

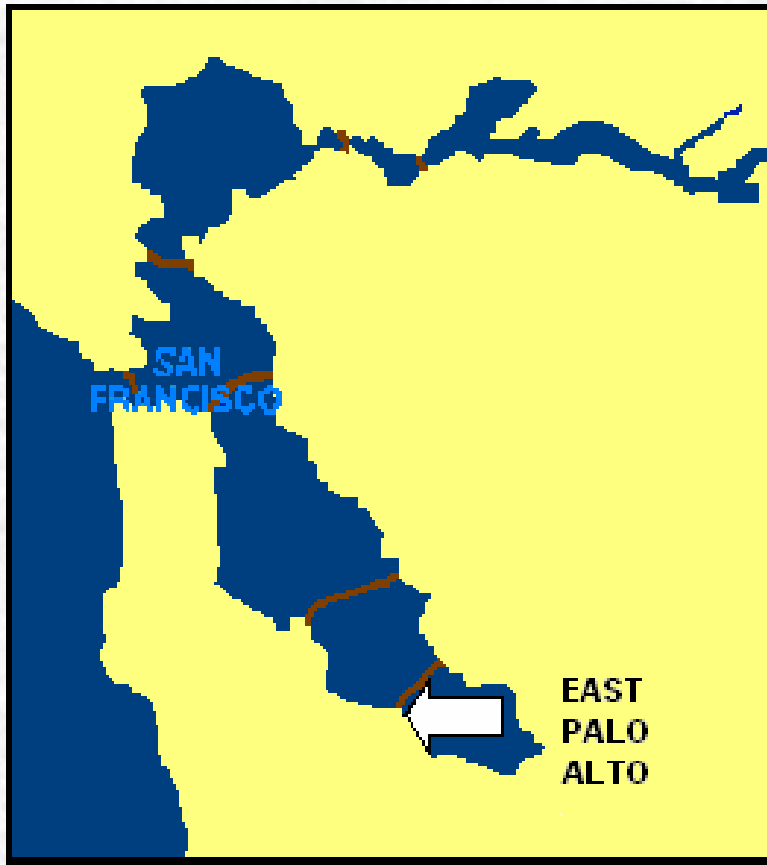
EAST PALO ALTO

A Brownfield Showcase Community



➤ **Pesticide Investigation using the Triad Approach**

First, a Little About East Palo Alto



- Incorporated in 1983
- 33,000 residents
- 60% Latino, 22% African American, 9% Pacific Islander
- 85% of its families with children use some form of public assistance

Triad Pilot Agricultural Sites

Weeks Neighborhood has former agricultural uses, which left pesticides.

This is a barrier to future housing development.

Project partners: Army Corps, USEPA Technology Innovation Program, State Regional Water Quality Control Board, County, SDI





Project Team

- City of East Palo Alto
- Water Board, Region 2
- US EPA
- ICES (Env. Consulting Firm)
- US COE
- San Mateo County
Environmental Office
- Strategic Diagnostics Inc.
(SDI)



Former Agricultural Use

- Four former agricultural properties scheduled for residential redevelopment:
 - 791/805 Runnymede St: Senior affordable housing - 1.38 acres
 - 855 Runnymede St: Transitional affordable housing - 0.52 acres
 - 872 Runnymede St: 7 single-family homes - 0.84 acres
 - 875 O'Conner St: Mixed-use - 32 townhomes/lofts and retail/commercial - 0.87 acres
- DDT and cyclodienes are the potential contaminants of concern

Desired Project Outcome

- ✓ Achieve residential development
 - 7000 ft² average lot size
- ✓ Protect human health and environment
 - on-site management, if possible
 - dig and haul to regulated disposal facility, if required
- ✓ Build trust with community
- ✓ Minimize remediation cost to facilitate redevelopment

Project Goals

- City of East Palo Alto interests
 - improve estimates of contaminated soil volume
 - cost effectively increase sample density
 - facilitate redevelopment
- Regional Water Board interests
 - ensure that any mixing areas are found
 - protect groundwater
 - confident final CSM

Intended Decisions

- Decisions for this project include:
 - Are hot spots (mixing areas) present?
 - Are pesticide application residues present?
 - What are the boundaries of the contamination?
 - What is the volume of soil exceeding action levels?

Conceptual Site Model (CSM) Inputs

- Organochlorine pesticides and 2 metals
- Two distinct release mechanisms – mixing areas and direct application and airborne drift
- Soil contamination main concern:
 - resistant to degradation
 - low water solubility and vapor pressure
 - high affinity to sorb to soil/relatively immobile

CSM Inputs (cont'd)

- ✓ Average lot size 0.9 acre
- ✓ Residential building constructed between 1916 and 1956
- ✓ Depth of tilling ranged from 18 to 24 inches
- ✓ 1-1.5 foot fill layer present on one property
- ✓ Main exposure pathway inhalation of contaminated soil

Triad Approach Application

- Systematic Planning: Community & City Planners involved; CSM postulated there was application residue or had been release from mixing areas
 - R9 PRGs/Water Board R2 ESLs action levels used
- Real-Time Measurement: Immunoassay paired with EPA 8081 for collaborative data set
- Dynamic Strategy: Soil samples collected initially from 3 depths at each location, field analysis to guide vertical/horizontal delineation

Systematic Planning

- Set decision unit (sampling design boundary) using knowledge regarding future land use and potential lot size
- Collaborative analytical approach utilizing immunoassay, GC, and ICP (As & Pb) analyses
- Sample grid designed to detect a 50-foot hot spot
- On-site decision tree for real-time definition of horizontal and vertical extent of soil contamination
 - sample support influence by contaminant release mechanism and limitations of excavation equipment

Decision Logic

- Concept – determine if pesticide hotspots and/or application residue are present
- Hotspots represent mixing areas; defined as
 - DDT > 10 ppm
 - cyclodienes > 2 ppm
- Initial grid designed to find 50-foot hotspots

Sampling Strategy

- Test and refine CSM
 - any hotspots would be at least 50 feet in diameter
 - contamination would be present in near-surface soil
 - over-spray residue may also be present
 - manage uncertainty & build CSM with IA
- Assumed that the DDT and cyclodiene families are the contaminants of interest
 - manage uncertainty with fixed laboratory analysis
- Action levels are low, pesticide concentrations may represent risk
 - manage uncertainty with fixed lab analysis

Collaborative Analysis Strategy

Selection of samples for laboratory analysis:

- based on range of pesticide concentrations detected by IA
 - include low, middle, high samples
- remain alert for differing soil matrices that could alter method performance
 - ensure coverage of all
- provide laboratory data for all parcels consistent with future development



Coordination



- Rights of entry for the properties
- Coordinate access for sampling
- Fixed-laboratory analysis
- Field test kits
- GPS surveying
- Central location for field analysis

Implementation

Field activities

- Coordinate with homeowners/tenants
- Establish and survey sample locations
- Collect samples at multiple depths, archive all but uppermost
- Establish field analysis office
- Begin analysis
- Evaluate results of field analysis



Dynamic Work Strategy: Real-time Decisions

- Evaluating field data
 - no detection
 - no further sampling
 - detection (< "hot spot")
 - characterize vertical extent
 - find hot spot
 - characterize horizontal and vertical extent
- Comparison to action levels
 - IA provided information about risk for most potential contaminants except dieldrin and heptachlor epoxide (very low action levels)



Collecting Samples

Soil samples:

- 78 locations, multiple depths
- analyzed in the field:
 - Envirogard DDT
 - RaPID Assay Cyclodiene

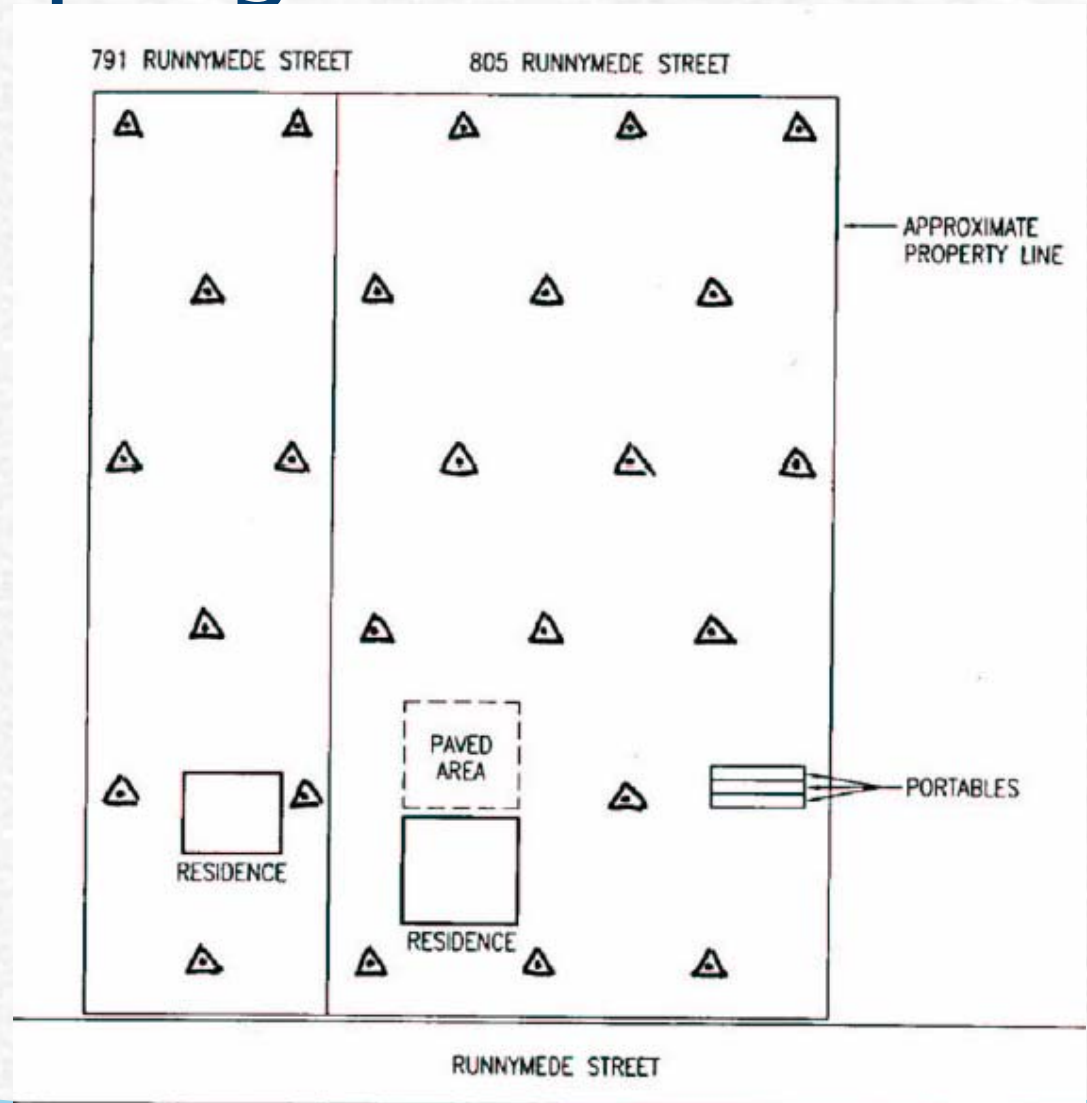
Sample support:

- 8 oz. soil collected w/ hand trowel from no more than a 6-inch deep soil horizon
- backhoe dug potholes to access deeper soil



Initial Sampling Locations

- The 50-foot sampling grid for 791 and 805 Runnymede Street.
- Typical approach for all parcels.
- Sampling points adjusted in field to avoid obstructions.



On-Site IA Method QC: DDT

DDT

- Each batch included 3 calibrators (0.2, 1.0 and 10.0 ppm) and a negative control
- All detects fell within calibrated range
- Photometric interpretation
- Field duplicates run at approximately 10%
 - 9/9 in agreement
- Results checked for consistency with CSM



On-Site IA Analysis

Local community
members involved;
taught to do analysis
but supervision
needed



On-Site Method QC: Cyclodiene

• Cyclodiene:

- Each batch includes 3 standards (1.0, 7.5 and 20 ppb), a control and a negative control
- All detects fell within calibrated range
- Photometric interpretation
- Field duplicates run at approximately 10%.
 - Coefficient of variation between standard duplicates to be $\leq 10\%$
 - 9/9 in agreement
- Results checked for consistency with the CSM

Demonstration of Methods Applicability

- Integrated into early field work
 - Inappropriate method performance observed immediately
 - Consulted with SDI to troubleshoot the problem
 - SDI determined the sample:diluent ratio was inappropriate
 - Problem resolved overnight with minimal disruption

Collaborative Lab Samples

- ✓ Samples carefully homogenized prior to split to control for within-sample heterogeneity
- ✓ Showed good agreement at decision level
 - Noted a 20-fold positive bias in cyclodiene IA results
 - Not possible to determine DDT IA bias due to insufficient detections
- ✓ DDT: 1/19 (5.3%) false positive, no false negative
- ✓ Cyclodiene: No false positive or false negative

Matured CSM

Highly confident that

- no hotspots/mixing areas were present
- Pesticide detections suggest application residues. Very low, basically homogeneous distributions.
 - additional laboratory sampling around hits showed that no significant mass or hotspots were present
 - isolated hits of dieldrin and other pesticides slightly above highly conservative thresholds
- Levels and volume of contaminated soil do not pose risk
 - average concentrations (across an exposure unit/property) of all contaminants less than action levels

Make the Decisions

- Decisions for this project included:
 - Are hot spots (mixing areas) present? **No**
 - Are pesticide application residues present? **Yes, but demonstrated insignificant**
 - What are the boundaries of the contamination? **No hotspots present requiring delineation**
 - What is the volume of soil exceeding action levels? **Insignificant**

Project Outcome

- ✓ Average pesticide, As, and Pb concentrations < action levels
 - proceed with redevelopment
- ✓ No area-wide pesticide residues > action levels
 - no special soil management required
- ✓ No hot spots found
 - no “dig and haul” required
- ✓ Proceed with redevelopment

Keys to a Successful Project

- ✓ Stay focused on ultimate goal
- ✓ Develop and use a conceptual site model
- ✓ Use a multi-disciplinary team
- ✓ Evaluate potential causes for making decision errors; identify and manage uncertainty
- ✓ Plan to encounter and resolve site uncertainty during field work
- ✓ Develop site specific QC protocol
- ✓ No field work until have consensus that project planning is complete and acceptable