

## Public Workshop: In-Use Off-Road Mobile Agricultural Equipment Regulation

March 14, 2013 – Fresno  
(Live Video Feed in Bakersfield & Modesto)

March 15, 2013 – Sacramento  
(Webcast)



## Two-Step Rulemaking Focusing on San Joaquin Valley's Air Quality Needs

- Focus on SJV near-term air quality needs:
  - Rule in 2013 to provide credit for reductions achieved through incentive programs consistent with 2007 SIP
- Ensure SJV long-term air quality needs will also be met:
  - Develop in conjunction with 2015 SIP, a rule that further encourages deployment of the cleanest available technologies through incentives, regulations, or both

## Where Are We At in the Process?

- Receiving and analyzing data for updating the emissions inventory
- Continuing to achieve emission reductions through incentive programs
- Continuing outreach and communication with stakeholders
- Planned proposal to ARB Board in Fall 2013

3

## San Joaquin Valley's Air Quality Goals and Emission Reduction Needs



## San Joaquin Valley's Air Quality Goals: Near-Term Needs

- Requires SJV to attain 0.080 ppm standard by 2023
- Ozone plan adopted in 2007 and approved by U.S. EPA
  - Goal of 5-10 tons per day of NOx reductions by 2017
  - Can be achieved through incentives
  - ARB to consider a mobile agricultural equipment rule in 2013
- Reductions accelerate progress toward attainment of the ozone standard in 2023

5

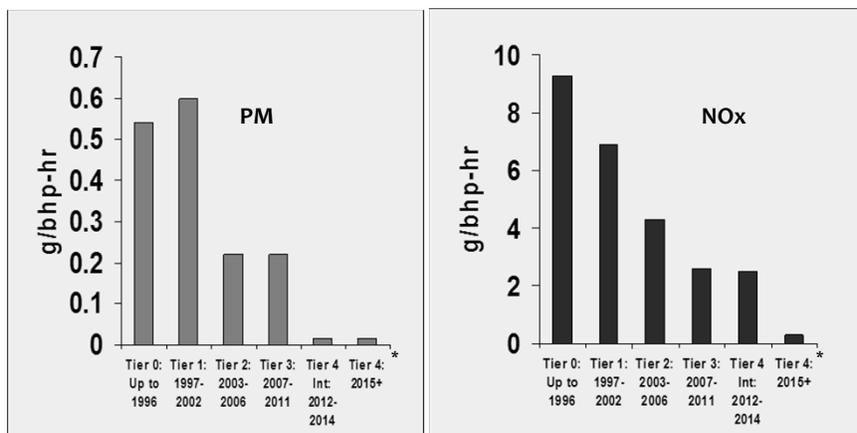
## San Joaquin Valley's Air Quality Goals: Long-Term Needs

- U.S. EPA set new ozone standard of 0.075 ppm with 2032 attainment deadline
- Work is beginning for the 2015 ozone attainment State Implementation Plan
- Strategy will be developed to identify long-term emission reductions needed from mobile agricultural equipment
- Need to accelerate cleanest available technologies (e.g. Tier 4 final) once available

6

## How Cleaner Technologies Help Meet Near- and Long-Term Air Quality Goals

EXAMPLE: Emissions standards for 100-174 Hp engines



\* Tier 4 for mobile agricultural equipment expected to be in 2020

7

## Draft Results from California's Mobile Agricultural Equipment Survey



## Update to Emissions Inventory

- An inventory is a representation of the emissions from mobile agricultural equipment in the State
- An accurate California specific inventory is critical to air quality planning (SIP) and to developing a sound regulatory strategy for the SJV
- In 2009 the process of collecting new and improved information on farms in California began
- This information will become the cornerstone for the updated emissions inventory

9

## Building an Inventory

- Characterize farm equipment based on survey results
  - The population of equipment in California
  - How old the equipment are (model year/tier)
  - How much these equipment operate (activity)
  - How hard these equipment operate (load factor)
- Information on equipment characteristics combined with emissions measurements produce emissions inventory

10

## Inventory Survey

- Cooperative effort between ARB, SJV district, and a wide array of stakeholders
  - Survey questionnaire designed to inform emissions inventory
  - Distributed by industry representatives
- Survey provided information about:
  - Vocation (producer, custom operator, dealer or processor)
  - Commodities, acreage, custom work, region, etc
  - Equipment by type, horsepower, age, annual usage, fuel use, and fuel type

11

## Survey Participants

- Wide coalition of ag industry groups
- Surveys were made anonymous before being incorporated in the inventory

Almond Board of California  
 Avocado Commission  
 California Association of Winegrape Growers  
 California Cattlemen's Association  
 California Citrus Mutual  
 California Cotton Ginners and Growers Association  
 California Farm Bureau Federation  
 California Grain and Feed Association  
 California Grape and Tree Fruit Association  
 California Poultry Federation  
 California Rice Commission  
 California Seed Association  
 California Warehouse Association  
 Far West Equipment Dealers Association  
 Nisei Farmers League  
 Pacific Egg and Poultry Association  
 Raisin Bargaining Association  
 Sun Maid Growers  
 The California Association of Wheat Growers  
 The California Bean Shipper Association  
 The Pacific Coast Renderers Association  
 Western Agricultural Processors Association  
 Western Growers  
 Western United Dairymen

12

## Survey Response Widespread

- o Broad coverage of farms (both size and commodity), large number of responses

Ag Sector	Responses
Producer	1,552
Custom Operator	151
First Processor	52
Rental	11
<b>Total</b>	<b>1,766</b>

**Equipment Reported in Survey**

<b>Agricultural Tractors</b>	<b>5,774</b>
Forklifts (all types)	593
Others	591
Nut Harvester	425
Skid Steers	357
ATVs	190
Other Harvesters	170
Swathers/Hay Conditioners	161
Sprayers/Spray rigs	142
Combine Harvesters	96
Balers	56
Bale Wagons	55
Hay Squeeze	34
Cotton Pickers	31
Forage & Silage Harvesters	20
Scrapers	9

13

## Survey Results: Statewide Representation

~50% of responses were from the San Joaquin region

Farm Size (Acres)	# Surveys
0-15	233
16-50	493
51-100	323
101-250	398
251-500	243
501-1000	223
Over 1000	291

Commodity	# Surveys
Nut Crops	506
Hay, Forage, Pasture, Grains	474
Grapes	413
Tree Fruit	226
Citrus	166
Row Crops	136
Vegetables, hand-picked	87
Beef Cows	71
Other	44
Nursery, Greenhouse, Floriculture	37
Vegetables, machine-picked	29
Milk Cows	12

14

## Survey Results: Farm Representation

- Good coverage of larger farms and many of the major commodities in California
- Equivalent number of surveys for small farms, but measured against large numbers of small farms in the State

Farm Size (Acres)	Survey Representation*
0-15	1%
16-50	3%
51-100	4%
101-250	4%
251-500	4%
501-1000	7%
1000+	32%

Commodity Group	Survey Representation*
Citrus	23%
Grapes	9%
Hay, Forage, Pasture, Grains	15%
Nut Crops	13%
Row Crops	16%
Tree Fruit	6%
Vegetables, hand-picked	15%
Vegetables, machine-picked	8%

\*As a fraction of acres as reported for the 2007 USDA Ag Census

15

## Survey Provided Strong Base for Inventory

- Survey captured wide coalition of groups, farm sizes, crops, regions
- Survey data provided strong, California-specific data; CA crops, CA farming practices
- Wealth of data allowed for a better look at California ag emissions inventory than was possible before

16

## Population

- Population from survey scaled up by comparing survey acres with statewide acres
  - Scaling done at commodity and farm size level
  - Data Sources: Ag Commissioners and USDA Agricultural Census
- Example scaling:

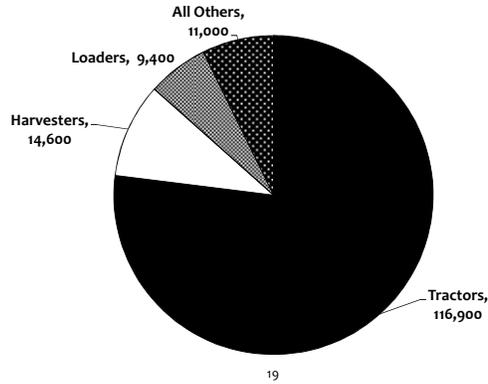
Crop Type	Farm Size (Acres)	Acres in Survey	USDA Acres	Survey Equip Pop	Scaled Population
Row Crops	0-15	1,000	2,000	100	200

## Livestock Scaled Separately

- For farms with crops and livestock;
  - Tractors assigned to crop production
  - Loaders / forklifts assigned to livestock
- Livestock scaled up based on Ag Commissioner totals for CA

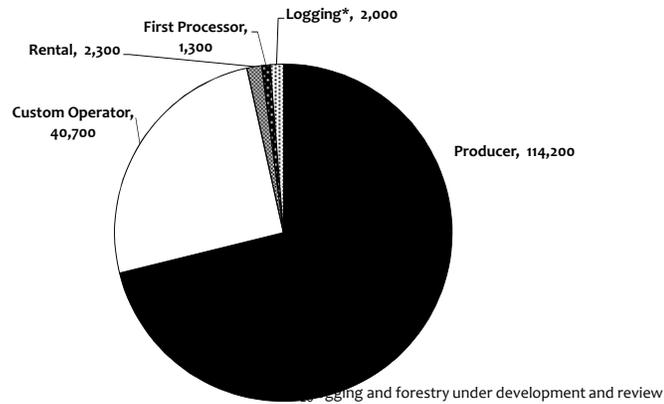
## Equipment Population by Type

- Equipment: Self-propelled diesel, 25 horsepower and up used in farming, first processing, custom work, and rentals
- Tractors make up 76% of the ag equipment population



## Equipment Population by Sector

- By sector, producers/custom operators have the largest population of equipment



## Equipment Population by Farm Size

- Approximately two-thirds of equipment are on farms between 50 and 1000 acres

Farm Size (acres)	Population of Diesel Equipment	% of Total
0-15	13,000	8%
16-50	31,000	20%
51-100	18,500	12%
101-250	30,500	20%
251-500	28,600	19%
501-1000	15,900	10%
1000+	16,600	11%

21

## Tier 0 Population by Farm Size

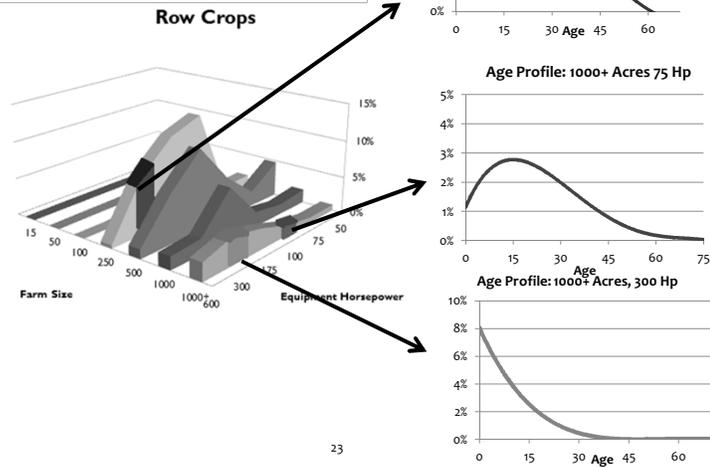
- Tier 0's common throughout industry, but to a lesser degree on the largest farms

Farm Size (Acres)	Population of Tier 0 Vehicles	Percent of Total
0-15	9,300	10%
16-50	20,700	23%
51-100	11,400	12%
101-250	18,300	20%
251-500	16,300	18%
501-1000	8,600	9%
1000+	7,000	8%

22

## Equipment Age Development

Equipment Population Example:  
Row Crops by Farm Size and Hp



## Average Equipment Age

Horsepower Bin	Average Age		Farm Size (acres)	Average Age
26-50	26		0-15	26
51-75	28		16-50	27
76-100	17		51-100	23
101-175	22		101-250	23
176-300	18		251-500	21
301-600	13		501-1000	20
			1000+	13

## Equipment Activity

- Activity per tractor increases consistently as farm acres and horsepower increases
- Newer tractors used more than older
- Farm size and hp related to commodity
- On average, tractors used more than specialty equipment like harvesters

25

## Average Activity Trends

Horsepower Bin	Average Annual Activity (hours/year)		Farm Size (acres)	Average Annual Activity (hours/year)
26-50	254		0-15	213
51-75	271		16-50	217
76-100	440		51-100	343
101-175	493		101-250	374
176-300	668		251-500	477
301-600	858		501-1000	511
			1000+	772

26

## Substantial Data on Load

- Load factor is average horsepower used as a portion of total horsepower
- Load developed based on fuel and activity reported in survey
  - Fuel and activity data for 2,300 pieces of equipment from the survey
- Estimated average load percent: 47%

27

## Inventory Development Summary

- Surveys provide highly detailed info on equipment characteristics, separated in categories by farm characteristics
- Updated inventories shows relationship between large farms using new equipment at high hours, smaller farms using older equipment a few hours a year

28

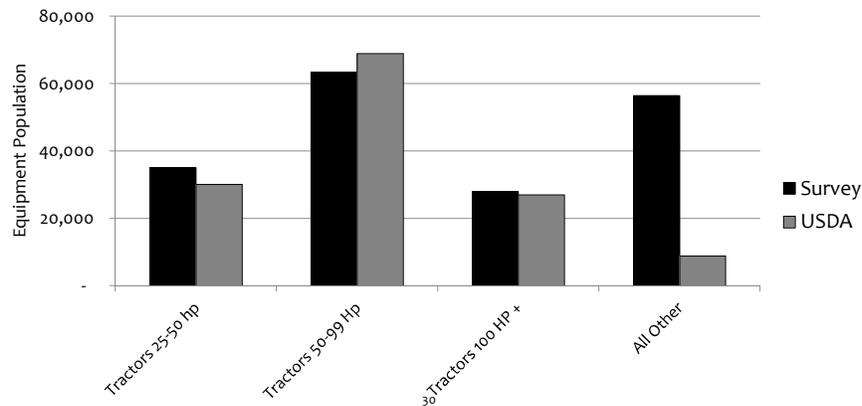
## Inventory Corroboration Summary

- Inventory results were compared to a number of independent data sources
  - USDA – 2007 ERG Research Study – EIA Fuel Data
- Population, age, and activity compares well against outside data
- Estimated total fuel consumption within 5% of reported farm fuel sales

29

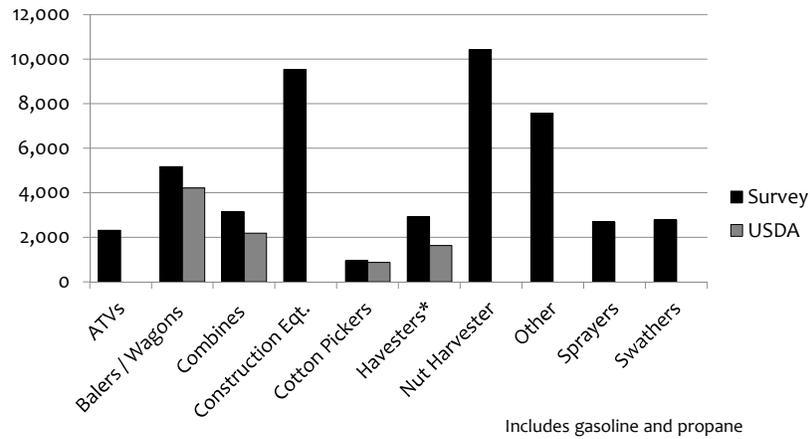
## Survey vs USDA Comparison

- Survey: 125,600 Tractors (116,000 Diesel)
- USDA: 125,100 Tractors



### Survey vs USDA: All Other

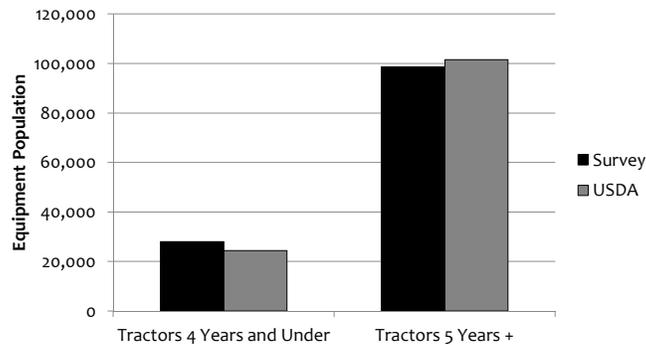
- Where USDA asked for non-tractors, results were comparable



31

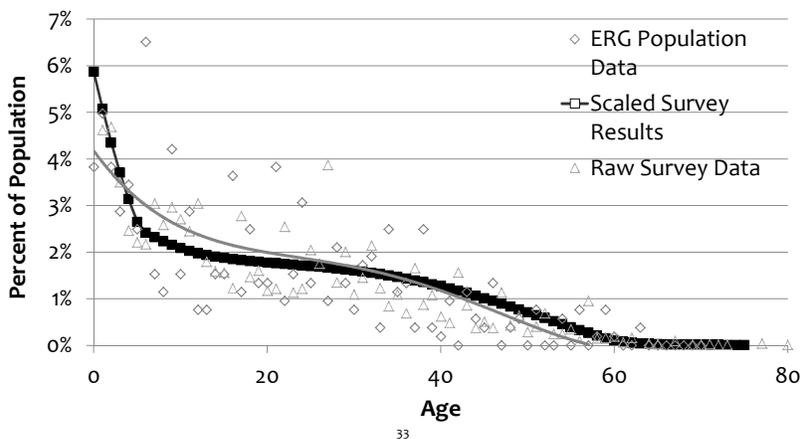
### Survey vs USDA: Age Comparison

- USDA has 2 age brackets: Over and under 5 years
- Survey results very consistent with USDA



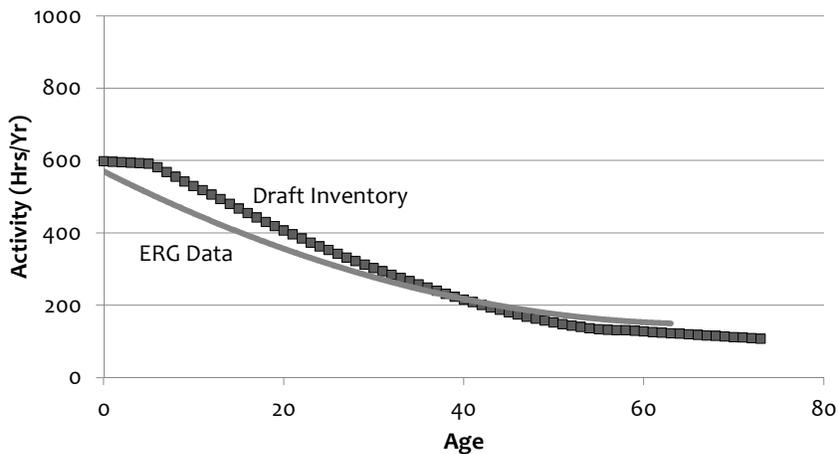
32

### Average Age Distribution Compares Well with 2007 ERG Study



33

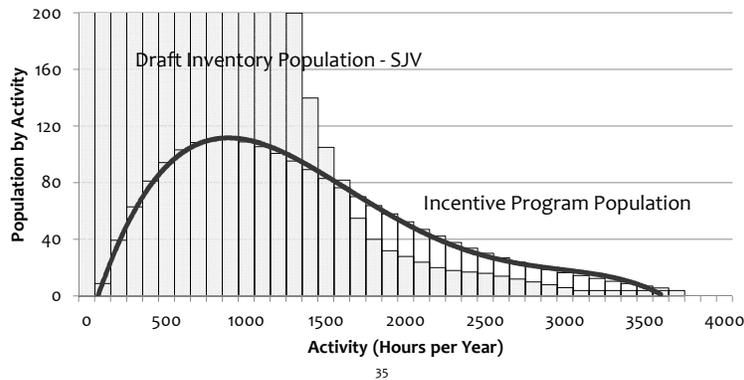
### Average Activity Compares Well with 2007 ERG Study



34

## Adjustments for High Activity Equipment

- Based on verified incentive project reports from SJV District high operators not sufficiently represented
- Inventory updated to reflect this population

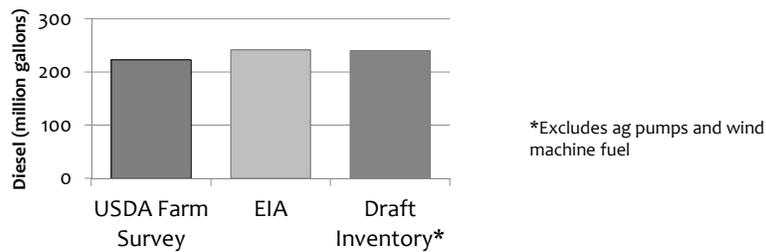


## Activity: Custom Operators

- Compared custom operator total activity to activity information from the USDA and UC Davis Extension
  - USDA total custom work annual expenditures for 2007
  - UC Davis hourly production rates
- Initial comparison indicates that total custom work activity is underestimated.
  - Results in a 5-15% impact on the overall inventory
- Staff continuing to refine this assumption and are seeking additional information from stakeholders.

## Fuel Corroboration Very Close

- Farm fuel data from Energy Information Administration and USDA
- Adjusting for high activity places reported farm fuel sales within 5% of draft inventory results



37

## Corroboration Summary

- Population, age, activity trends closely matches independent sources
- High-activity operators, specifically custom operators, scaled to match incentive data and independent studies
- Total fuel with adjustment within 5% of EIA average annual ag fuel use
  - Consistent statewide fuel use supports overall inventory

38

## Next Steps for Inventory

- Continue to refine inventory based on stakeholder feedback from workshops

39

## Proposal for Reducing Emissions from In-Use Off-Road Mobile Agricultural Equipment in the San Joaquin Valley



## Overview of Proposed Approach

- Near-Term Actions:
  - Continue to incentivize cleaner equipment
  - Develop mechanism agreed upon in Statement of Principles in 2010
  - Continue working collaboratively with SJVAPCD, USDA-NRCS, and U.S. EPA
  - Ensure emissions benefits achieved from federal and local incentive funding are SIP creditable
  - Establish a mechanism to ensure reductions are surplus, quantifiable, enforceable, and permanent

41

## Overview of Proposed Approach

- Longer-Term Actions:
  - Continue to encourage emission reductions achieved through incentive programs in the future
  - Tier 3 and cleaner engines will be part of the rule
  - Accelerate cleanest available technologies – engines meeting Tier 4 final emission standards

42

## Near-Term Actions: Federal Credit for Incentives

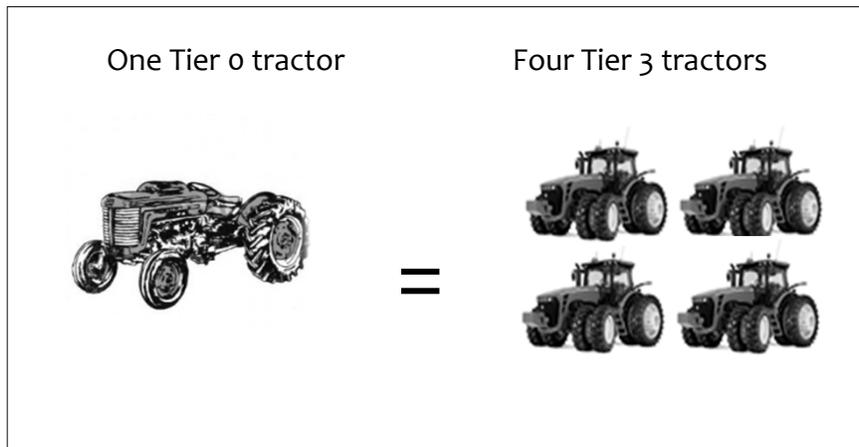


## Incentives Have Reduced Emissions

- Local, State, and federal incentives have accelerated deployment of cleaner Tier 3 equipment
- Goal of 5-10 tpd by 2017 is being achieved through incentives
- Voluntary and requires a cost share of 20-50%

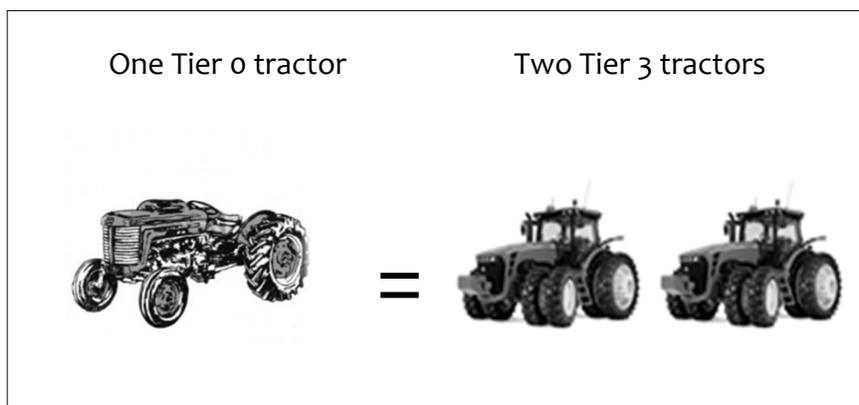
Incentive Programs	Equipment Replaced	Grant Monies Spent	Investments From Industry
National Resources Conservation Service (NRCS)	1318	\$72.2MM	\$64.1 MM
SJV local funds	702	\$21.0 MM	\$25.9 MM
Carl Moyer Program	275	\$12.2 MM	\$14.8 MM

## Today's Engines Are Much Cleaner For NOx Tier 0 vs. Tier 3



45

## Today's Engines Are Much Cleaner for PM Tier 0 vs. Tier 3



46

## How do Incentive Project Reductions Become SIP Creditable?

- Program ensures reductions are surplus, quantifiable, enforceable, and permanent
- Program updated over time through public process
- Program requires ongoing accountability including reporting, audits and enforcement
- U.S. EPA requires a rule to implement the interagency agreement

47

## Proposed Approach for Incentive Programs

- Develop a mechanism to provide SIP credit for emission reductions achieved with incentive funding
  - Collaboration between USDA-NRCS, U.S. EPA, SJVAPCD and ARB
- Allow districts to apply ARB program for local and federal funds
- Mechanism will ensure ongoing accountability through program reviews and audits

48

## Final Proposal Later this Year

- ARB and SJVAPCD will work with U.S. EPA to ensure incentives are SIP creditable
- SJVAPCD staff bring similar proposal to their Governing Board in June 2013
- ARB staff will bring proposal to ARB Board in Fall 2013
- Both actions will ensure that achievement of the SJV 2007 SIP goals through SJVAPCD incentive programs will be credited to the SIP

49

## Longer-Term Actions: Achieve Additional Reductions for 2015 Ozone SIP



## Achieve Additional Reductions to Attain Ozone Standard by 2032

- Work is beginning for the 2015 ozone attainment State Implementation Plan (SIP)
- Will include strategy to achieve long-term emission reductions from ag equipment
  - Accelerate turnover of equipment to cleanest available technology (e.g. Tier 4 final) once available
- Strategy will be developed in parallel with SIP
- Strategy will be taken to ARB Board in 2015

51

## Key Elements for Long-Term Rule

- Acceleration of cleaner technologies with a focus on Tier 4 final engines
- Continued opportunities for incentives
- Investments in Tier 3 and cleaner engines through 2020 to be part of compliance options
- Mechanism for 'trade-down' of existing Tier 3 equipment
- Develop through open public process

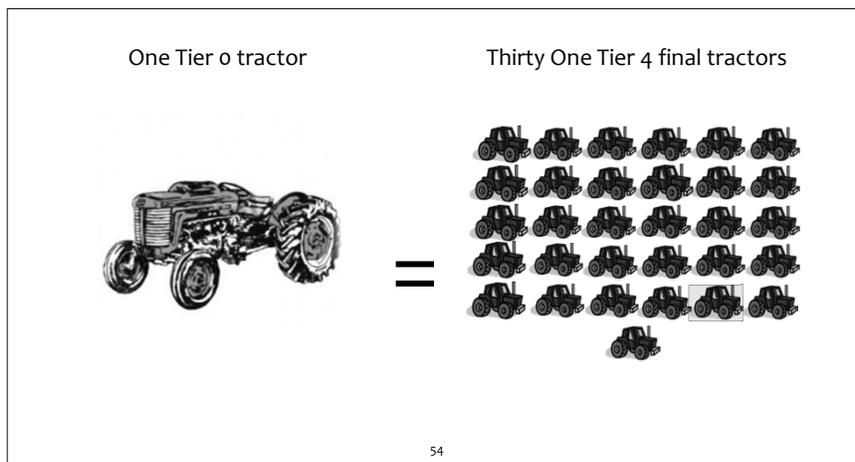
52

## When are Cleanest Engine Technologies Expected to Become Available?

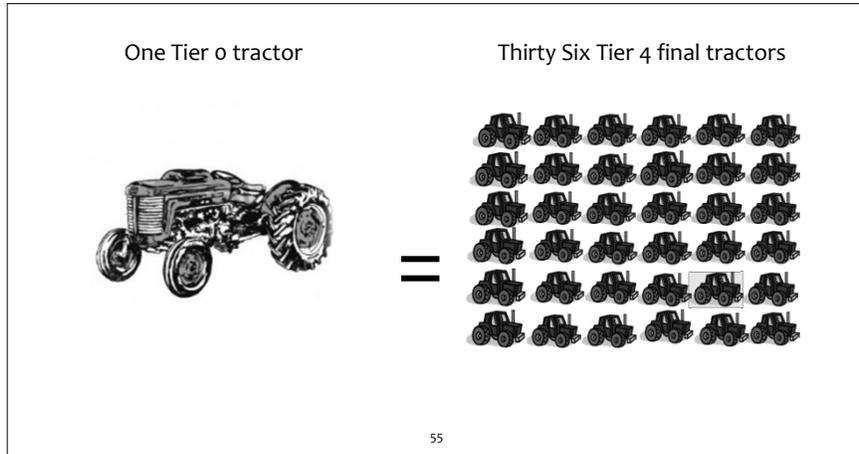
- Tier 4 Final engine standards phase in beginning 2013, depending on horsepower
- Manufacturers can utilize flexibility options to meet standards
  - Averaging, Banking, and Trading Program (ABT)
  - Transition Program for Equipment Manufacturers (TPEM)
  - Difficult to predict when Tier 4 Final available
- Staff expects Tier 4 final engines to be widely available in all horsepower categories for mobile agricultural equipment by 2020

53

## Tomorrow's Engines are the Cleanest for NOx Tier 0 vs. Tier 4 final



# Tomorrow's Engines are the Cleanest for PM Tier 0 vs. Tier 4 final



## Next Steps of the Process



## Next Steps

- Work with SJVAPCD and U.S. EPA on local incentive rules
- Continue stakeholder outreach
- Take ARB incentive rule for consideration to ARB Board in Fall 2013
- 2015 SIP strategy development for mobile agricultural equipment kicks off in early 2014

57

## Staff Contact Information

- Regulatory Development Staff
  - Sam Gregor, Lead Staff: [sgregor@arb.ca.gov](mailto:sgregor@arb.ca.gov) or (916) 323-0005
  - Lynsay Carmichael, Staff: [lcarmich@arb.ca.gov](mailto:lcarmich@arb.ca.gov) or (916) 322-0407
- Emissions Inventory Staff
  - Cory Parmer, Staff: [pparmer@arb.ca.gov](mailto:pparmer@arb.ca.gov) or (916) 323-8525
  - Nicole Dolney, Manager: [ndolney@arb.ca.gov](mailto:ndolney@arb.ca.gov) or (916) 322-1695
- Ombudsman's Office
  - Zenia Aguilera, Staff: [zaguiler@arb.ca.gov](mailto:zaguiler@arb.ca.gov) or (916) 327-1266
- Mobile Agricultural Regulation Website:
  - <http://www.arb.ca.gov/ag/agtractor/agtractor.htm>

58

## Open Discussion

