

## Implementation of Active Disposal Site Gas Monitoring and Control Regulations:

### Lessons Learned

Scott Walker, PE, CEG, Manager,  
Engineering Support Branch (ESB)  
Compliance and Enforcement (CED) Division  
April 12, 2011



## Recap- Landfill Gas Regulations

- 2004- Study recommended the more stringent 27 CCR landfill gas monitoring and control closure/postclosure standards apply to active sites.
- 2007- new regulations adopted (20917-20945).
- 2008- regulations revised to extend general compliance dates; technical guidance/BMPs prepared.
- 2009 (July)- revised processes and procedures to address large backlog in Plans.
- 2011 (April)- Implementation 90% complete



## Gas Control- 27 CCR 20921(a)

The operator shall ensure landfill gas generated at the disposal site is controlled:

- (1) Methane gas must not exceed 1.25% by volume within any portion of on-site structures.
- (2) Methane gas migrating from the disposal site must not exceed 5% by volume at the permitted boundary.
- (3) Trace gases shall be controlled to prevent adverse exposure.



## Gas Monitoring- 27 CCR 20923(a)

The operator shall implement a gas monitoring and control program:

- (1) The monitoring network shall be designed by a registered civil engineer or certified engineering geologist and shall ensure detection of landfill gas migrating beyond the permitted boundary and into on-site structures; and
- (2) The monitoring network shall be designed to account for specific site characteristics and potential migration pathways or barriers.



## Gas Monitoring (cont.)

- Monitoring and Control Program Plans (Plans) require approval by EA and CIWMB concurrence.
- Approved Plans to be fully implemented by 10/18/2009 (<20 tpd 10/18/10); extensions allowed.
- Prescriptive standards: monitoring probe location, spacing (1000' max.), depth (to waste), construction.
- Alternatives to prescriptive standards allowed if demonstrated to meet performance requirements by design engineer or geologist.



5

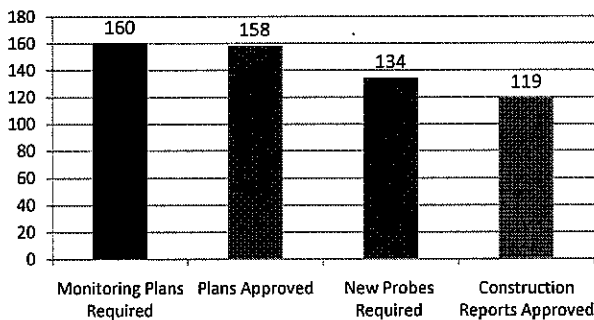
## Remediation- 27 CCR 20937

- (a) When results of landfill gas monitoring indicate concentrations in excess of compliance requirements:
- (1) Immediately take steps necessary to protect public health and safety and environment and notify EA;
  - (2) Within seven (7) days: (A) Verify validity of results; and (B) Place in operating record description;
  - (3) Within 60 days, implement a remediation plan approved by the EA and CIWMB; and
  - (4) Construct gas control system designed by registered engineer, within specified time period.



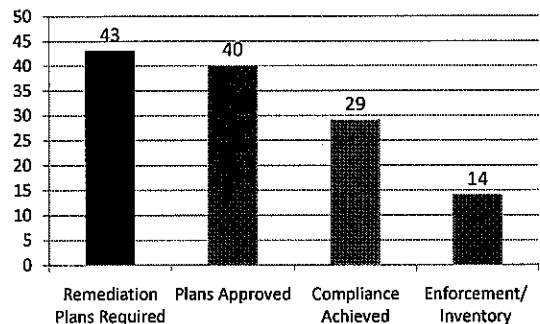
6

## Monitoring Plan Compliance 3/11:



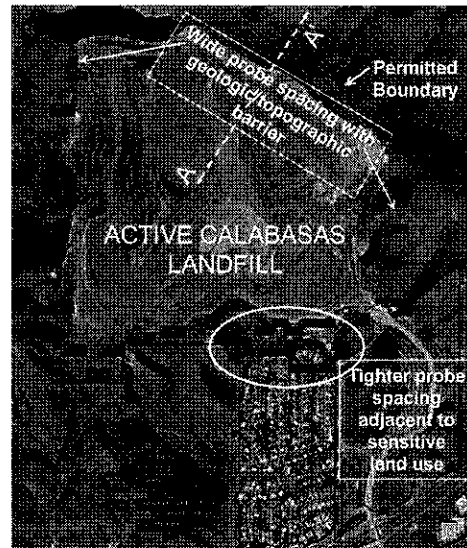
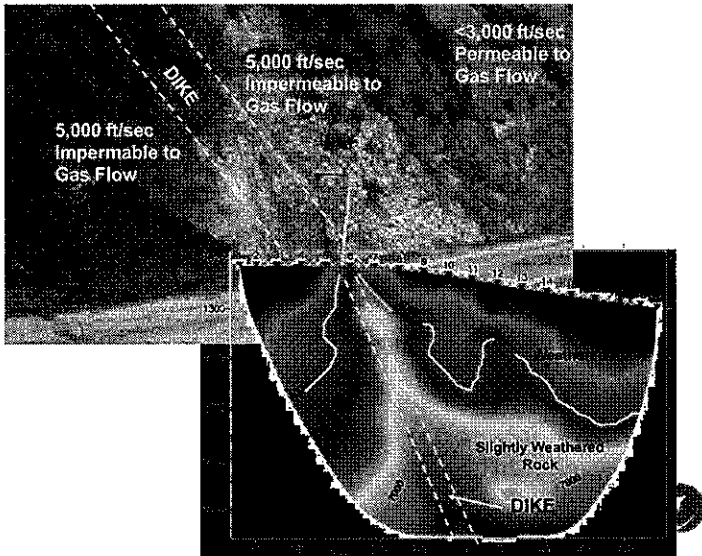
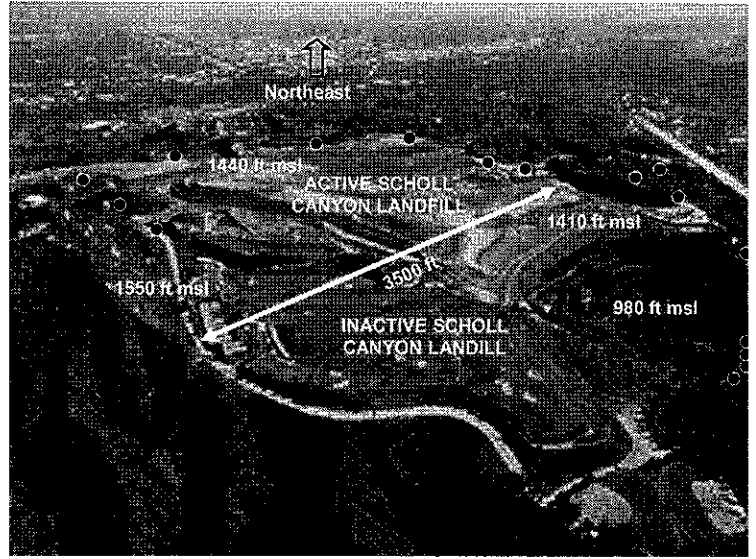
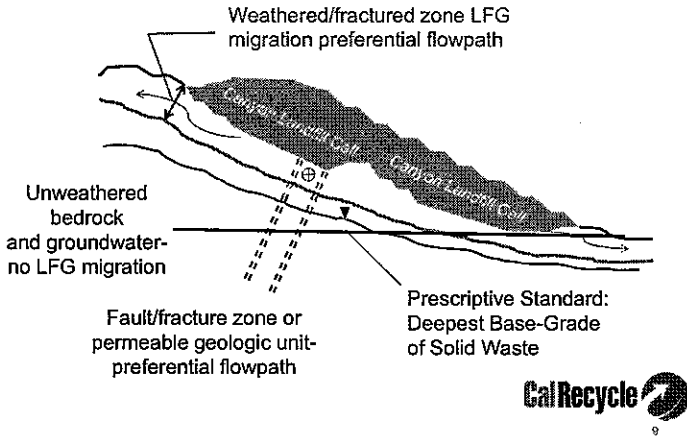
7

## Remediation Cases From New Probes

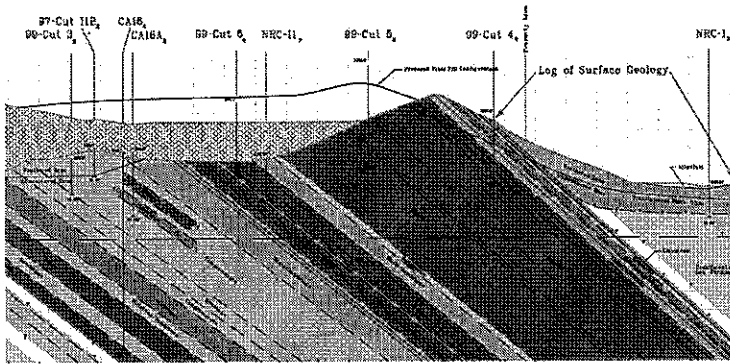


8

# Lesson Learned: Alternative Probe Networks Based on Site-Specific Geology and Land Use



## Section A-A'



13

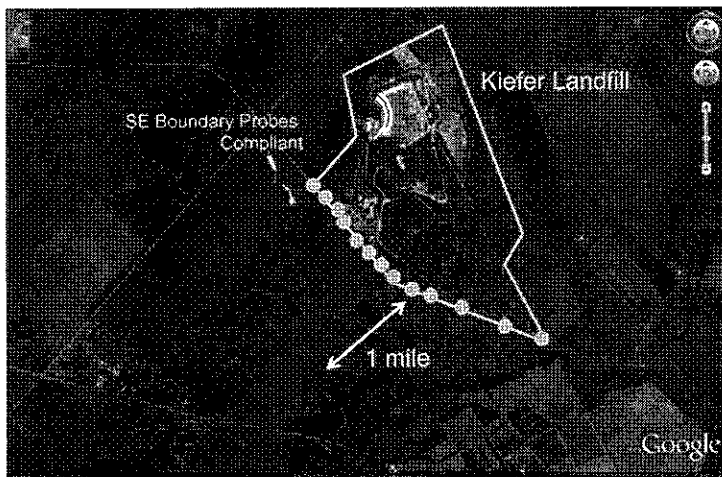
## Lessons Learned- Remediation

- Probes typically deeper, closer to waste footprint, and/ or tighter spacing resulted in new violations at *1/3 of facilities*.
- No inhabitable structures impacted.
- Most impacted sites have existing gas collection and control systems. Typical remediation approaches:
  - Inspect, repair, and adjust (optimize) existing system.
  - Replace compliance probes further from waste footprint.
  - Expand infill collection capacity (new wells and piping).
- Special cases: new systems; perimeter/SVE systems; thermogenic (i.e. non-landfill) gas; older “stranded” gas.



14

## Lessons Learned- “Stranded Gas”



15

## Lessons Learned- Implementation

- What didn't work:
  - Level of effort to implement was greatly underestimated and not adequately addressed during the rulemaking process.
  - Lack of site-specific flexibility resulted in impasse with operators.
- What worked: *Adjustments in July 2009:*
  - Business practices; sharepoint tracking system; enforcement guidance; extension request and dispute resolution processes.
  - Core multi-Branch group of motivated Supervisors and technical expertise in responsible charge.
  - Proactive, facilitative, results oriented negotiation with operators rather than traditional command and control.



16

## Active Disposal Site Gas Monitoring and Control Regulations: Follow-up

- Future workshop(s) to:
  - Share benefit of statewide technical knowledge gained with LEAs, agencies, and stakeholders.
  - Areas of further discussion:
    1. Identification and remediation of older weathered or “stranded” gas cases. Are enhanced and monitored natural attenuation approaches viable?
    2. Thermogenic gas and mixtures; methods for testing.
    3. Probe purging protocols, effectiveness evaluations.
    4. Extraction well vacuum influence on probes.
    5. Agency overlap and coordination (e.g., ARB, SCAQMD).



17

## Implementation of Active Disposal Site Gas Monitoring and Control Regulations: Lessons Learned Questions?

Compliance and Enforcement (CED) Division  
April 12, 2011



18

