

# Verifier Accreditation Training for Mandatory Greenhouse Gas Reporting

General Verification  
Course 1.3 - Accuracy & Product Data

California Environmental Protection Agency

 **Air Resources Board**



# Verifier Accreditation Training for Mandatory Greenhouse Gas Reporting

## Course 1: General Verification

1.1 Verification Context, Principles, and Program  
Overview

1.2 Stationary Fuel Combustion and Sorbent Sources

1.3 Accuracy & Product Data

1.4 Electricity Generating Units & Cogeneration

# Course 1.3 Handout

- Handout 1.3.1 Covered Product Data:  
Table 9-1 of the Cap-and-Trade Regulation

# Course 1.3 Accuracy and Product Data

1. Excluded Sources
2. *De minimis* Emissions
  - Examples
  - Verification
3. Measurement Accuracy
4. Missing Data
5. Product Data

# Excluded Emissions Sources - Not Reported to ARB § 95101(f)

- EGUs designated as backup or emergency generators in air permit
- Portable equipment not part of oil and gas production
- Fire suppression systems and equipment
- Primary and secondary schools with a NAICS code of 611110
- Fugitive methane emissions from municipal solid waste landfills described in 40 CFR Part 98, Subpart HH
- Fugitive methane and fugitive nitrous oxide emissions from livestock manure management systems described in Subpart JJ, regardless of the magnitude of emissions produced
- Agricultural irrigation pumps

Facilities solely powered by nuclear, hydro, wind, or solar are excluded, unless on-site combustion emissions  $\geq 10,000$  MT CO<sub>2</sub>e (see Course 1.4)

# Small Emissions Sources - Reported as De Minimis Sources § 95103(i)

- Sources with emissions that collectively are both
  - $\leq 3\%$  of total facility or supplier emissions including biomass-derived fuel combustion ***and***
  - $\leq 20,000$  MT CO<sub>2</sub>e
- Emissions may be estimated using reasonable alternative method
  - Not biased toward over or under estimation
  - Accuracy within 5% not required
- Not applicable to electric power entities
- Not applicable to covered product data

# De Minimis Emissions – Potential Examples

- Infrequent fuel deliveries of propane where amount combusted during year can be estimated using hourly logged meter
- Sorbent used in emissions control systems for power plants
- Diesel fuel from a single tank that is used for both reportable stationary combustion equipment and non-reportable mobile equipment (a “reasonable estimate” of reportable emissions is acceptable)
- CH<sub>4</sub> and N<sub>2</sub>O emissions from a power plant using CO<sub>2</sub> CEMS

# Verification - Emissions Treated as De Minimis § 95103(i)

- Request documentation of data sources and emissions calculations reported as de minimis
- Assess reasonableness of alternative methods as well as accuracy of calculations
- Ensure appropriate categorization of exempt vs. non-exempt emissions reported as de minimis
- Evaluate uncertainty of emissions estimate to ensure total de minimis emissions are  
     $\leq 3\%$  facility emissions **AND**  $\leq 20,000$  MT CO<sub>2</sub>e

# Group Participation Exercise 1.3.1:

## De Minimis Sources

An operator reports emissions for the following sources. Which sources can be reported as de minimis?

Source	Emissions (MT CO <sub>2</sub> e)	% of Total
A	6,100	0.7%
B	9,900	1.2%
C	20,500	2.4%
D	352,000	42%
E	450,000	54%
Total	838,500	

# Group Participation Exercise 1.3.1:

## De Minimis Sources - Solution

Source	Emissions (MT CO <sub>2</sub> e)	% of Total
A	6,100	0.7%
B	9,900	1.2%
C	20,500	2.4%
D	352,000	42%
E	450,000	54%
Total	838,500	

Sources A and B may be reported as de minimis sources using either:

- Alternative reasonable method,

OR

- Tier method with accuracy requirement relaxed as long as method and result are reasonable

# Group Participation Exercise 1.3.2:

## De Minimis Sources

A refinery operator reports the following GHG emissions sources. Which sources may be considered de minimis?

Emission Point	Type of Fuel	Source ID(s)	Emissions (MT CO <sub>2</sub> e)	% of Total Emissions	Cumulative % of Total Emissions
P15	FCC Coke	RS7	1,116,740	31.54	100.00
P4	Refinery Fuel Gas - Utilities	RS12, RS15	696,314	19.67	68.46
P2	RFG – Fuels A	RS20, RS23/24	464,058	13.11	48.79
P8	RFG – Cracking	RS1	282,443	7.98	35.68
P1	Natural Gas	RS16	214,508	6.06	27.70
P12	Natural Gas	RS26	174,366	4.93	21.64
P12	Refinery Fuel Oil	RS3	155,762	4.40	16.72
P14	RFG – Fuels B	RS17/18/19	123,994	3.50	12.32
P3	RFG – Cracking	RS2	100,440	2.84	8.81
P9	Acid Gas	RS33	96,172	2.72	5.98
P8	RFG – Utilities	RS11, RS14	55,143	1.56	3.26
P1	Biomass-Derived	RS6	25,125	0.71	1.70
P10	Natural Gas	RS36/37/38	14,654	0.41	0.99
P4	CCR Offgas	RS4	12,321	0.35	0.58
P7	CCR Offgas	RS5	4,231	0.12	0.23
P12	Sour Gas	RS35/39	3,655	0.10	0.11
P6	Gas Oil	RS40	292	0.01	0.01
P7	Refinery Fuel Oil	RS12	0	0.00	0.00
				100.00	

# Group Participation Exercise 1.3.2:

## De Minimis Sources - Solution

Emission Point	Type of Fuel	Source ID(s)	Emissions (MT CO <sub>2</sub> e)	% of Total Emissions	Cumulative % of Total Emissions
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<i>P7</i>	<i>CCR Offgas</i>	<i>RS5</i>	<i>4,231</i>	<i>0.12</i>	<i>0.23</i>
<i>P12</i>	<i>Sour Gas</i>	<i>RS35/39</i>	<i>3,655</i>	<i>0.10</i>	<i>0.11</i>
<i>P6</i>	<i>Gas Oil</i>	<i>RS40</i>	<i>292</i>	<i>0.01</i>	<i>0.01</i>
<i>P7</i>	<i>Refinery Fuel Oil</i>	<i>RS12</i>	<i>0</i>	<i>0.00</i>	<i>0.00</i>
				100.00	

Threshold for de minimis is BOTH <3% of total emissions and <20,000 MT CO<sub>2</sub>e

# Questions and ARB Comments

1. Excluded Sources
2. *De minimis* Emissions
- 3. Measurement Accuracy**
  - Accuracy requirements
  - Calibration
  - Verification
4. Missing Data
5. Product Data

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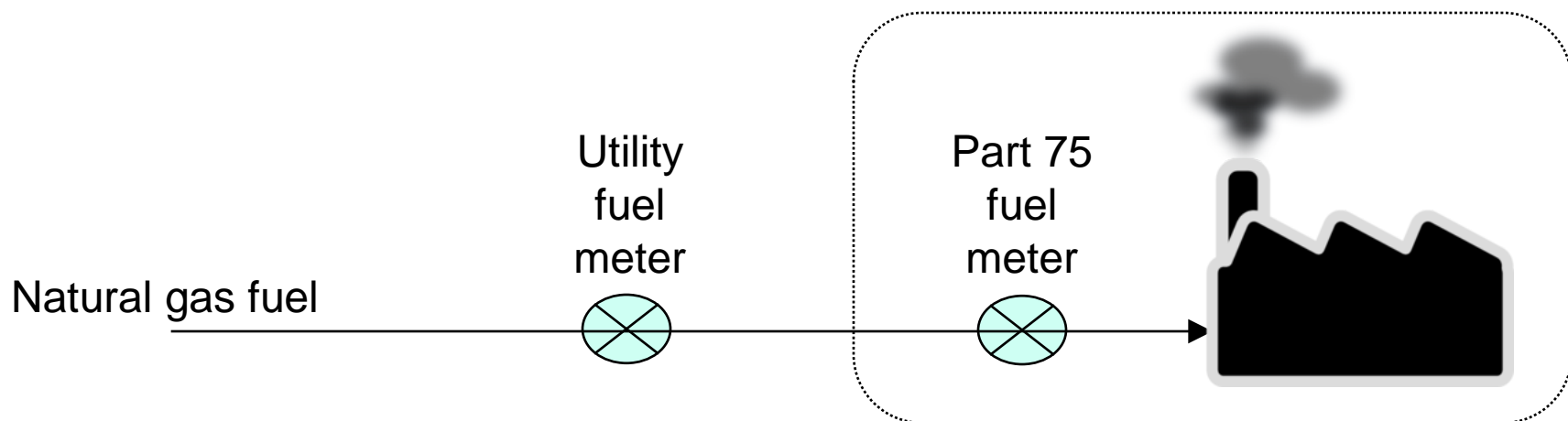


# Measurement Accuracy Requirements

- (1) 40 CFR Part 75 accuracy requirements
  - CFR Part 98 and § 95103(k) reference Part 75
- (2) 40 CFR 98.3(i) applies to facilities subject to Part 98
- (3) § 95103(k) applies to *covered* emissions and *covered* product data from *covered* entities (subject to Cap-and-Trade Regulation)
  - Requires covered data measurements to be +/-5% accurate
  - MRR calibration requirements more stringent than Part 98

# Facilities Subject to 40 CFR Part 75

- Primarily applies to electric generating units (EGUs)
- Must meet Part 75 Appendix D accuracy requirements
- Exempt from MRR-specific calibration requirements in § 95103(k)
  - Except that facilities using Part 75 Appendix G § 2.3 (fuel flow based “CEMS”) must still meet measurement accuracy of +/-5% ( § 95103(k)(10))



# Facilities Subject to 40 CFR Part 98.3(i)

- Requires calibration by 2010
- Calibration may be postponed if device cannot be calibrated until next scheduled maintenance outage (98.3(i)(6))
- Calibration procedures not specified - an “industry standard” may be used (98.3(i)(1)(i))
- For orifice meters, transmitter calibration requires
  - If 3 transmitters,  $\pm 2\%$  for each, or overall accuracy of  $\pm 6\%$
  - If 2 transmitters,  $\pm 2\%$  for each, or overall accuracy of  $\pm 4\%$
- Requirement to inspect orifice plate during calibration (98.34(b)(1)(iv))

# Measurement Accuracy § 95103(k)

- MRR requirements follow 98.3(i) for fuels and feedstocks, with certain differences:
  - More specific calibration requirements
  - May postpone calibration if approved by ARB in writing
  - Measurement device accuracy (+/- 5%) applies for devices used to calculate **covered** emissions and **covered** product data
- § 95103(k) applies to monitoring of fuel and feedstock consumption; process stream flow; steam flow; density, specific gravity, MW measurements; mass and liquid flow measurements; chromatographs, spectrometers, calorimeters and scales
- Specific provisions for inventory, stock and tank-drop measurements are specified in § 95103(k)(11)

# Data Not Subject to Measurement Accuracy Requirements under § 95103(k)

- Exempt biogenic CO<sub>2</sub> emissions, geothermal emissions, and some vented and fugitive emissions from oil and gas production (emissions not covered under C&T)
- Emissions measured using financial transaction meters (verifier confirms no ownership connection between fuel supplier and purchaser § 95103(k)(7))
- Emissions reported and verified as de minimis
- Individual emissions sources reported under Part 75
- Electricity generation or thermal output estimates
- Fuel usage, when not used to calculate emissions (CEMS)

# Meters Not Subject to § 95103(k) Calibration Requirements

- When financial transaction meters are used ( § 95103(k)(7))
  - Verifier assumes data is measured accurately
- Non-financial transaction meters used by Public Utility Gas Corporations, meeting accuracy requirements of the CPUC
  - Verifier assumes data is measured accurately
- When “best available information/methods/data” are allowed ( § 95103(h))
  - Must still demonstrate measurement accuracy of data (+/-5%)
- Upstream ethanol and additive meters for gasoline blendstocks, applicable to § 95121 transportation fuel suppliers ( § 95103(k)(7))

# ARB Calibration Requirements § 95103(k)

- Calibration procedures must be documented in the GHG Monitoring Plan
- All inspection and calibration information must be made available to verifiers
- Perform calibrations according to either
  - Original equipment manufacturer's (OEM) documentation, or
  - 40 CFR 98.2(i)(2)-(3) if OEM is unavailable, except a minimum of 3 calibration points must be used
- If OEM is not available, or if another method is deemed to be more accurate, then can use alternate method
  - ALL alternative methods used must be approved in writing by ARB ( § 95109(b))
- Includes other requirements such as photo of orifice plate
- Postponement requests for cases of operational disruption

# Recalibration Frequency and Accuracy Requirements § 95103(k)(4)

- See reporting guidance (Meter Calibration and Accuracy: Emissions Data Metering for Greenhouse Gas Reporting)
- Shortest frequency is required
  - According to applicable subpart of Part 98
  - As recommended by manufacturer
  - Once every 3 year compliance period (CA-only requirement)
    - No less than 30 months
    - No more than 48 months
  - When meter is replaced
  - Within 48 months of pre-2012 calibration if OEM does not specify calibration frequency

# Failed Calibrations<sup>1</sup>

- If meter fails calibration, verifier must identify a nonconformance and confirm total period of invalid data
  - Data collected since the date of the last accurate calibration is considered invalid data
  - § 95103(k)(6)(B) provides for annual field accuracy tests in years between successive calibrations, to limit length of invalid data periods
- If invalid data for a measurement device represents >5% of covered emissions or covered product data, the operator must demonstrate using other evidence that the measured data is still +/-5% accurate ( § 95103(k)(10))

<sup>1</sup> See missing emissions data and excluded covered product data provisions later in Course 1.3 If an ARB-approved postponement request is in effect, see published guidance.

# Verification of Measurement Accuracy

## (1 of 2)

- Include assessment of risk for meter accuracy in sampling plan
  - Higher risk for covered emissions, covered product data, and larger, more uncertain sources
  - Low risk for non-covered emissions and small sources

# Verification of Measurement Accuracy

## (2 of 2)

- Confirm all measurements claimed as exempt meet specified exemption requirements
  - Public utility gas meters must meet CPUC requirements
  - Financial transaction meter criteria ( § 95103(k)(7))
  - Exempt biomass measurement (C&T § 95852.2(a))
  - CH<sub>4</sub> and N<sub>2</sub>O from biomass-derived fuel combustion are **not exempt** from accuracy requirements unless *de minimis*

# Meter System Verification Issues

- Are the meter specifications appropriate for the application (e.g. fluid type, flow range, temperature range)?
- Was the meter installed per manufacturer specifications (e.g. required straight pipe lengths upstream and downstream)?
- Is the meter being maintained and operated per manufacturer specifications?
- Was the meter calibrated for the full period of data reporting, per U.S. EPA and MRR calibration requirements?
- Do the meter calibrations demonstrate required meter accuracy?

# Addressing Meter System Issues in the Verification Risk Assessment (1 of 2)

- Verification risk assessments must address risk of inaccurate data from meter system issues
- Every verification team should include personnel knowledgeable about meter systems
- GHG monitoring plan should describe the meter system (specifications, calibrations, operation, maintenance)

# Addressing Meter System Issues in the Verification Risk Assessment (2 of 2)

Complete documentation on high risk meters should be obtained and reviewed during the verification

- OEM specifications on fluid type, range, and temp. vs. in-service use
- Summary of OEM installation requirements vs. as-built confirmation
- OEM operation and maintenance procedures vs. in-service procedures
- OEM calibration procedures vs. in-service procedures
- Accuracy requirements for each meter and failed calibration procedures

# Meter System Factors Contributing to Higher Verification Risk

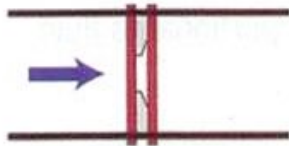
- Meters operated by the reporting facility (particularly when no independent supplier data is available to compare to metered results)
- Meters that provide data used in the calculation of more than 5% of covered emissions
- Meters that provide data used in the calculation of *any* covered product data
- Complex metering systems that require multiple sensors
- Meter systems with sparsely available OEM and facility documentation
- Meter systems with infrequent calibrations (over one year) and no intervening field accuracy assessments

# Meter System Factors Contributing to Lower Verification Risk

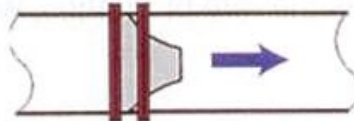
- Meters producing data for minor and “*de minimis*” emission sources
- Meters exempt from § 95103(k) measurement accuracy requirements
  - Meters solely used to collect data on non-covered emissions and non-covered production
  - Financial transaction meters where supplier (meter operator) is independent of facility operator (see § 95103(k)(7))

# Wide Range of Flow Meter Types Used

Differential Pressure Meters (including orifice, nozzle, venture, wedge and Pitot tube meters)



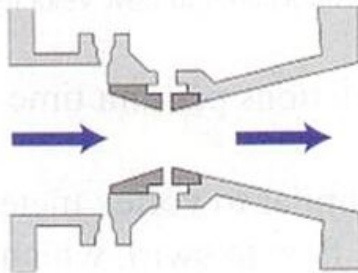
Standard Orifice



Standard Nozzle



Venturi Meter



Proprietary Flowtube

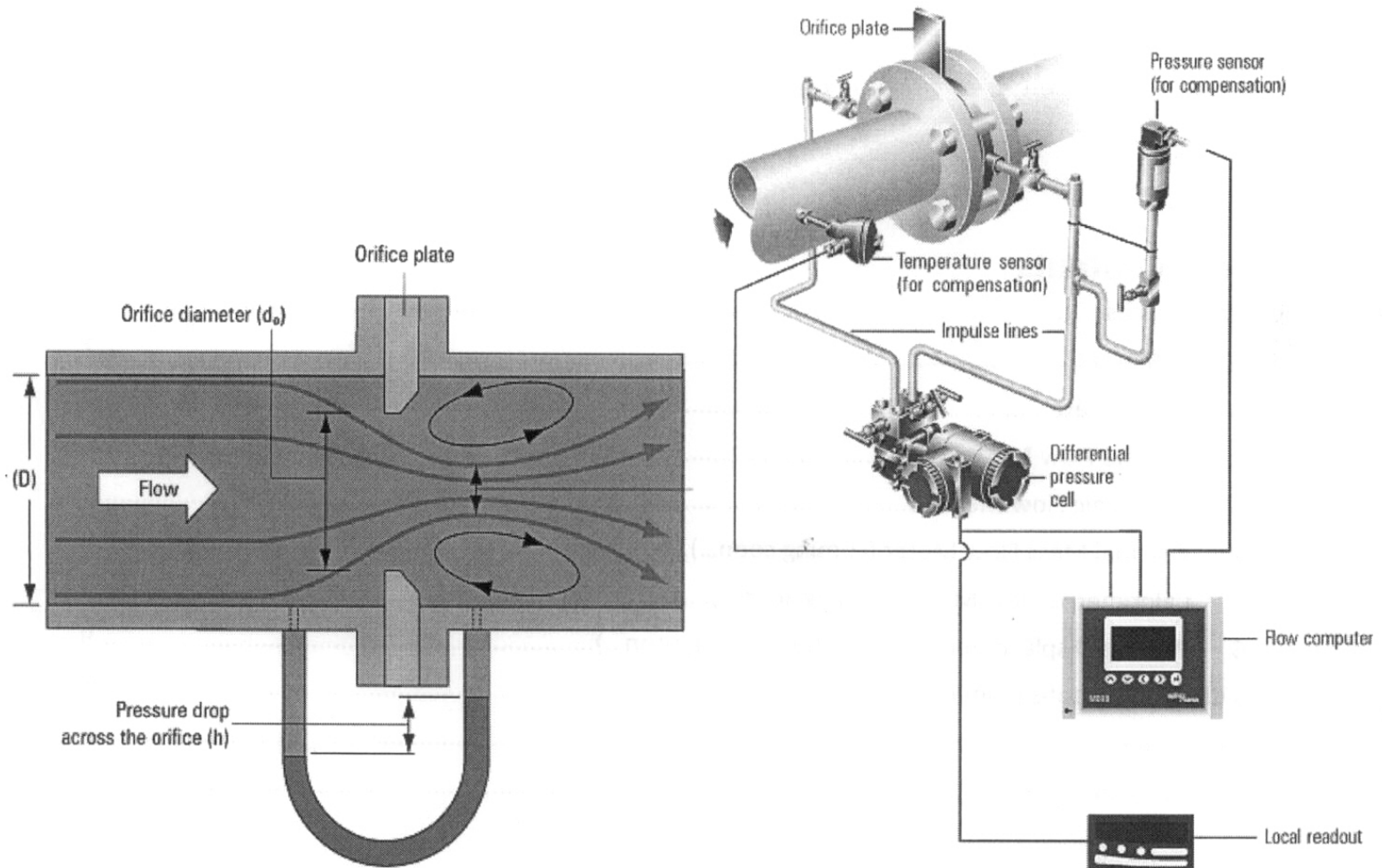


V-Shaped Wedge



Pitot Tube

# Orifice Plate Meters are the Most Common



# Orifice Plate Meters (1 of 2)

- Common application for gas and steam flow meters
- OEM specified installation – minimum straight pipe lengths required upstream and downstream for linear flow
- Orifice meters have three sensors that must be separately calibrated (static pressure, differential pressure and temperature)
- Orifice plates must be installed correctly and must be inspected to check for deposits or etching of orifice - see § 95103(k)(6)
- The 5% meter accuracy requirement applies to the entire meter (i.e. sum the errors from each of the three sensors)

## Orifice Plate Meters (2 of 2)

- During verification, graph flow to look for sudden changes or creep
- If plate replaced or serviced, look for sharp change in flow on service date
- During site visit, check that plate installed correctly (engraving faces upstream)
- Measure pipe diameter, upstream and downstream straight run
- Take photos of installation for future reference

# Orifice Plate Example Calibration Record

Orifice Plate - Meter Tube Information	
Tube I.D. <u>1.939</u>	Plate I.D. <u>1.732</u>
Orifice Taps Pipe <input type="checkbox"/> Flange <input type="checkbox"/>	
Orifice Fitting: Serial No. _____	
Sr. <input type="checkbox"/> Jr. <input type="checkbox"/> Simplex <input type="checkbox"/> Flg. <input type="checkbox"/>	
Plate Inspection	
Plate Clean Yes <input type="checkbox"/> No <input type="checkbox"/>	
Plate Damaged Yes <input type="checkbox"/> No <input type="checkbox"/>	
Plate Change <input type="checkbox"/> Tube Change <input type="checkbox"/>	
Removed _____ " Installed _____ "	

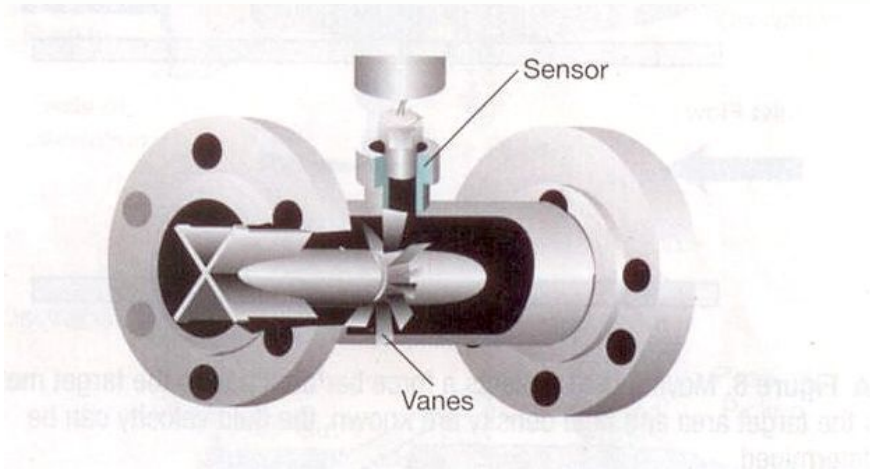
Differential							
Found _____ " Left _____ " Test Method PK <input type="checkbox"/> W.C. <input type="checkbox"/>							
Temp. Comp. Yes <input type="checkbox"/> No <input type="checkbox"/> W.C. Temp. _____ °F							
W.P. Zero As Found _____							
Friction Test: O.K. <input type="checkbox"/> Reset <input type="checkbox"/>							
Found				Left			
Up		Down		Up		Down	
PK/WC	Rec	PK/WC	Rec	PK/WC	Rec	PK/WC	Rec
			0.05				0
			74.99				75
			149.98				150

Thermometer				
	Found		Left	
Range	Test Ther	Rec	Test Ther	Rec
High		197.08		200
Flow		66.73		
Low		0.005		0
Static Pressure				
Found		Left		
D W	Rec	D W	Rec	
PSIG _____	PSIG <u>-14</u>	PSIG _____	PSIG <u>0</u>	
+A.P. _____	+A.P. <u>249.85</u>	+A.P. _____	+A.P. <u>250</u>	
PSIA _____	PSIA <u>499.79</u>	PSIA _____	PSIA <u>500</u>	
Date <u>4-11-12</u>		Time <u>200</u> a.m. <u>p.m.</u>		
Tester <u>Joe Brett</u>				
(I Hereby Certify That The Information Herein Is Correctly Stated)				

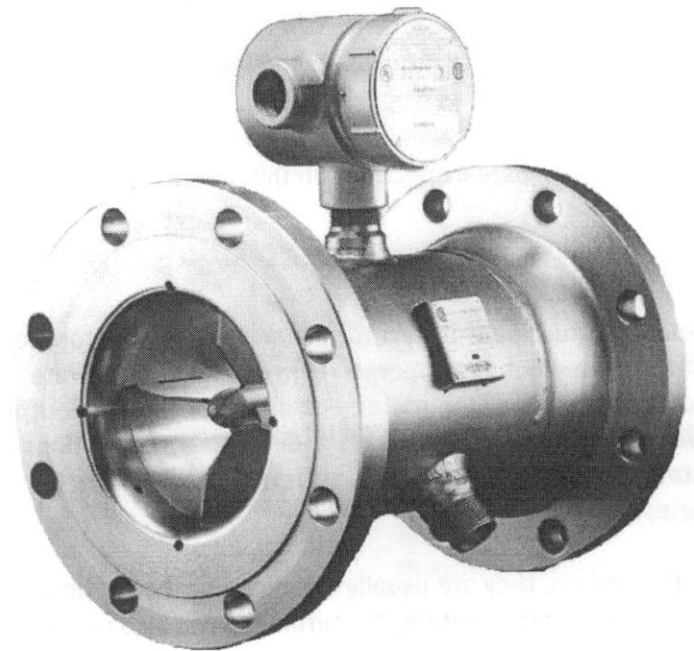
# Orifice Plate Example Calibration Record

Meter Type				Differential Tests													
ORIFICE		Manuf ALLEN BRADLEY		Type EFM		DP Test Inst. CRYSTAL 33		Serial Number 2262-738439									
S.N. 1 DP-07292135		S.N. 2 SP-09070828		Model No. N/A		DP Avg Initial 51.300		DP Avg Final 46.300		WP Zero -.100		AP Zero -.100					
DP Range 200		SP Range 3000		Static Set PSIG		Leak Found No		Pen Lag N/A		Arc N/A		Friction / Drag N/A					
Taps FLANGE		SP Conn. US		D.P. Cutoff		As Found Test 0.000		As Found Meter -0.100		As Left Test 0.000		As Left Meter 0.000					
Static Tests																	
SP Test Inst. CRYSTAL 33		Serial No. 2262-738439		SP Avg Initial 406.000		SP Avg Final 405.000		As Found Test 100.000		As Found Meter 99.800		As Left Test 100.000		As Left Meter 100.000			
								200.000		199.600		200.000		200.000			
								150.000		149.600		150.000		150.000			
								50.000		49.700		50.000		50.000			
								0.000		-0.100		0.000		0.000			
As Found Test 405.100		As Found Meter 405.000		As Left Test 405.000		As Left Meter 405.000											
0.000		0.000		0.000		0.000											
Temperature Test				Meter Tube / Plate Data													
Temp Type EFM		Serial No. CH105F2T4		Scale		Fitting Manuf. OTHER		Type FLANGE		Serial No. N/A		Tube ID 4.026		Plate Bore 1.000		Beta Ratio 0.25	
Temp Range 0-249.8		Temp Test Inst. OTHER		Serial No. 111541364		Inspect Plate Yes		Plate Clean Yes		Mic Plate Yes		Plate Cond. Good		Plate Changed No		New Plate	
As Found Test 76.700		As Found Meter 76.000		As Left Test 76.000		As Left Meter 76.000											

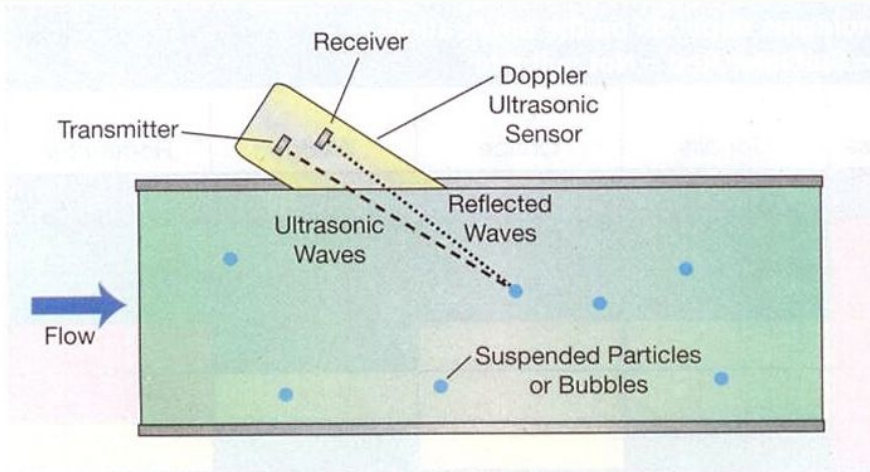
# More Common Flow Meters - Turbine Flow



- Requires temperature and pressure correction (normally internal)
- Best application is steady fluid flow
- Requires flow straightener vanes or long runs of straight pipe
- Internal parts should be inspected periodically for wear or corrosion



# More Common Flow Meters - Ultrasonic



- Two types – Doppler and Time-of-Flight
- Common use in natural gas transmission
- Requires long straight pipe upstream and downstream
- These are low maintenance meters



# Natural Gas Combined Cycle Electric Generating Unit Flow Meters

Most report CO<sub>2</sub> under 40 CFR 75 Appendix G 2.3

- This reporting is commonly referred to as CEMS CO<sub>2</sub> reporting, but does not make use of stack gas CO<sub>2</sub> and exhaust gas flow meters
- These facilities use CEMS software to calculate CO<sub>2</sub> emissions based on fuel gas flow from an orifice meter and heat content from a gas chromatograph
- Calibration standards per 40 CFR 75 App. D (sum of three sensor errors 4% or less, and orifice inspection within tolerance)
- Verify meters meet § 95103(k)(10) - exempt from § 95103(k)(1-9)
- Supplier fuel data normally available for comparison to reported fuel flow and heat content data

## Group Participation Exercise 1.3.3: Measurements and Monitoring

An operator of an electric generation facility subject to Subpart D discovers that a natural gas fuel meter was out of calibration by 2%, and instead of adjusting the meter back into calibration, the operator replaces the meter

- What information should the verifier request?
- What actions should the verifier take?

# Group Participation Exercise 1.3.3:

## Measurements and Monitoring - Solution (1 of 2)

### What information should the verifier request?

- Calibration schedule to determine if frequency meets OEM requirement
- Dates and operating schedules for old meter removal and new meter installation - are there data gaps?
- Qualifications of person installing and calibrating new meter
- Initial calibration records for new meter
- OEM manual to determine if meter is fit for purpose - was it designed for that type of gas or liquid, moisture content, and pressure range?
- Explanation of which parts of the metering system are examined and evaluated for accuracy and which inputs are used to estimate flow
- Unless same meter type is used to replace the meter, ensure units of measurement in the measured output are the same

## Group Participation Exercise 1.3.3: Measurements and Monitoring - Solution (2 of 2)

### What actions should the verifier take?

- If both (old and new) meters are demonstrated to be +/- 5% accurate, then meters are deemed correct
- If new meter is not accurate, identify in issues log.
  - Determine whether reporter used a temporary method or an ARB-approved alternate method
  - Determine whether reporter used missing data provisions
  - Method(s) should be described in GHG Monitoring Plan

Review the (Meter Calibration and Accuracy: Emissions Data Metering for Greenhouse Gas Reporting) Guidance

# Questions and ARB Comments

1. Excluded Sources
2. *De minimis* Emissions
3. Measurement Accuracy
- 4. Missing Data**
  - Types and Requirements
  - Missing Data Options
  - Evaluation and Verification
5. Product Data

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# Types of Missing Data § 95129

## (Applies to Emissions Data Only)

- Part 75 - use of Part 75 missing data provisions
- CEMS - use applicable Part 60/75 provision
- Fuel characteristic data § 95129(c)
  - High heat value of non-pipeline natural gas
  - Carbon content of mixture of petroleum coke and coal
- Fuel consumption § 95129(d)
  - Gallons of diesel fuel
  - Therms of natural gas
  - Wood waste or other biogenic sources

## Missing Data § 95129

- Reporting entities must make every reasonable effort to collect valid data
- Most invalid or missing emissions data can be replaced using provisions in § 95129
- Missing data estimates are conservative and overestimate actual emissions
- However, correctly substituted data is treated as “accurate” by verifier when evaluating material misstatement

[http://www.arb.ca.gov/cc/reporting/ghg-rep/guidance/missing\\_data.pdf](http://www.arb.ca.gov/cc/reporting/ghg-rep/guidance/missing_data.pdf)

# Requirements for Missing Data § 95129

- Missing data substitution only applies to data used to calculate emissions—it does not apply to covered product data
- **§ 40 CFR Part 75:** All missing data for fuel-based CO<sub>2</sub> calculation for units using Part 75 methods
- **§ 95129:** Fuel consumption, fuel characteristic data, steam production data for all emissions; CH<sub>4</sub> and N<sub>2</sub>O calculation for Part 75 and units using CEMS

# Types of Missing Data Required to be Substituted Under § 95129

- If a facility has missing fuel consumption or fuel characteristic data, or steam data, missing data substitution is required by § 95129
  - Verifier must note date and source of any missing data substitutions discovered during verification in the verification report ( § 95131(b)(13)(D))
- The following two examples do not trigger missing data because they do not impact data quality
  - Not following re-calibration frequency but subsequent calibration was found to be in compliance with measurement accuracy
  - A faulty temperature probe for a process that never changes temperature

# Options for Missing Fuel Consumption Data under § 95129(d)(1),(2), and (3)

- Option 1: Estimate using load ranges
- Option 2: Estimate data capture rate for fuel consumption data
- Option 3: Use maximum potential fuel consumption rate if data capture rate is not available

# Options for Missing Fuel Consumption Data under § 95129(d)(1): Option 1: Load Ranges

- Eligible sources (electricity generation)
- Create and maintain fuel-specific databases
- Establish 10 operating load ranges or use approved alternate load ranges (units producing electrical or thermal output, only)
- Estimate using previous 720 hours of data, use higher load ranges, and max potential flow rate, if necessary
- Lookback period of 3 years

# Options for Missing Fuel Consumption Data under § 95129(d): Option 2: Data Capture

- Estimate data capture rate for fuel consumption data as required in § 95129(d)(2)

Data capture rate:  $(\# \text{ obtained} / \# \text{ required}) \times 100$

- Use the following methods depending on capture rate

Data Capture Rate	Data Substitution Method
≥ 95%	Available process data
90-95%	90 <sup>th</sup> percentile value recorded in current and previous 2 years, use prorate procedure if required
80-90%	95 <sup>th</sup> percentile value recorded in current and previous 2 years, use prorate procedure if required
<80%	Maximum potential rate

# Options for Missing Fuel Consumption Data under § 95129(d): Option 3: Use Max. Value

- Applies if unit is unable to use options 1 or 2, because no quality-assured data is available in missing data lookback period
- Use maximum fuel consumption for the unit for each hour of missing data

# Evaluating Missing Data for Tier 4 Units

## (1 of 2)

- For missing fuel consumption data, follow same missing data procedures as for other tiers
  - If fuel consumption data were not used for emission calculation, operator may use best available estimate to fill missing data
- Do the missing CEMS data substitution procedures conform with applicable procedures in 40 CFR Part 60 and 75?

# Evaluating Missing Data for Tier 4 Units

## (2 of 2)

- If there was a serious CEMS breakdown, did the reporter
  - Request and receive approval to use interim data collection procedures during the breakdown period?
  - Change calculation methods and follow Tier 2 or Tier 3 requirements during the breakdown?

# Requirements for Missing Fuel Characteristic Data § 95129(c): HHV, CC, MW, etc.

- Reanalyze sample or analyze backup sample to obtain valid data
- Otherwise, estimate data capture rate  
(# obtained/# required x 100%)

Data Capture Rate	Data Substitution Method
≥ 90%	“Before and after” averaging
80-90%	Highest value recorded in current and previous 2 years
< 80%	Greatest of highest recorded of all records, or default in Table 1

# Evaluating Missing Data for CH<sub>4</sub> and N<sub>2</sub>O Emissions and Source Test Data

- Follow the missing data procedures for evaluating evidence as specified in § 95129(d) - three options
- Part 75 and CEMS units also must follow § 95129(d) for CH<sub>4</sub> and N<sub>2</sub>O (unless *de minimis*) even though they do not use § 95129 for CO<sub>2</sub>
- If facility is using source testing to derive EF
  - Based on source test report, verify that source testing followed the ARB-approved test plan
  - Verify that calculations followed applicable procedures using source-specific EFs

# Other Missing Data Substitution Requirements

- May use ARB-approved interim data collection procedure for fuel analytical data in case of equipment breakdown and loss of data >10% (§ 95129(h))
- Substitute missing steam production data based on data capture (§ 95129(e))
  - Use process data, 90<sup>th</sup> percentile value, highest value
  - If steam data are missing, contact ARB staff
- Note that a temporary method can be used to avoid missing data substitution – reporter notifies ARB and uses for <365 days (§ 95103(m)(4))

# Missing Data Nonconformance

- If missing data affects greater than 20% of an emissions source, **OR** 5% of total emissions, a finding of nonconformance is issued and described in verification statement (§ 95131(b)(13)(C))
  - Includes fuel flow, fuel characteristics (HHV, CC, MW)
- If missing data procedure is used correctly, the substitute emissions data is defined as acceptable and does not impact evaluation of material misstatement (error = 0)

# Verifying Missing Data Substitution

## § 95131(b)(13)

- If  $\leq 20\%$  of missing data are substituted and verifier confirms that correct procedure was used, a finding of conformance with required emissions calculation methods is issued
- If missing data procedures are followed correctly, data are defined as accurate and correct, even if the result of using the substituted data overestimates emissions
  - This is “built into” the regulation to incentivize reporters to minimize missing data

# Group Participation Exercise 1.3.4: Missing Fuel Flow Data

Boiler burns natural gas to generate steam:

- At least 23% of the fuel flow data is missing
- HHV of gas is between 1,075 and 1,100 Btu/scf for 355 of 365 days
- Load range data is available per § 95129(d)(1)

What information should the verification team request?

## Group Participation Exercise 1.3.4: Missing Fuel Flow Data - Solution

What information should the verification team request?

- Fuel flow data and operator's method of missing data substitution (GHG Monitoring Plan)
- Data from another source, utility meter, or other fuel supplier
- Cause of missing data and steps taken to prevent future data risks
- **A nonconformance exists because >20% of the data used to estimate flow data is missing (see §95131(b)(13)(C)), regardless of the quality of the substituted data**

# Group Participation Exercise 1.3.5:

## Missing Data

A boiler burns a mixture of natural gas and landfill gas (verified exempt) with the following data capture rates. How should missing data be substituted to calculate emissions?

	Natural Gas	Landfill Gas
Annual HHV (avg.)	955 Btu/scf	510 Btu/scf
% data capture of HHV	88%	100%
% data capture of CC	76%	0%
% flow data capture	88%	88%
Max HHV	1,045 Btu/scf	540 Btu/scf
95th percentile value of fuel flow (3yrs)	12,000 scfm	1,800 scfm
Fuel analytical data	86% CH <sub>4</sub> , 7% CO <sub>2</sub>	varies

# Group Participation Exercise 1.3.5:

## Missing Data - Solution

- Natural Gas
  - Not pipeline quality (970 to 1,100 Btu/scf, and at least 90% CH<sub>4</sub>, <5% CO<sub>2</sub>)
  - Must use Tier 3 (measured CC)
  - Less than 80% data capture for carbon content, so use greatest of highest value or default from Table 1 (75%)
  - Fuel flow substituted using load ranges, if available, otherwise use 95% percentile value (>80% data capture)
- Landfill (biogas) emissions
  - Verified exempt (not covered), so may use either Tier 1 or Tier 2
  - Missing data substituted using § 98.35 (average of before and after, and best available allowed)

# Questions and ARB Comments

1. Excluded Sources
2. *De minimis* Emissions
3. Measurement Accuracy
4. Missing Data
- 5. Product Data**
  - **Covered Product Data**
  - **Verifying Covered Product Data**
  - **Product Data Verification Statement**

California Environmental Protection Agency

 **Air Resources Board**

# Covered Product Data ( § 95103(l)) (1 of 2)

- Required to support Cap-and-Trade Program direct allocation of allowances through product- based benchmarks
  - For each covered product, the operator must report a matching NAICS code and perform the activity listed with the product in Table 9-1
- Independent from emissions data verification
- Verifier must confirm that missing data were not used in place of actual product data
  - Missing data provisions DO NOT apply
- Covered products listed in § 95110, 95113-95120, 95124, and 95156 (especially 95115(n))

## Covered Product Data ( § 95103(I)) (2 of 2)

- For many covered products, data must be quantified on a production basis. Some covered products are quantified on a sales basis, and some are intermediate products.<sup>1</sup>
  - Check reporting requirements to each covered product to determine which method is required.
  - Covered product data ONLY includes materials produced on-site.
  - Use of sales data with an inventory adjustment is considered equivalent to production data for products that are sold

<sup>1</sup>*Covered Product Data General Reporting and Verification Guidance*

# Verifying Covered Product Data

## § 95131(b)(8)(E) (1 of 2)

- Plant engineer and operations may be separate from accounting and sales departments—be sure to check data with both sources, if applicable
- Verification is evidence-based – review raw data *and* compiled data from daily production records, accounting, and sales department to determine accuracy of reported data.

# Verifying Covered Product Data

## § 95131(b)(8)(E) (2 of 2)

- Types of information to request and check
  - Product inventory and stock records
  - Product sales records and contracts
  - Onsite and offsite product delivery records
  - Purchase and delivery records for inputs to products
  - Product measurement records
  - Other information that provides financial or direct measurement information about total products reported
- Request explanation of why sales data accurately represents the quantity of produced covered product, if applicable

# Verifying Covered Product Data and Conflicts of Interest (95133(b)(2)(H)-(I))

- Verifiers must NOT perform a risk-based analysis of covered production data based on the contribution of that data to free allowance allocation
  - Doing so constitutes a high conflict of interest under 95133(b)(2)(H) and (I)
    - (H) Appraisal services of carbon or greenhouse gas liabilities or assets
    - (I) Brokering in, advising on, or assisting in any way in carbon or greenhouse gas-related markets
- Verifiers must instead check ALL covered product data for conformance and material misstatement

# Verifying Covered Product Data

## § 95131(b)(7) Sampling Plan

- The verifier's risk analysis and sampling plan must include all covered product data.
- The verifier must conduct an in-depth review for covered products identified as the highest risk, including detailed data checks and review of data management systems.
- For all other covered products the verifier should at a minimum review the data management systems for data collection, and review data as needed, to reach reasonable assurance that each covered product meets the accuracy requirements of section 95103(k).

# Requirements Specific to Measurement of Covered Product Data: Inventory, Stock, or Tank Drops § 95103(k)(11)

- All methods used to measure inventory, stock, or tank drops must achieve  $\pm 5\%$  accuracy
- Quantification of a calendar year inventory adjustment or use of a material balance method must achieve  $\pm 5\%$  accuracy for the year
- Techniques used to quantify amounts stored at the beginning and end of a time period are not subject to calibration requirements
- Verifier must confirm whether a correctable error exists and once corrected, account for uncertainty in amounts stored at the beginning and end of a time period in material misstatement assessment

# Verifying Covered Product Data Measurements (1 of 3)

- Verifiers should not assume what is reported is complete
- Evidence to request
  - Scope of all owned and operated assets
    - Establish that all covered product data are properly evaluated
    - Ensure that all relevant business relationships are understood
  - GHG Monitoring Plan
  - Documentation of procedures and results for each product measurement device
  - Calculation of volumes/masses of inventory, stock, or tank drop measurements ( § 95103(k)(11))

# Verifying Covered Product Data Measurements (2 of 3)

## How to evaluate evidence

- Same calibration requirements as emissions data
- Determine frequency of recalibrations meet rule requirements
- Determine calibrations demonstrate meters within +/-5% accuracy
- If accuracy spec not met and data not excluded, THEN verifier to document as “nonconformance” (§ 95103(k)(10))
- Failure to correct a correctable error results in adverse verification statement

# Verifying Covered Product Data Measurements (3 of 3)

- How to evaluate evidence
  - Inventory, stock, or tank drop measurements (§ 95103(k)(11))
    - Compare records and independent calculations to reported fuel consumed/product produced (beginning/end of year estimates)
    - Check that all measurement devices meet accuracy requirements
  - **No use of data substitutions**
- Note: Changes in Product Calculation Method § 95103(m)

# How to Cross-check Data

- **Data that are only used for reporting to ARB should be scrutinized very carefully**
- After using the same method to re-calculate covered product data, ask for any other data that can be used as evidence to corroborate the reported data
  - Sales data with an inventory adjustment may be a good comparison
  - Ask for internal production reports that are used by accountants and corporate management. If everyone uses the data, it's more likely to be “correct.”
- Document why the cross-check supports your findings


# Excluded Product Data § 95103(I)

- Data reporters are required to exclude portions of covered product data that are not measured accurately (and may elect to exclude accurate data)
  - Not an “all-or-nothing” allocation
- Does not impact the verification statement
  - Excluded covered product has no impact on assessment of material misstatement and conformance with measurement accuracy requirements of remaining covered product data

# Reporting Excluded Product Data § 95103(I)

- Missing or invalid covered product data is still reported separately using best available methods
  - Evaluated for conformance, but allocations are only provided for verified covered product data that are accurate
- **Does not apply to cement covered product data**

Adjusted Clinker and Mineral Additives Produced = Clinker Produced x  
(1 + (Limestone and Gypsum Consumed)/Clinker Consumed))



Calculation does not  
allow data to be  
excluded

# Product Data Verification Statement



## VERIFICATION STATEMENT - **PRODUCT DATA** (delete this page if no product data)

<b>PART I. EMISSIONS DATA REPORT INFORMATION</b>	
1. REPORTING YEAR: 2014 data reported in 2015	
<b>PART II. VERIFICATION BODY INFORMATION</b>	
1. VERIFICATION BODY NAME: [REDACTED]	
<b>Part III. REPORTING ENTITY INFORMATION</b>	
1. NAME OF REPORTING ENTITY: [REDACTED]	2. ARB ID NUMBER: [REDACTED]
<b>Part IV. VERIFICATION STATEMENT INFORMATION</b>	
1. This verification statement attests that the submitted data are (check one) <input type="checkbox"/> reasonably assured of being free of material misstatement <input type="checkbox"/> <b>NOT</b> reasonably assured of being free of material misstatement	
2. This verification statement attests that the submitted data are (check one) <input type="checkbox"/> reasonably assured of being in conformance with the regulation <input type="checkbox"/> <b>NOT</b> reasonably assured of being in conformance with the regulation <input type="checkbox"/> <b>NOT</b> reasonably assured of being in conformance with the regulation, including <b>NOT</b> in conformance with §95131(b)(9): failure to correct data errors discovered during data checks	
3. As a result of the selections above, the final verification statement is (check one) <input type="checkbox"/> positive: reasonably assured of no material misstatement and in conformance with the regulation <input type="checkbox"/> qualified positive: reasonably assured of no material misstatement, but not reasonably assured in conformance with the regulation <input type="checkbox"/> adverse: not in conformance with §95131(b)(9) and/or not reasonably assured of no material misstatement	
4. Qualifying Statement (required for qualified positive or adverse statements): [REDACTED]	

# Group Participation Exercise 1.3.6: Covered Product Data Verification

A tomato processing facility reports the following product data. What verification statement(s) is likely?

	Reported by Operator	Verifier Calculated	Difference
Total Combustion Emissions (MT)	124,005	124,001	4 (0.003%)
Diced tomatoes (tons)	350,000	350,012	-12
Aseptic tomato paste (31%TSS) (tons)	154,505	154,499	6
Salted and dried zucchini slices (tons)	45,670		
Quantity of covered product data (tons)	504,505	504,511	6 (.001%)

# Group Participation Exercise 1.3.6:

## Covered Product Data Verification - Solution

If zucchini is removed from emissions data report, verifier submits positive product data VS

	Reported by Operator	Verifier Calculated	Difference
Total Combustion Emissions (MT)	124,005	124,001	4 (0.003%)
Diced tomatoes (tons)	350,000	350,012	-12
Aseptic tomato paste (31%TSS) (tons)	154,505	154,499	6
<del>Salted and dried zucchini slices (tons)</del>	<del>45,670</del>		
Quantity of covered product data (tons)	504,505	504,511	-6 (.001%)

# Other Product Data (Not “Covered”)

- Verified for conformance, not +/-5% accuracy or material misstatement
- Only products in C&T Table 9-1 are “covered” product data
- Examples of product data that are not covered include
  - Rare earth oxide equivalents
  - Corn entering wet milling process
  - Cement production

# Questions and ARB Comments

## Course 1: General Verification

### ***Complete:***

1.1 Verification Principles, Requirements, and Procedures

1.2 Stationary Fuel Combustion and Sorbent Sources

1.3 Accuracy & Product Data

### ***Next:***

1.4 Electricity Generating Units & Cogeneration

California Environmental Protection Agency

 **Air Resources Board**