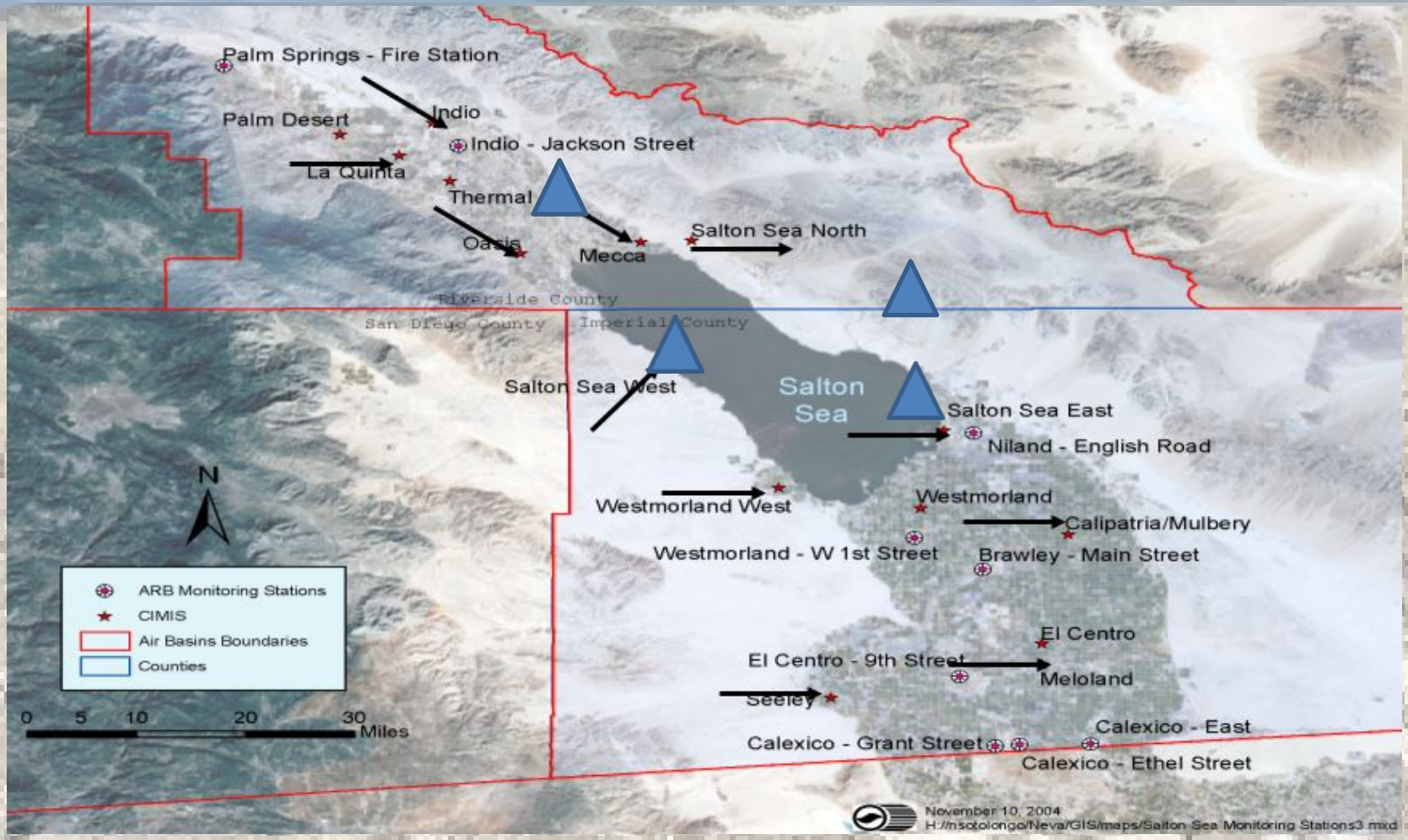
Network Design and Construction Steps

- Determination of Number and General Locations of Stations
- Online Investigation of Potential Sites
- Onsite Confirmation of Site Adequacy
- Acquisition of Site Entitlements
- Instrument Selection
- Procurement Process
- Construction and Installation Sequence

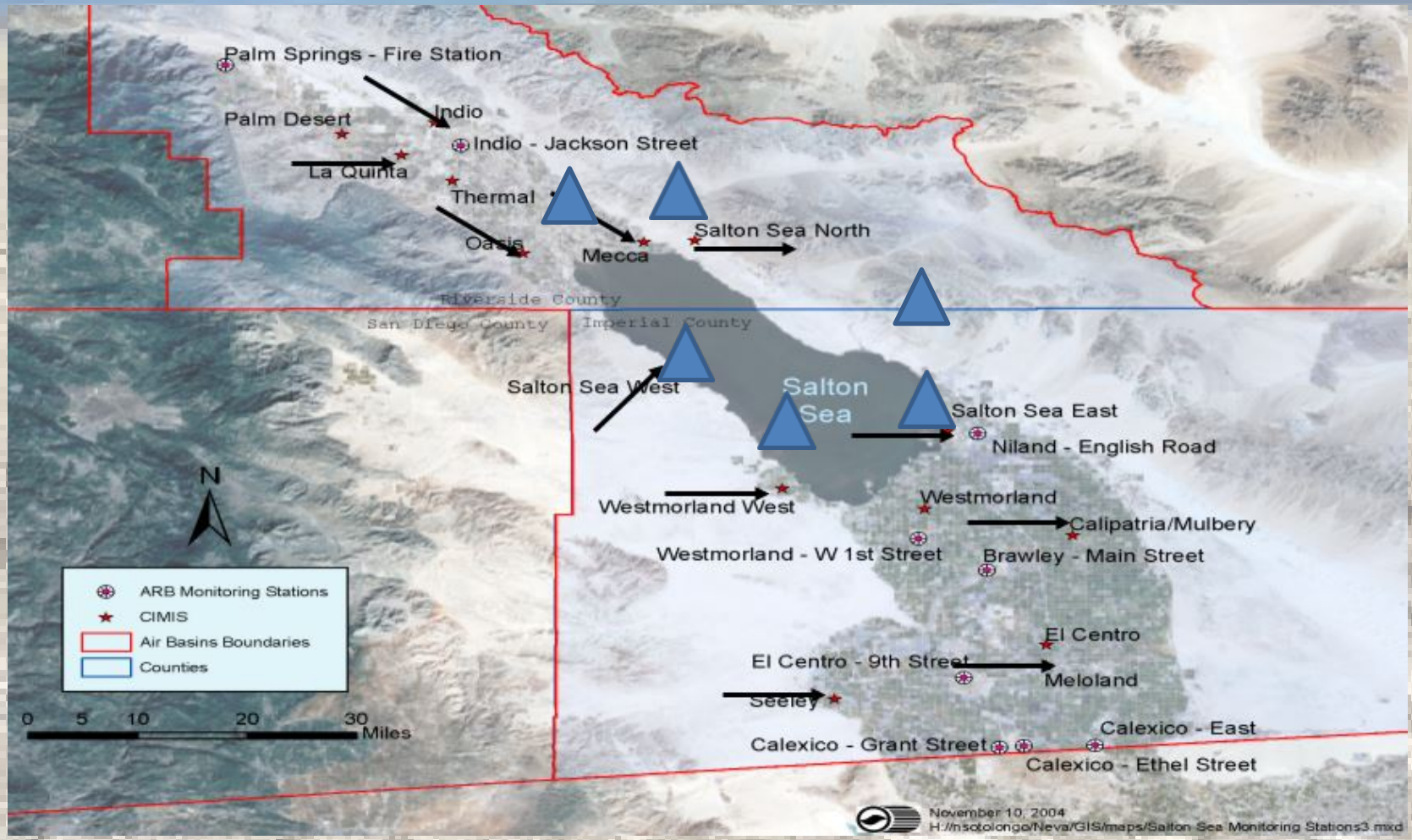
High Wind Directions at CIMIS Stations in 2004



Initial Station Location Design



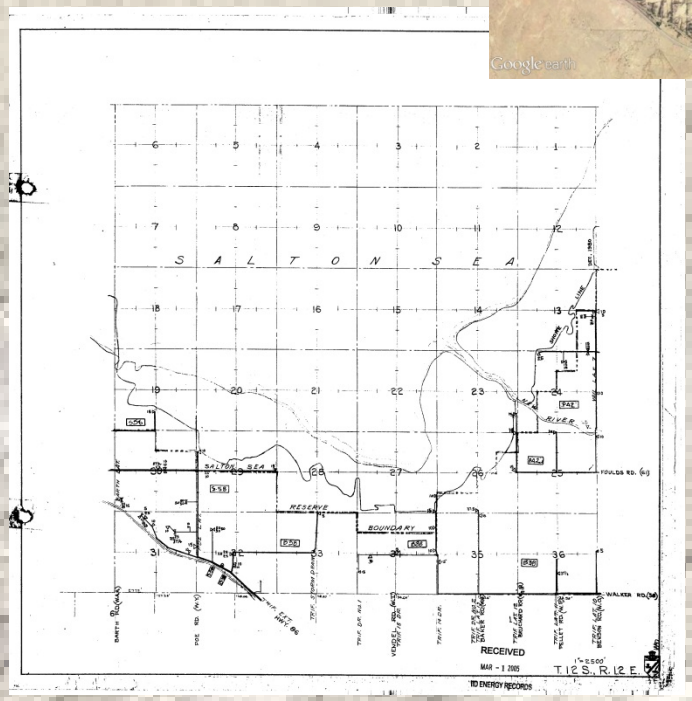
Final Station Location Design



Station Siting Criteria

- Proximity to 2003 shoreline (-228 ft msl)
- Line power availability
- Accessibility
- Security
- Public land
- Distance from mechanically-generated PM sources

Site Investigations: Online



Assessor Inquiry - Main
Asmt: 017-140-025-000 Feeparcel: 017-140-025-000
Owner: I I D

Situs Address			
NameAddress		I I D P O BOX 937 IMPERIAL CA 92251	
Status	Date	ACTIVE	
Taxability Code	Descr	003	NON-TAXABLE PROPERTY
TRA	Base Date	082-003	01/01/2000
Creating Doc#	Date	190099999999	
Current Doc#	Date	199819421248	08/18/1998
Terminating Doc#	Date		
Neighborhood C...	Supl Cnt	017	
Asmt Description		POR SEC 22 10-10 366.69AC	
Land Use 1	Land Use 2	CXXE	X
Zoning 1	Dwell 1		
Acres	SqFt	0	0
SSN1	SSN2		

Parcel Desc: POR SEC 22 10-10 366.69AC

Section	TownShip	Range

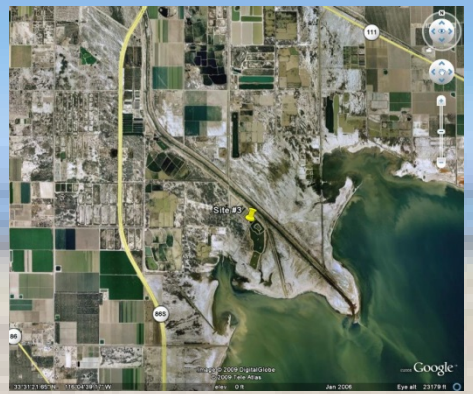
Description					POR SEC 22 10-10 366.69AC			
TPZ	Ag Pres	Etal	Bonds					
Multi ...	910 MH	Flag 1	Flag 2					
Asmt PP	Tax PP	Appeal	Split					
Comments					From 017140250I 07/25/2005			

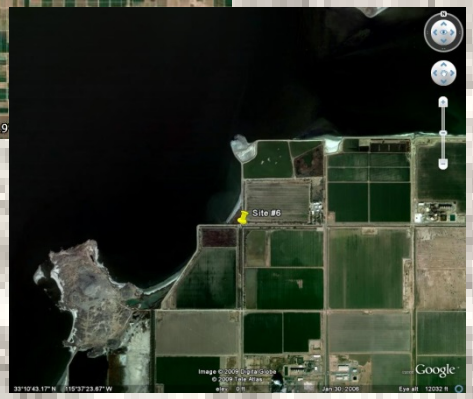
Values

	TAXROLL	CURRENT	APR DATE
Land			
Structure			01/01/2005
Fixtures			
Growing			
Total L&I			
Fixture RP			
MH PP			
PP			
Exemption			
Net			
R/C #			
TR/Date			
Status			
Description	ENROLLED in BASE YEAR		

Site Investigations: Onsite

Final Site Selections





Monitoring Site Entitlements

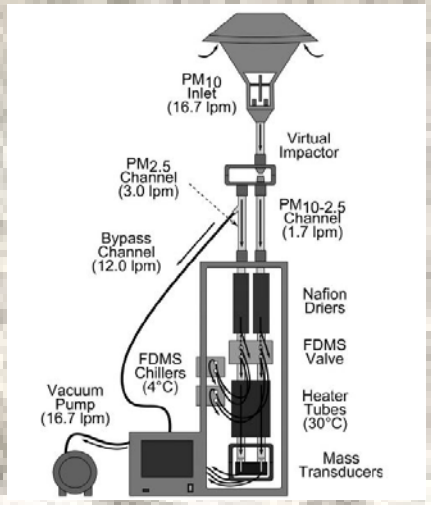
- Federal, State, and Local Agencies from Which Land Use Entitlements Were Required:
  - U.S. Department of Interior: Bureau of Reclamation
  - U.S Department of Interior: Fish and Wildlife Service
  - U.S. Department of Defense: Army Corps of Engineers
  - California Department of Parks and Recreation
  - Bombay Beach Community Services District
  - Salton City Community Services District
  - Torres Martinez Desert Cahuilla Indian Tribe

Continuous PM Monitoring: BAM vs. TEOM

- Personal Bias: Experience with TEOMs in:
  - Maricopa County (Phoenix), Arizona
  - Pinal County (Casa Grande), Arizona
  - Owens Lake, California

BAM vs. TEOM Comparison

Parameter	MetOne BAM 1020	Thermo TEOM 1405-D
PM_{10} Upper Concentration Limit	1,000 µg/m^3	40,000 µg/m^3
Actual Sampling Time Per Hour	42 minutes	60 minutes
Minimum Averaging Time	20 minutes	10 seconds
PM_{10}-$PM_{2.5}$ Capability in Single Monitor	No	Yes
Semi-Volatile Measurement Accuracy	Good	Poor
U.S. EPA Certification	Yes	No



Continuous PM Monitoring Priorities

- Continuous sampling of both PM_{10} and $PM_{2.5}$ by one instrument if possible
- Minimum sampling time = 5 minutes
- Maximum inlet PM_{10} concentration capability = 40,000 $\mu g/m^3$
- Monitor selected: TEOM 1405-D dichotomous sampler without FDMS (semi-volatile) inlet package

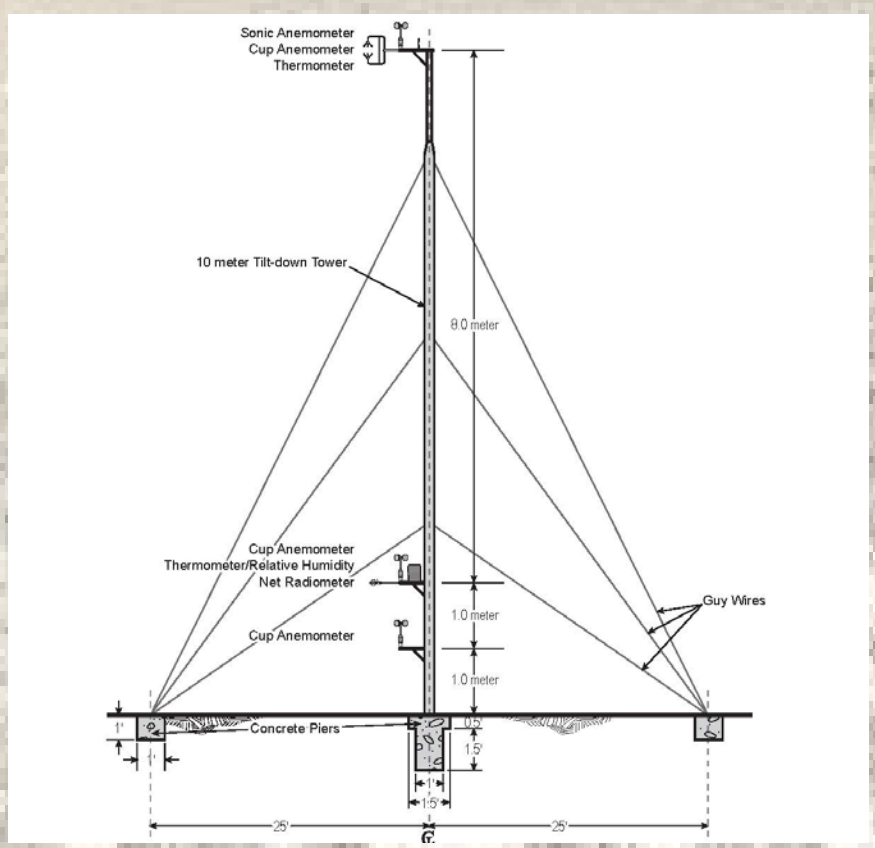
Meteorological Parameters

- Priorities:
  - Dispersion modeling meteorological file generation capability (AERMOD, CALPUFF)
  - Instrument durability in high temperature, high PM loading environment
- Meteorological parameters selected:
  - Wind speed and direction, scalar and vector[1]
  - Wind speed at 1 m, 2 m, and 10 m for roughness height analysis[1]
  - Sigma theta (calculated)

[1]R.M. Young

Meteorological Parameters (cont.)

- Meteorological parameters selected:
  - Ambient temperature at 2 m and 10 m for delta-T calculation[1]
  - Net radiation[2]
  - Relative humidity[1]
  - Barometric pressure[1]
- Tower requirements:
  - 10 m height[3]
  - Tilt-down capability



[1]R.M Young
[2]MetOne
[3]Aluma Tower

Procurements Options – Advantages

Direct Buy and Build

Save overhead cost, about 40% of total

Build the way you want

True team building exercise

Turn-Key Contract

Saves staff TIME!

Have contract legal recourse for correcting issues

Project completion is almost always on time

Graphics Credit: Jaime Contreras, SLOCAPCD

Procurement Options – Disadvantages

Direct Buy and Build

Time consuming for Project Manager & staff involved

Expect routine work backlog

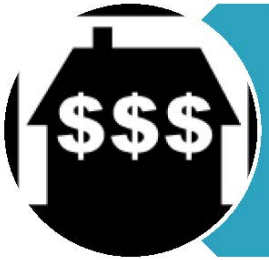
Missing learning opportunity

Deadlines often get pushed

Turn-Key Contract

Approach is most expensive

Some details will differ from expected… but meet specs!



Almost always incurs in cost overruns

Graphics Credit: Jaime Contreras, SLOCAPCD

Procurement Process

- ARB developed vendor and equipment lists for IID use including:
  - TEOM Dichot $PM_{2.5}/PM_{10}$ continuous monitors
  - Meteorological instruments and tower
  - Shelter
- IID had civil engineering consultant design shelter and tower foundations, prepare construction drawings

Procurement Process (cont.)

- IID, with ARB technical support, prepared and released RFQ to monitoring equipment vendors, 5 qualified proposals received
- IID supervised scoring of proposals by Salton Sea air quality team, selected 3 finalists
- IID hosted a Salton Sea air quality team panel that interviewed and scored the finalists
- IID and the air quality team selected the successful proposer based on technical scores and IID review of financial qualifications, past performance, subcontractor qualifications, and costs proposed

Station Construction Sequence

- American Ecotech, turn-key contractor, purchased all equipment, assembled complete shelters and towers in company warehouse, and tested all systems
- Ecotech subcontractor constructed foundations, electrical service, and tower signal cable
- Ecotech packaged each shelter and transported each directly to installation site

Construction Sequence (cont.)

- Ecotech anchored each shelter and tower to foundations and completed electrical and signal wiring
- IID and air quality team performed acceptance inspections and reviewed Ecotech acceptance test reports and data
- Ecotech programmed web-based dataloggers and provided training to Imperial County APCD and Torres Martinez tribal technicians tasked with operating and maintaining the Salton Sea network

Epilogue

- The Salton Sea PM and meteorological monitoring network has generally met monitoring objectives since February 2010
- The second and third phases of monitor purchases (PM filter, ozone, NOx, CO, H2S, NH3, PM deposition) have not been funded by the QSA-JPA because of a scope change in Ecosystem Restoration Project
- ICAPCD developed a QAPP and operator's manual for the network monitors, and IID has updated these documents after taking over network operation in July 2011

Epilogue (cont.)

- Network data is reported hourly to AQMIS, but not to AQS as TEOM dichots remain uncertified
- PM_{10} data recorded by the network show two stations (Salton City and Naval Test Base) to be significantly impacted by nearby migrating sand dunes during high wind events
- Correlation of Salton Sea PM data with ICAPCD/SCAQMD data show playa dust emissions not impacting nearby communities to date

2015 PM_{10} Summary

Maximum 24-hour and Annual Average PM_{10} Concentrations at Salton Sea, Coachella Valley, and Imperial Valley Monitoring Site in 2015		
Station	Maximum 24-hour PM_{10} Concentration ($\mu g/m^3$)	Annual Average PM_{10} Concentration ($\mu g/m^3$)
Salton Sea		
Bombay Beach	150	25.4
Naval Test Base	1,308	50.1
Salton City	2,063	135.6
Salton Sea Park	192	20.6
Sonny Bono	268	38.4
Torres Martinez	336	34.5
Coachella Valley		
Indio	200	36.8
Palm Springs	199	20.6
Imperial Valley		
Brawley	228	44.0
Niland	211	46.7
Westmorland	251	47.9

2010-2014 PM_{10} Trends