



Regulatory Concepts for Landfill Methane Capture

**What California is Doing Might
Ultimately Affect You!**

Golder Associates



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Purpose

What AB32 Legislation and
rulemaking may mean to the
Northwestern states





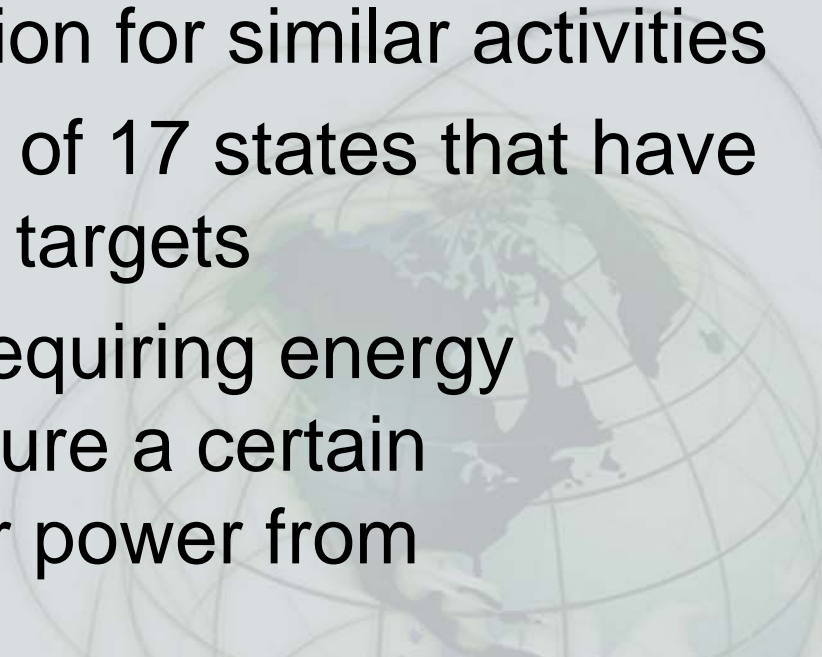
Western Climate Initiative

- A comprehensive multi-sector plan is being developed
- The waste management sector is specifically identified
- Methane is one of the target compounds





Other State Actions

- CA, OR, WA are 3 of 23 states with active climate legislative commissions or executive advisory groups - Idaho has introduced legislation for similar activities
 - CA, OR, WA are 3 of 17 states that have set GHG emission targets
 - CA, OR, WA are requiring energy companies to procure a certain percentage of their power from renewables
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AB32 - Some Details

- The Global Warming Solutions Act of 2006 – AB32 - Signed into law in September 2006
- **ARB published a list of early actions in June 2007 (Landfill Methane Capture)**
- Mandatory emissions inventory Rules and 1990 baseline are to be established in 2008
- Mandatory reporting begins in 2009 and a Regulatory Scoping Plan published

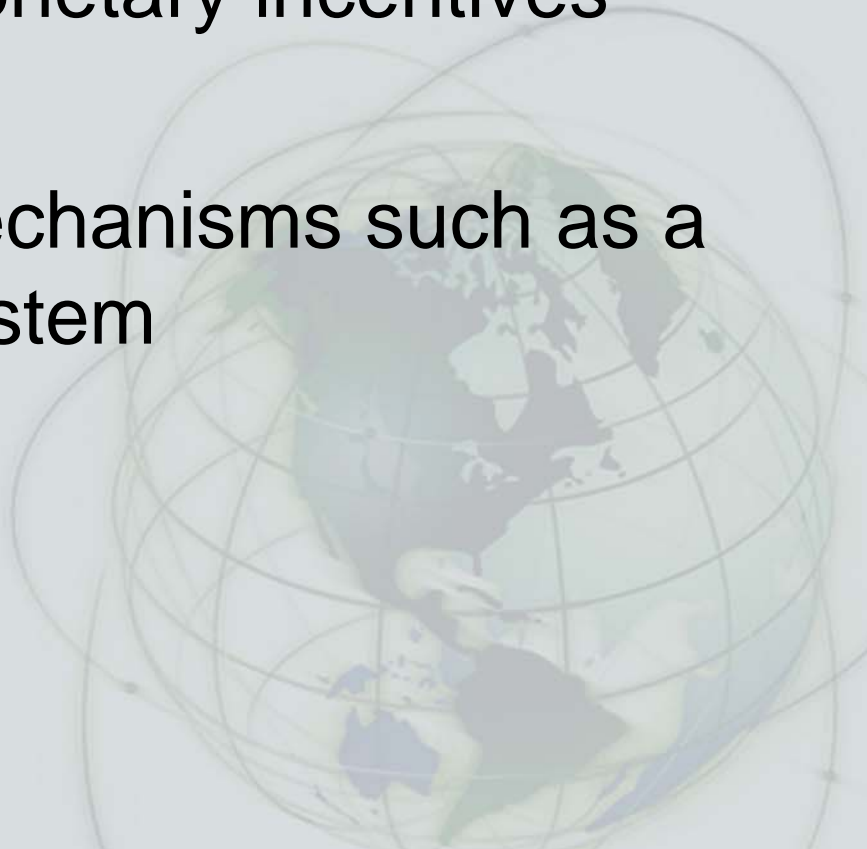


AB32 (continued)

- **On January 1, 2010 the enforceable early action regulations will be adopted**
 - Elements of the scoping plan for GHG limits and measures will be adopted, and
 - In 2012 the GHG limits and measures will be operative.
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THE MAIN Strategies

- Direct regulations
 - Alternative compliance mechanisms
 - Monetary/non-monetary incentives
 - Voluntary actions
 - Market-based mechanisms such as a cap-and-trade system
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Landfill Methane Capture Strategy

- Will require the installation of GCCS at smaller landfills that currently are not required to have one
- Drives increased landfill methane capture and control efficiencies



Applicability

- Affects all new and existing MSW landfills
- $\geq 400,000$ tons of degradable waste in place (proposed) – unless exemption requirements are met
- Exemption based on landfill size, surface emissions, and gas generation rate ($< 400,000$ tons of WIP, < 200 ppm_v surface emissions, and landfill gas heating capacity of < 2.5 MBtu/hr)

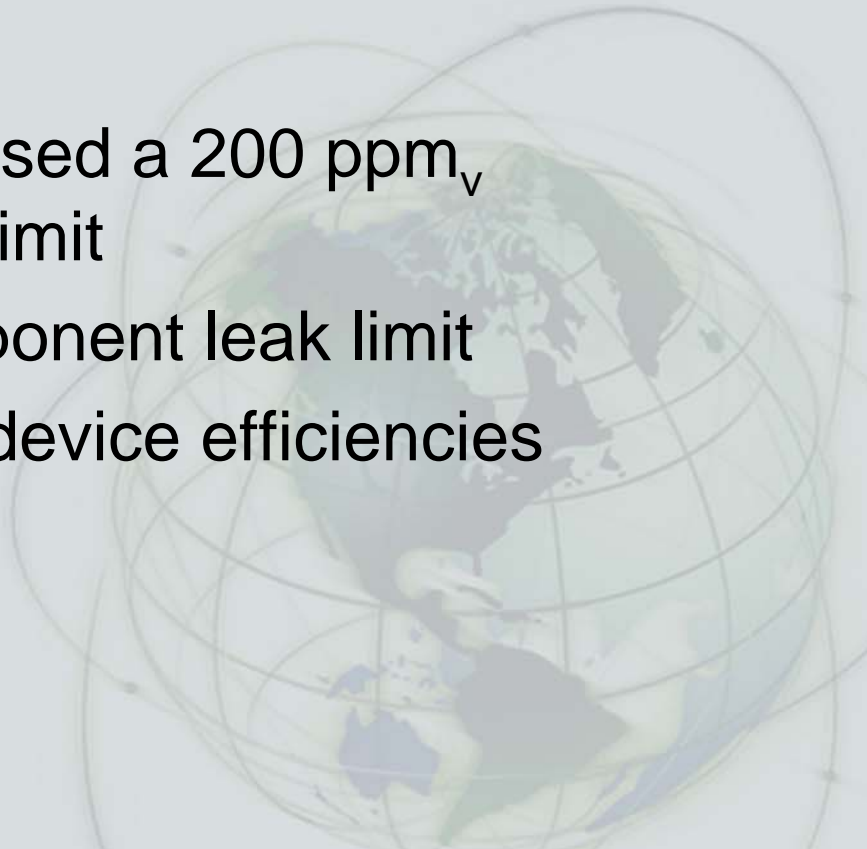


If You Are Subject

- Prepare an LFG collection and control system design plan subject to approval (12 months)
- Control options are flexible (from flares to LNG/CNG plants (open flares will not be allowed, and there are engine permitting issues)
- Install and operate the GCCS (18 month window after approval of the GCCS Plan



Compliance

- ARB prefers performance based compliance focusing on surface emissions, component leaks, and control efficiency
 - ARB has proposed a 200 ppm_v instantaneous limit
 - 200 ppm_v component leak limit
 - Higher control device efficiencies
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– Surface Emissions (ppm_v)

Concentration	Sites with Hits	Comment
0-50	15	
51-100	0	
101-200	1	
201-500	2	ARB Exceedance (proposed)
501-1000	2	NSPS Exceedance
1001-5000	1	
>5001	8	
	29	6.9% increase in exceedances



Other Proposed Requirements

- Monthly surface emission measurements going to quarterly after demonstrating good control for open landfills
- Quarterly to annual emissions measurements for closed landfills
- Reduced surface walk spacing to 25 feet from the 100 feet in NSPS

Cost of Control – Some Assumptions

Moisture content Size (waste in place)	Wet 400K	Wet 1121K	Wet 2396K	Dry 400K	Dry 1121K	Dry 2396K
Area of waste in place (acres)	18	33.6	53.8	18	33.6	53.8
Number of LFG extraction wells	29	40	59	10	15	21
Average well spacing	177	204	217	296	341	62
Total depth of LFG extraction wells (LF)	862	1812	3551	313	665	1259
Square parcel perimeter length (LF)	3539	4837	6124	2539	4837	6124
Peak LFG flow (scfm)	384	748	1524	145	293	488
Maximum header size (IPS)	8	12	18	6	8	10



Cost of Control – Capital Cost

Moisture Content Size (Waste in place)	Wet 400K	Wet 1121K	Wet 2396K	Dry 400K	Dry 1121K	Dry 2396K
GCCS Engineering including permit to construct	\$100 K	\$100 K	\$100 K	\$100 K	\$100 K	\$100 K
Control System Installed Cost	187 K	216 K	247 K	163 K	170 K	194 K
Component contingency	37K	43 K	49 K	33 K	34 K	39 K
Collection System Installed Cost	574 K	899 K	1417 K	445 K	634 K	885 K
Construction contingency	115 K	180 K	283 K	89 K	127 K	177 K
Flare Start-up Technician	7 K	7 K	7 K	7 K	7 K	7 K
Total Capital Cost	\$1,020K	\$1,445K	\$2,103K	\$836K	\$1,072K	\$1,403K



Cost of Control – Annual Operating Costs

Moisture Content Size (Waste In Place)	Wet 400 K	Wet 1121 K	Wet 2396 K	Dry 400 K	Dry 1121 K	Dry 2396 K
Annual O&M and Compliance	\$100 K	\$150 K	\$200 K	\$100 K	\$150 K	\$200 K
Annual Utilities	\$15 K	\$22.5 K	\$30 K	\$15 K	\$22.5 K	\$30 K
Miscellaneous	\$20 K	\$20 K	\$20 K	\$20 K	\$20 K	\$20 K
Total Capital Cost	\$135 K	\$192 K	\$250 K	\$135 K	\$192.5 K	\$250 K



Summary

- Limited data being used to set thresholds
 - Side slopes are not specifically excluded
 - Significant cost impacts
 - Technology is well established
 - Viewed as low hanging fruit
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