

ATTACHMENT A

PROPOSED SECOND 15-DAY MODIFICATIONS

Subchapter 10. Climate Change

PROPOSED AMENDMENTS TO THE REGULATION FOR THE MANDATORY REPORTING OF GREENHOUSE GAS EMISSIONS

[NOTE: This document shows proposed modifications to the originally proposed amendments to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (Title 17, Division 3, Chapter 1, Subchapter 10, Article 2, sections 95101, 95102, 95103, 95104, 95105, 95111, 95112, 95113, 95114, 95115, 95117, 95118, 95119, 95121, 95122, 95124, 95129, 95130, 95131, 95132, 95133, 95150, 95153, 95156, 95157, Appendix A, and Appendix B, title 17 California Code of Regulations (CCR), and proposed adoption of new sections 95160, 95161, 95162, and 95163, title 17, CCR, set forth in Attachment A to the Staff Report: Initial Statement of Reasons, released on July 19, 2016.

*The original proposed amendments to the regulation are shown in underline; deletions from the regulation are shown in ~~strikeout~~. Additional proposed modifications were released following a notice of public availability of modified text, dated December 21, 2016, and are displayed in double-underline to indicate additions and ~~double-strikeout~~ to indicate deletions. Further proposed modifications made available with this notice of public availability of modified text dated March XY, 2017, and are shown in **underline** to indicate additions and **~~bold-strikeout~~** to indicate deletions.*

This display version of the regulation for public comment is primarily limited to the revisions added for the March XY release, and does not include prior edits, except as needed to show the current updates. The prior released versions of the regulation are available here: <https://www.arb.ca.gov/regact/2016/ghg2016/ghg2016.htm>.

*The symbol "****" means that intervening text not proposed for amendment is not shown.*

Amend Division 3, Chapter 1, Subchapter 10, Article 2, Subarticle 1, sections 95101, 95102, 95103, 95104, 95105, 95111, 95112, 95113, 95114, 95115, 95117, 95118, 95119, 95121, 95122, 95124, 95129, 95130, 95131, 95132, 95133, 95150, 95153, 95156, 95157, Appendix A, and Appendix B, and proposed adoption of new sections 95160, 95161, 95162, 95163, title 17 California Code of Regulations to read as follows:

Article 2: Mandatory Greenhouse Gas Emissions Reporting

Subarticle 1. General Requirements for Greenhouse Gas Reporting

§ 95102. Definitions.

- (a) For the purposes of this article, the definitions in subsections (a), (b), and (c) shall apply. Subsection (b) is specific to product data definitions. Subsection (c) is specific to definitions regarding refining and related processes.

(138) —“Electricity exporter” means electric power entities that deliver exported electricity. The entity that exports electricity is identified on the NERC e-Tag as the purchasing-selling entity (PSE) on the last segment of the tag’s physical path, with the point of receipt located inside the state of California and the point of delivery located outside the state of California. Electricity exporters include Energy Imbalance Market (EIM) Entity Scheduling Coordinators serving the EIM market that can result in exports from California. **For electricity exported through EIM, CAISO will report the MWhs and emissions associated with the EIM exported electricity.**

“Fuel cell” means a device that converts the chemical energy of a fuel and an oxidant directly into electrical energy without using combustion. Fuel cells require a continuous source of fuel and oxidant to operate.

(246) —“Imported electricity” means electricity generated outside the state of California and delivered to serve load located inside the state of California. Imported electricity includes electricity delivered across balancing authority areas from a ~~first point of receipt generation source~~ located outside the state of California, to the first point of delivery located inside the state of California, having a final point of delivery in California. Imported electricity includes electricity imported into California over a multi-jurisdictional retail provider’s transmission and distribution system, or electricity imported into the state of California from a facility or unit physically located outside the state of California with the first point of interconnection to a California balancing authority’s transmission and distribution system. Imported electricity includes electricity that is a result of cogeneration located outside the state of California. Imported electricity does not include electricity wheeled through California, defined pursuant to this section. Imported electricity does not include electricity imported into the California Independent System Operator (CAISO) balancing authority area to serve retail customers that are located within the CAISO balancing authority area, but outside the state of California. Imported Electricity does not include electricity imported into California by an Independent System Operator to obtain or provide emergency assistance under applicable emergency preparedness and operations reliability standards of the North American Electric Reliability Corporation or Western Electricity Coordinating Council. Imported electricity shall include Energy Imbalance Market (EIM) dispatches **designated by the CAISO’s optimization model and reported by the CAISO reported by the CAISO to EIM Participating Resource Scheduling Coordinators** as electricity imported to serve retail customers load that are located

~~within the State of California, and shall also include electricity emissions not reported by EIM Participating Resource Scheduling Coordinators but distributed to EIM Purchasers pursuant to section 95852.~~

~~“Importer of fuel” means an entity that imports fuel into California and who is the importer of record under federal customs law, or the owner or first entity to hold title to the fuel upon import into the State of California if the fuel is not subject to federal customs law. For imported fuel not subject to federal customs law, the “importer of fuel” is the owner of the fuel upon its entering into California if the **eventual transfer of ownership of the product between the seller and to an the California buyer end user or marketer located in California occurs upon delivery to a destination at a location** inside California. However, where the transfer of ownership of the **product fuel between the seller and the to a California buyer end user or marketer** occurs at a location outside of California, the “importer of fuel” is the producer, marketer, or distributor that is the seller of the fuel **that is forwarding the fuel in accordance with a contract of sale from an origination outside of California to the end user or marketer a buyer** located inside California. Pursuant to section 95122, only importers of liquefied petroleum gas, compressed natural gas, and liquefied natural gas are subject to reporting as an importer of fuel.~~

~~(255) —“Intrastate pipeline” means any pipeline or piping system wholly within the sState of California that is delivering natural gas to end-users and is not regulated as a public utility gas corporation by the California Public Utility Commission (CPUC), is not a publicly-owned natural gas utility, and is not regulated as an interstate pipeline by the Federal Energy Regulatory Commission. For purposes of this article, only intrastate pipeline operators that physically deliver gas to end users in California are subject to reporting under this article considered to be Local Distribution Companies. This definition includes onshore petroleum and natural gas production facilities and natural gas processing facilities, as defined by sections 95150(a)(2)-(3) of this article, that deliver pipeline and/or non-pipeline quality natural gas to one or more end users. Facility operators that operate an interconnection pipeline that connects their facility to an interstate pipeline, or that share an interconnection pipeline to an interstate pipeline with other nearby facilities, are not considered intrastate pipeline operators. Facilities that receive gas from an upstream LDC and redeliver a portion of the gas to one or more adjacent facilities are not considered intrastate pipelines.~~

- (b) For the purposes of this article, the following definitions associated with reported product data shall apply:

“Adjusted hulled and dried pistachios” means the raw pistachios that have been received and subjected to a hulling and drying process. Hulling is the process of removing pistachio hulls that cover pistachio shells and kernels. Drying is the process of reducing the moisture content of hulled pistachios.

Adjusted hulled and dried pistachios shall conform to the sampling methodology specified in the “Representative Sampling” section of “Pistachios In the Shell, Shipping Point and Market Inspection Instructions” (U.S. Department of Agriculture 2005), which is hereby incorporated by reference, and the weight shall be corrected to 5 percent moisture.

(2) ~~“Almond” means the edible seed of the almond (*Prunus amygdalus*).~~
“Almond” means the edible seed of the almond (*Prunus amygdalus*).

“Blanched almonds” means raw almond meats that are introduced to the blanching process. Blanching is the process through which skins are detached from almond meats.

“Boric Oxide Equivalent” means the theoretical equivalent mass of boric oxide (B_2O_3) in all produced borate products, which is not necessarily equal to the mass of the physical substance boric oxide. This theoretical chemically equivalent mass of B_2O_3 in produced borate product is measured either (1) by using the methods described in "Method to Determine the Boric Oxide Equivalent in Borate Products" (ARB 2017), which is hereby incorporated by reference, or (2) by multiplying the mass of borates by the default boric oxide equivalency factors and summing the products. The default boric oxide equivalency factors are as follows: 38 percent for borax decahydrate ($Na_2B_4O_7 \cdot 10H_2O$), 49 percent for borax pentahydrate ($Na_2B_4O_7 \cdot 5H_2O$), 69 percent for anhydrous borax ($Na_2B_4O_7$), 56 percent for boric acid (H_3BO_3), and 99 percent for anhydrous boric acid (B_2O_3).

(12) ~~**[Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.]**~~ “Butter” means the product made by gathering the fat of fresh or ripened milk or cream into a mass that also contains a small portion of other milk constituents including nonfat solids. Moisture and nonfat solids are essential constituents of butter.

(14) ~~**[Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.]**~~ “Buttermilk powder” means milk powder obtained by drying liquid buttermilk that was derived from the churning of butter and pasteurized prior to condensing. Buttermilk powder has a protein content of no less than 30%. It may not contain, or be derived from, nonfat dry milk, dry whey, or products other than buttermilk, and contains no added preservatives, neutralizing agents, or other chemicals.

“Flavored Almonds” means pasteurized almond meats that are introduced to the flavoring process. Flavoring occurs when almonds are passed through a seasoning mixture to add various snack food flavors and then dehydrated to a desired moisture level for packaging.

“Flavored Pistachios” means hulled and dried pistachios that are introduced to the flavoring process. Flavoring occurs when pistachios are passed through a seasoning mixture to add various snack food flavors and then dehydrated to a desired moisture level for packaging. Flavored pistachios may include pistachios hulled and dried internally, or pistachios hulled and dried by other facilities.

(48) ~~— **[Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.]** “Freshwater diatomite filter aids” means inorganic mineral powders derived by processing freshwater diatomite which is fossilized single-celled algae found in lake beds. Filter aids are used in combination with filtration hardware to enhance filtration performance to separate unwanted solids from fluids.~~

(58) ~~— **[Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.]** “Intermediate dairy ingredients” means intermediate (non-final) dairy product imported from other dairy facilities that enter the rehydrating process, which uses water and heat to manufacture powdered products.~~

“Pasteurized almonds” means raw almond meats that are introduced to the pasteurizing process. Pasteurizing partially sterilizes the almonds to destroy objectionable organisms without major chemical alteration of the almond meats.

(77) ~~— “Pistachio” means the nuts of the pistachio tree *Pistacia vera*.~~

“Pistachio” means the nut of the pistachio tree (*Pistacia vera*).

(93) ~~— **[Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.]** “Seamless rolled ring” means a metal product manufactured by punching a hole in a thick, round piece of metal, and then rolling and squeezing (or in some cases, pounding) it into a thin ring. Ring diameters can be anywhere from a few inches to 30 feet.~~

(95) ~~[Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.]~~ "Soda ash equivalent" means the total mass of all soda ash, biocarb, ~~borax, V-Bor, DECA, PYROBOR, Boric Acid,~~ Sodium Sulfate, Potassium Sulfate, Potassium Chloride, and Sodium Chloride produced.

NOTE: Authority cited: Sections 38510, 38530, 39600, 39601, 39607, 39607.4 and 41511, Health and Safety Code. Reference: Sections 38530, 39600 and 41511, Health and Safety Code.

§ 95103. Greenhouse Gas Reporting Requirements.

The facilities, suppliers, and entities specified in section 95101 must monitor emissions and submit emissions data reports to the Air Resources Board following the requirements specified in 40 CFR §98.3 and §98.4, except as otherwise provided in this part.

(f) *Verification Requirement and Deadlines.* The requirements of this paragraph apply to each reporting entity submitting an emissions data report that indicates emissions equaled or exceeded 25,000 metric tons of CO₂e, including CO₂ from biomass-derived fuels and geothermal sources, electric power entities that are electricity importers or exporters, facilities with sources as identified in section 95101(b)(3), or each reporting entity that has or has had a compliance obligation under the cap-and-trade regulation in any year of the current compliance period. The requirements of this paragraph ~~also apply to reporting entities electric power entities that are electricity importers or exporters~~ that have not met the requirements for cessation of verification in section 95101(i)(4). The reporting entity subject to verification must obtain third-party verification services for that report from a verification body that meets the requirements specified in Subarticle 4 of this article. Such services must be completed and separate verification statements for emissions data and for product data, as applicable, must be submitted by the verification body to the Executive Officer by August 10 ~~September 10~~ each year. Each reporting entity must ensure that these verification statements are submitted by this deadline. Contracting with a verification body without providing sufficient time to complete the verification statements by the applicable deadline will not excuse the reporting entity from this responsibility. These requirements are additional to the requirements in 40 CFR §98.3(f).

(h) *Reporting in ~~2018~~2015.* All provisions of the regulation are in full effect for ~~2018~~2014 data reporting in ~~2019~~2015 and beyond, except the following:

- (1) Pursuant to section 95103(f), verification of emissions data reports submitted for 2017 data in 2018 must be completed by August 10, 2018. Each year

~~thereafter, verification must be completed by August 10 All changes Operators of petroleum refineries may use best available methods for reporting 2014 data for primary refinery products and calcined coke pursuant to sections 95113(l)(1) and 95113(l)(2), respectively.~~

- (2) ~~All covered product data reporting must be reported for 2017 data submitted in 2018, and for each subsequent year. **Best available methods may be used for reporting 2017 data submitted in 2018 for sulfuric acid and boric oxide equivalent.**~~

- (6) The requirements of sections 95131 through 95133 are effective for 2017 data reported in 2018.**

- (k) *Measurement Accuracy Requirement.* The operator or supplier subject to the requirements of 40 CFR §98.3(i) must meet those requirements for data used for calculating non-covered emissions and non-covered product data, except as otherwise specified in this paragraph. In addition, the following accuracy requirements apply to data used for calculating covered emissions and covered product data. The operator or supplier with covered product data or covered emissions equal to or exceeding 25,000 metric tons of CO₂e or a compliance obligation under the cap-and-trade regulation in any year of the current compliance period must meet the requirements of paragraphs (k)(1)-(10) below for calibration and measurement device accuracy. Inventory measurement, stock measurement, or tank drop measurement methods are subject to paragraph (11) below. The requirements of paragraphs (k)(1)-(11) apply to fuel consumption monitoring devices, feedstock consumption monitoring devices, process stream flow monitoring devices, steam flow devices, product data measuring devices, mass and fluid flow meters, weigh scales, conveyer scales, gas chromatographs, mass spectrometers, calorimeters, and devices for determining density, specific gravity, and molecular weight. The provisions of paragraph (k)(1)-(11) do not apply to: stationary fuel combustion units that use the methods in 40 CFR §98.33(a)(4) to calculate CO₂ mass emissions; emissions reported as *de minimis* under section 95103(i); and devices that are solely used to measure parameters used to calculate emissions that are not covered emissions or that are not covered product data. The provisions of paragraphs (k)(1)-(9) and (k)(11) do not apply to stationary fuel combustion units that use the methods in 40 CFR Part 75 Appendix G §2.3 to calculate CO₂ mass emissions, but the provisions in paragraph (k)(10) are applicable to such units.

- (6) In addition to the specific calibration requirements specified below, and, if applicable, the field accuracy assessment requirements specified below, all flow meter and other measurement devices covered by this part, regardless of type, must be selected, installed, operated, and maintained in a manner to ensure accuracy within ±5 percent.

- (A) Perform all mass and volume measurement device calibration as specified in the original equipment manufacturers (OEM) documentation. If OEM documentation is unavailable, calibrate as specified in 40 CFR §98.3(i)(2)-(3), except that a minimum of three calibration points must be used spanning the normal operating conditions. When using the three calibration points, one point must be at or near the zero point, one point must be at or near the upscale point, and one point at or near the mid-point of the devices operating range. If OEM documentation does not specify a method or is unavailable, and calibration methods specified in 40 CFR §98.3(i)(2)-(3) are not possible for a particular device, the procedures in section 95109(b) must be followed to obtain approval for an alternative calibration procedure. Additionally:
1. Pressure differential devices must be inspected at a frequency specified in paragraph (k)(4) of this section, unless the device is located at a refinery or hydrogen plant that operates continuously with infrequent outages. In such cases, the owner or operator of the refinery or hydrogen plant must inspect each device at a frequency of at least once every six years. The inspection must be conducted as described in the appropriate part of ISO 5167-2 (2003), or AGA Report No 3 (2003) Part 2, both of which are incorporated by reference, or a method published by an organization listed in 40 CFR §98.7 applicable to the analysis being conducted. If the device fails any one of the tests then the meter shall be deemed out of calibration. If OEM guidance for a particular pressure differential device recommends against disassembly and inspection of the device, disassembly and inspection requirements in this paragraph do not apply. Documentation of OEM guidance must be made available to verifiers and ARB upon request.

- (l) *Reporting and Verifying Product Data.* The reporting entity must separately identify, quantify, and report all product data as specified in sections 95110-95124 and 95156 of this article. It is the responsibility of the reporting entity to obtain verification services for the product data. Product data will be evaluated for conformance and material misstatement independent of GHG emissions data. Covered product data is evaluated for material misstatement and conformance, while the remaining reported product data is evaluated for conformance only. Reporting entities must exclude inaccurate covered product data, **and may elect to exclude accurate covered product data**, ~~and may elect to exclude accurate covered product data.~~ Reporting entities that exclude covered product data must report a description of the excluded data and an estimated magnitude using best available methods. The excluded covered product data will not be used for the material misstatement assessment or for the total covered product data variable described in section 95131(b)(12)(A). Operators of cement plants may not exclude covered product data.

NOTE: Authority cited: Sections 38510, 38530, 39600, 39601, 39607, 39607.4 and 41511, Health and Safety Code. Reference: Sections 38530, 39600 and 41511, Health and Safety Code.

§ 95105. Recordkeeping Requirements.

Each reporting entity that is required to report greenhouse gases under this article, except as provided in section 95103(a)(9), must keep records as required by 40 CFR §98.3(g)-(h) with the following qualifications.

- (c) *GHG Monitoring Plan for Facilities and Suppliers.* Each facility operator or supplier that reports under 40 CFR Part 98, each facility operator or supplier with emissions equal to or exceeding 25,000 MTCO₂e (including biomass-derived CO₂ emissions and geothermal emissions), and each facility operator or supplier with a compliance obligation under the cap-and-trade regulation in any year of the current compliance period, must complete and retain for review by a verifier or ARB a written GHG Monitoring Plan that meets the requirements of 40 CFR §98.3(g)(5). For facilities, the Plan must also include the following elements, as applicable:

- (3) ~~Identification of measurement device location, and the location of any additional devices or sampling ports. Reference to one or more diagrams (simplified block flow or piping and instrumentation diagrams) that provide a clear visual representation of the relative the locations and relative positions of all measurement devices and sampling locations, as applicable, required for calculating covered emissions and covered product data (e.g. temperature, total pressure, HHV, fuel consumption). The diagram(s) must include and label fuel sources, combustion emissions units, and production processes, as applicable.~~

NOTE: Authority cited: Sections 38510, 38530, 39600, 39601, 39607, 39607.4 and 41511, Health and Safety Code. Reference: Sections 38530, 39600 and 41511, Health and Safety Code.

§ 95111. Data Requirements and Calculation Methods for Electric Power Entities.

The electric power entity who is required to report under section 95101 of this article must comply with the following requirements.

(b) *Calculating GHG Emissions.*

- (2) *Calculating GHG Emissions from Specified Facilities or Units.* For electricity from specified facilities or units, the electric power entity must calculate emissions using the following equation:

- (E) Meter Data Requirement. For verification purposes, electric power entities shall retain meter generation data to document that the power claimed by the reporting entity was generated by the facility or unit at the time the power was directly delivered.

1. ~~This provision~~ A lesser of analysis is applicable to imports from specified sources, including imported electricity under EIM, for which ARB has calculated an emission factor of zero, and for imports from California Renewable Portfolio Standard (RPS) eligible resources, excluding the following: (1) ~~contract or ownership agreements, known as grandfathered contracts that meet California RPS program requirements in Public Utilities Code Section 399.16(d) or California Code of Regulations, Title 20 Section 3202(a)(2)(A);~~ (2) dynamically tagged power deliveries; (3) ~~untagged power deliveries, including EIM imports;~~ (4) **contract or ownership agreements, known as grandfathered contracts that meet California RPS program requirements in Public Utilities Code Section 399.16(d) or California Code of Regulations, Title 20 Section 3202(a)(2)(A);** (2) dynamically tagged power deliveries; (3) nuclear power; (524) asset controlling supplier power; and (634) imports from hydroelectric facilities for which an entity's share of metered output on an hourly basis is not established by power contract. ~~Accordingly, a~~ A lesser of analysis is required pursuant to the following equation:

$$\text{Sum of Lesser of MWh} = \sum H_{M_{sp}} \min(MG_{sp}, TG_{sp})(S_{sp})$$

- ~~(h) Reporting requirements for Imported Electricity in the Energy Imbalance Market (EIM) the California Independent System Operator (CAISO). Annually, CAISO will calculate, report, and cause to be verified, the information listed here:~~

- (1) Calculation of EIM Outstanding Emissions. Each year after the verification deadline in section 95103(f), ARB will calculate "EIM Outstanding Emissions" using information reported annually by **CAISO and Participating Resource Scheduling Coordinators with imported electricity in EIM, and information received from CAISO under an annual subpoena.** Annual information reported by **CAISO and Participating Resource Scheduling Coordinators** must be based on **data** ~~f~~**For each 5- minute interval, CAISO will calculate the following: the results of each 5-minute interval;**

(A) **EIM Outstanding Emissions as calculated by ARB.** “Remaining EIM Outstanding eEmissions” = equals “Total California EIM dispatch eEmissions” less “Deemed Delivered EIM Emissions”—emissions associated with electricity imported by EIM Participating Resource Scheduling Coordinators deemed delivered to California by the EIM optimization model.

(B) **Calculating Total California EIM Emissions as calculated by ARB.** Annually, based on each 5-minute interval, **CAISO must ARB will calculate, report and cause to be verified,** the CO₂ equivalent mass emissions associated with imported electricity in EIM using the following equation:

$$CO_2e = MWh \times EF_{unsp} \times TL$$

Where:

CO₂e = CO₂ equivalent mass emissions from Total California EIM electricity (MT of CO₂e).

MWh = Megawatt-hours of EIM imports **identified by CAISO used to serve California load.**

EF_{unsp} = Default emission factor for unspecified electricity imports in 95111(b)(1)

EF_{unsp} = 0.428 MT of CO₂e/MWh

TL = 1.02 (transmission loss factor) **in 95111(b)(1).**

(C) **Deemed Delivered EIM Emissions.** Annually, based on **the results of** each 5-minute interval, each EIM Participating Resource Scheduling Coordinator must calculate, report, and cause to be verified, emissions associated with electricity imported as deemed delivered to California by the EIM optimization model.

(2) Annually, CAISO will report, and cause to be verified, the following information:

(A) **Annual sum of the “remaining emissions” calculated in section 95111(h)(1); Annual State-Wide Total for EIM Imports and Exports. Total annual imports and exports into and out of California in MWh, consistent with the results of the EIM optimization based on Real-Time Dispatch (RTD), and associated with (1) Total California EIM Emissions, and (2) Deemed Delivered EIM Emissions;**

(B) **Names of entities meeting California imbalances from EIM transfers and annual quantity of purchased MWh for each entity based on 5 minute interval data; Annual State-Wide Total for EIM Imports By Entity. Total annual imports into California in MWh, consistent with the results of the EIM optimization model based on Real-Time Dispatch (RTD), and associated with (1) Total California EIM Emissions, and (2) Deemed Delivered emissions, for each**

Participating Resource Scheduling Coordinator (PRSC) and for CAISO;

(C) Annual State-Wide Total for EIM Exports. Report total annual exports out of California in MWh, consistent with the results of the EIM optimization model based on Real-Time Dispatch (RTD), for each Participating Resource Scheduling Coordinator (PRSC) and for CAISO.

(3) The data provided in this section 95111(h)(2) must be verified per section 95103(f).

NOTE: Authority cited: Sections 38510, 38530, 39600, 39601, 39607, 39607.4 and 41511, Health and Safety Code. Reference: Sections 38530, 39600 and 41511, Health and Safety Code.

§ 95114. Hydrogen Production.

The operator of a facility who is required to report under section 95101 of this article, and who is not eligible for abbreviated reporting under section 95103(a), must comply with Subpart P of 40 CFR Part 98 (40 CFR §§98.160 to 98.168) in reporting emissions and other data from molecular hydrogen production to ARB, except as otherwise provided in this section. GHG emissions and output associated with hydrogen production must be reported separately from other emissions and output associated with a petroleum refinery.

(j) *Additional Product Data.* Operators must report the total annual mass of on-purpose and by-product gaseous hydrogen gas produced (metric tons) and total annual mass of liquid hydrogen sold (metric tons). Operators must separately report all gaseous and all liquid hydrogen sold or otherwise transferred (metric tons) to petroleum refineries and hydrogen vehicle fueling stations and include the name of the purchaser (or receiver) and the quantity sold or transferred to each facility or entity. ~~For hydrogen gas produced, annual masses of on-purpose hydrogen gas and by-product hydrogen gas produced must be reported (metric tons).~~ Operators must also specify if the hydrogen plant is an integrated refinery operation. Hydrogen plants integrated in refinery operations must also report any sales or transfers of hydrogen as specified in this subsection. ~~Operators must report all hydrogen sold or otherwise transferred to another facility and include the purchaser (or receiver) and quantity sold or transferred to each facility.~~

NOTE: Authority cited: Sections 38510, 38530, 39600, 39601, 39607, 39607.4 and 41511, Health and Safety Code. Reference: Sections 38530, 39600 and 41511, Health and Safety Code.

§ 95115. Stationary Fuel Combustion Sources.

The operator of a facility who is required to report under section 95101 of this article, and who is not eligible for abbreviated reporting under section 95103(a), must comply with Subpart C of 40 CFR Part 98 (§§98.30 to 98.38) in reporting stationary fuel combustion emissions and related data to ARB, except as otherwise provided in this section.

- (n) *Additional Product Data.* Operators of the following types of facilities must also report the production quantities indicated below.

- (2) ~~***Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.***~~ The operator of a soda ash manufacturing facility must report the quantity of soda ash equivalent, ~~biocarb, borax, V-Bor, DECA, PYROBOR, boric acid, and sulfate~~ produced in the data year (short tons).

- (14) ~~***Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.***~~ The operator of a facility mining or processing freshwater diatomite filter aids must report the production of freshwater diatomite filter aids in the data year (short tons).

- (15) ~~***Staff is reviewing the benchmark for this product and may propose a revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.***~~ The operator of a ~~performing~~ forging facility must report the production of seamless rolled ring during the data year (short tons).

- (16) The operator of a dairy product facility must report the production of ~~milk, buttermilk, skim milk, cream, fluid milk product, butter, condensed milk, buttermilk powder, intermediate dairy ingredients, dairy product solids for animal feed, lactose, whey protein concentrate (WPC), deproteinized whey, cheese by cheese type, nonfat dry milk and skimmed milk powder by the type of heat treatment (low heat, medium heat, or high heat), anhydrous milkfat, and milk protein concentrate,~~ and ultrafiltered milk products by product type during the data year (short tons). Butter re-melted and re-introduced to the manufacturing process may be reported as fluid milk production. Buttermilk powder and nonfat dry milk and skimmed milk powder that is re-constituted and re-introduced to the manufacturing process may be reported as production. The operator must report the production of total WPC and -WPC with high protein concentration using diafiltration process during the data year (short tons). The operator must also report the amount of imported protein. ~~***Staff is reviewing the benchmark for this product and may propose a***~~

revision to this definition as a result. Any proposed revision would be circulated for a 15-day comment period.]

- (17) **The operator of an almond or pistachio processing facility must report the production of adjusted hulled and dried pistachios, flavored pistachios, blanched almonds, flavored almonds, and pasteurized almonds (short tons).** ~~The operator of an almond or pistachio processing facility must report the sum of pistachios hulled and dried and/or flavored and packaged (short tons) where the hulling and drying, flavoring and packaging is a continuous process, and the sum of almonds pasteurized, blanched and/or flavored and dried (short tons) where flavoring and drying is a continuous process.~~
- ~~(18)~~ **(18)** The operator of a wet corn milling facility must report the production of corn entering wet milling process during the data year (short tons).
- ~~(1989)~~ The operator of a winery must report the production of distilled spirits (proof gallons), dry color concentrate (short tons), grape juice concentrate (gallons), grape seed extract (short tons), and liquid color concentrate (gallons) during the data year.
- ~~(2019)~~ **The operator of a sulfuric acid regeneration facility must report the production of sulfuric acid produced (short tons).**
- (21) The operator of a borate manufacturing facility must report the quantity of borate produced in the data year in boric oxide equivalent (short tons).**

NOTE: Authority cited: Sections 38510, 38530, 39600, 39601, 39607, 39607.4 and 41511, Health and Safety Code. Reference: Sections 38530, 39600 and 41511, Health and Safety Code.

Subarticle 4. Requirements for Verification of Greenhouse Gas Emissions Data Reports and Requirements Applicable to Emissions Data Verifiers; Requirements for Accreditation of Emissions Data and Offset Project Data Report Verifiers

§ 95131. Requirements for Verification Services.

Verification services shall be subject to the following requirements.

(b) Verification services shall include, but are not limited to, the following:

- (4) *Review of Reporting Entity's Operations, Product Data and Emissions.* The verification team shall review facility operations to identify applicable greenhouse gas emissions sources and product data. This shall include a review of the emissions inventory and each type of emission source to ensure that all sources listed in sections 95110 to 95123 and sections 95150 to 951578 of this article are properly included in the emissions data report. This shall also include a review of the product data to ensure that all product data listed in sections 95110 to 95123 and sections 95150 to 951578 of this article are included in the emissions data report as required by this article. The verification team shall also ensure that the reported current primary and any secondary (if reported) NAICS code(s) reported pursuant to section 95104(c) accurately represents the NAICS-associated aActivities (a) listed noted in Table 8-1 of the Cap-and-Trade Regulation, ~~as applicable.~~ Review of these NAICS codes and associated activities must be documented in the verification team's sampling plan.

- (8) *Data Checks.* To determine the reliability of the submitted emissions data report, the verification team shall use data checks. Such data checks shall focus on the largest and most uncertain estimates of emissions, product data and fuel and electricity transactions, and shall include the following:

- (F) The verification team is responsible for ensuring via data checks that there is reasonable assurance that the emissions data report conforms to the requirements of this article. In addition, and as applicable, the verifier's review of conformance must confirm the following information is correctly reported:

3. Energy generation and disposition information reported pursuant to section 95104(d), 95112(a), 95112(b) and electricity and thermal energy purchases and acquisitions reported pursuant to 95104(d)(1) and 95104(d)(2), if any of the following apply:

- a. The facility belongs to an industry sector (e.g., reported a NAICS code) listed in Table 8-1 of section 95870 of the cap-and-trade regulation;
- b. The facility is applying for legacy contract transition assistance under the cap-and-trade regulation; or
- c. The facility is ~~applying~~eligible for ~~the~~a limited exemption of emissions from the production of qualified thermal output pursuant to sections 95852(j), 95870(e)(5), and 95870(e)(6) and of the cap-and-trade regulation.

NOTE: Authority cited: Sections 38510, 38530, 39600, 39601, 39607, 39607.4 and 41511, Health and Safety Code. Reference: Sections 38530, 39600 and 41511, Health and Safety Code.

Appendix B

to the Regulation for the Mandatory Reporting
of Greenhouse Gas Emissions

TEST PROCEDURE

for

~~Flash Emissions of Greenhouse Gases and
Other Compounds from Crude Oil and Natural Gas
Separator and Tank Systems~~

Determining Annual Flash Emission Rate of ~~Methane~~
Gaseous Compounds from Crude Oil, Condensate, and Produced Water

Test Procedure for Determining Annual Flash Emission Rate of **Methane Gaseous Compounds** from Crude Oil, Condensate, and Produced Water

1. PURPOSE AND APPLICABILITY

In crude oil and natural gas production, flash emissions may occur when gas **entrained dissolved** in crude oil, condensate, or produced water is released from the liquids due to a decrease in pressure or increase in temperature, such as when the liquids are transferred from an underground reservoir to the earth's surface. This procedure is used for determining the annual flash emission rate from tanks used to separate, store, or hold crude oil, condensate or produced water. The laboratory methods required to conduct this procedure are used to measure methane and other gaseous compounds.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

This procedure is conducted by collecting ~~one~~ samples of crude oil or condensate and ~~one sample of~~ produced water upstream of a separator or tank where flashing may occur. Samples ~~shall~~**must** be collected under pressure and according to the methods specified in this procedure. If a pressure separator is not available for collecting samples, sampling shall be conducted using a portable pressurized separator.

Two sampling methods are specified for collecting liquid samples **while maintaining a positive pressure within a sampling cylinder to prevent flashing within the cylinder and are referenced in GPA 2174 2.1c and 2.1a, which are hereby incorporated by reference and fully identified in section 14 of this appendix, under References.** The first method requires a double valve cylinder ~~for collecting crude oil or produced water samples.~~ ~~The and the~~ second ~~method~~ requires **a piston-type constant pressure cylinder equipped with a pressurized piston for collecting condensate or produced water samples.** Both methods shall be conducted as specified in this procedure.

The laboratory methods specified for this procedure are based on American Standards and Testing Materials (ASTM), US Environmental Protection Agency (EPA), and Gas Processor Association (GPA) methods. These laboratory methods measure the volume and composition of gases that flash from the liquids, including a Gas-Oil or Gas-Water Ratio, as well as the molecular weight and weight percent of the gaseous compounds. **Included are procedures for measuring the bubble point pressure and conducting a laboratory flash analysis.** The laboratory results are used with the crude oil or condensate or produced water throughput to calculate the mass of emissions that are flashed from the liquids per year.

3. DEFINITIONS

For the purposes of this procedure, the following definitions apply:

3.3 “Bubble point pressure” means the pressure, at the pressurized sample collection temperature, at which the first bubble of gas comes out of solution.

3.43.3 “Condensate” means hydrocarbon and other liquid either produced or separated from crude oil or natural gas during production and which condenses due to changes in pressure or temperature.

3.53.4 “Crude oil” means any of the naturally occurring liquids and semi-solids found in rock formations composed of complex mixtures of hydrocarbons ranging from one to hundreds of carbon atoms in straight and branched chain rings.

3.63.5 “Double valve cylinder” means a metal cylinder equipped with valves on either side for collecting crude oil, condensate, or produced water samples.

3.73.6 “Emissions” means the discharge of natural gas into the atmosphere.

3.83.7 “Emulsion” means any mixture of crude oil, condensate, or produced water with varying amounts of natural gas contained in the liquid.

3.93.8 “Flash or flashing” means a process during which gas entrained dissolved in crude oil, condensate, or produced water under pressure is released when subject to a decrease in pressure, such as when liquids are transferred from an underground reservoir to a tank on the earth’s surface or from a pressure vessel to an atmospheric tank.

3.10 “Floating Piston cylinder” means a metal cylinder containing an internal pressurized piston for collecting crude oil, condensate or produced water samples.

3.113.9 “Gas-Oil Ratio (GOR)” means a measurement used to describe the volume of gas that is flashed from a barrel of crude oil or condensate in a separator and tank system.

3.123.10 “Gas-Water Ratio (GWR)” means a measurement used to describe the volume of gas that is flashed from a barrel of produced water in a separator and tank system.

3.133.11 “Natural gas” means a naturally occurring mixture or process derivative of hydrocarbon and non-hydrocarbon gases, of which its constituents include methane, carbon dioxide, and heavier hydrocarbons. Natural gas may be field quality (which varies widely) or pipeline quality.

3.143.12 “Operating pressure” means the steady-state pressure of the vessel from which a sample is collected. If no vessel pressure gauge is available or the

difference between the sampling train pressure gauge and vessel pressure gauge readings is greater than +/- 5 psig of the vessel pressure, the sampling train pressure gauge reading shall be used to record the steady state pressure on Form 1.

~~3.153.13~~ “Operating temperature” means the steady state temperature of the vessel from which a sample is collected. If no vessel temperature gauge is available or the difference between the sampling train temperature gauge reading and the vessel temperature gauge reading is greater than +/- 4°F of the vessel temperature, then the sampling train temperature gauge reading shall be used to record the steady state temperature on Form 1.

~~3.14~~ “Percent water cut” means the volume percentage of produced water to crude oil or condensate.

~~3.15~~ “Piston cylinder” means a metal cylinder containing an internal pressurized piston for collecting condensate or produced water samples.

~~3.16~~ “Portable pressurized separator” means a sealed vessel that can be moved from one location to another by attachment to a motor vehicle without having to be dismantled and is used for separating and sampling crude oil, condensate, or produced water at the steady state temperature and pressure of the separator and tank system required for sampling.

~~3.23~~ “Target temperature” means the temperature at which a pressurized hydrocarbon liquid is flashed, and is therefore the temperature of the first atmospheric separator or tank.

~~3.243.23~~ “Throughput” means the average volume of crude oil, condensate, or produced water expressed in units of barrels per day.

4. BIASES AND INTERFERENCES

~~4.3~~ Collecting liquid samples from a pressure separator or portable pressurized separator that periodically drains liquids will have an impact on the final results reported. Samples shall not be collected from a pressure separator or portable pressurized separator while it periodically drains liquids and shall only be taken when a drain valve is closed.

~~4.4~~ Collecting liquid samples using an empty double valve cylinder without displacing an immiscible liquid from the cylinder will allow gases to flash from the cylinder and will have an impact on the final results reported. Samples collected using a double valve cylinder shall be collected as specified in this procedure.

4.6 Non-calibrated equipment including pressure or temperature gauges will have an impact on the final results reported. All pressure and temperature measurements shall be conducted with calibrated gauges as specified in this procedure and shall be calibrated at least twice per year.

4.8 The collection and testing of duplicate samples is recommended in order to verify the reported results.

4.9 Failure to perform the bubble point pressure and sample integrity check may affect the reported results.

4.10 Performing a flash analysis by a means other than the method specified in this procedure may affect the reported results.

5. SAMPLING EQUIPMENT SPECIFICATIONS

5.1 An intrinsically safe pressure gauge capable of measuring liquid pressures of less than 50 pound per square inch gauge pressure within +/- 10% accuracy up to 2,000 pounds per square inch absolute within +/- 0.1% accuracy.

5.2 A pressure gauge capable of measuring liquid pressures greater than 50 pounds per square inch gauge pressure within +/- 5% accuracy.

5.25.3 A temperature gauge capable of reading liquid temperature within +/- 2°F and within a range of 32°F to 250°F.

5.35.4 A graduated cylinder capable of measuring liquid in at least five (5) milliliter increments with at least the same capacity as the double valve cylinder used for liquid sampling.

5.45.5 A portable pressurized separator that is sealed from the atmosphere and is used for collecting crude oil, condensate, and produced water samples at the steady state temperature and pressure of the separator and tank system being sampled.

6. SAMPLING EQUIPMENT

6.4 High-pressure rated metal components and control valves that can withstand the temperature and pressure of the pressure vessel or portable pressurized separator being sampled from which the sample liquid is gathered.

6.6 A temperature gauge with minimum specifications listed in section 5.

7. DATA REQUIREMENTS

7.1 The data requirements required to conduct this procedure shall be provided by the facility owner or operator prior to conducting the sampling methods specified in this procedure. Field sampling shall not be performed until all data requirements are provided as listed in section 7.2 and as specified on Form 1.

7.2 For each ~~pressure separator or portable pressurized separator~~ sampled ~~collected~~, the following data shall be recorded on the sample cylinder identification tag and on Form 1 prior to conducting a sample collection method:

- (a) The separator identification number or description.
- (b) The separator temperature and pressure if available.
- (c) **First downstream atmospheric tank or separator temperature.**
- (~~c~~) ~~Crude oil or condensate throughput.~~
- (~~d~~) ~~Produced water throughput.~~
- (~~e~~) ~~Percent water cut.~~
- (~~f~~) ~~Gas flow rate of three phase separator if available.~~
- (~~g~~) ~~Number of wells in the separator and tank system.~~
- (~~h~~) ~~Days of operation per year.~~

8. DOUBLE VALVE CYLINDER SAMPLING METHOD

8.1 The double valve cylinder sampling method is used for collecting crude oil or produced water samples and is not applicable for collecting samples of condensate. Liquid samples of condensate shall be collected using the piston cylinder sampling method specified in section 9.

8.18.2 Fill the double valve cylinder with non-reactive liquid that is immiscible with the liquid to be collected to prevent flashing within the cylinder and to prevent the displacement liquid from mixing or attaining homogeneity with the sample liquid.

- (a) As an alternative for collecting produced water samples, the double valve cylinder may be filled with sample water under the same pressure as the vessel to be sampled and then purged according to the procedure specified in section 8.6.

8.28.3 ~~Locate~~ identify a pressure separator immediately upstream of the separator or tank required for testing ~~and verify it is pressurized to at least 15 psig. If no pressure separator is available, install a portable pressurized separator if no pressure separator is available~~ immediately upstream of the separator or tank that can be used to collect crude oil, **condensate**, and produced water samples.

8.38.4 Record the sample collection data requirements specified in section 7 on the cylinder identification tag and on Form 1.

8.48.5 Locate the sampling port(s) for collecting liquid samples.

8.58.6 Connect the sampling train as illustrated in Figure 1 to the sampling port on the pressure separator or portable pressurized separator while minimizing tubing between the purge valve and cylinder as shown. Bushings or reducers may be required.

8.68.7 Purge the sampling train: Place the outlet of valve B into the waste container. With valves B, C and D closed, slowly open valve A completely, and then slowly open valve B to purge the sample train until a steady stream of liquid without gas pockets is observed, and then close valve B.

8.78.8 Prepare for sampling: Orient the double-valve cylinder in the vertical position so that displacement liquid can readily be discharged from the cylinder. Note that the orientation of valves C and D depend on the type of sample being collected and the liquid used for displacement. Based on density differences in liquids, the heaviest liquid must be introduced or expelled from the bottom of cylinder. See Figure 2

(a) If the alternative method for collecting a produced water sample is chosen, the cylinder must be purged at a rate not to exceed 60 milliliters per minute until at least 1600 milliliters (two cylinder volumes) are purged through the cylinder that has been previously filled with pressurized sample water prior to proceeding further.

8.88.9 Slowly open valve C to the full open position and place the outlet of valve D into the graduated cylinder.

8.98.10 Collect liquid sample: Slowly open valve D to allow a slow displacement of the non-reactive displacement liquid at a rate ~~between 150 and 200~~ **not to exceed 60** milliliters per minute (~~3 drips per second~~) to prevent the sample liquid from flashing ~~inside the cylinder~~. Continue until ~~80 to 95~~ **approximately 70** percent of the displacement liquid is measured in the graduated cylinder, ~~and then~~ **Then** close valves D and C.

8.108.11 Record the ~~steady state~~ pressure and temperature on Form 1.

8.118.12 Record the double valve cylinder volume and the volume of liquid sampled on the cylinder identification tag and on Form 1.

8.12 **Drain approximately 20% of the remaining displacement liquid into the graduated cylinder to take outage and record the actual volume of liquid drained on Form 1. This is required for safety and to prevent a pressurized cylinder from exploding during transport.**

9. PISTON CYLINDER SAMPLING METHOD

9.1 ~~Locate~~ **Identify** a pressure separator immediately upstream of the separator or tank required for testing ~~and verify it is pressurized to at least 15 psig. If no pressure separator is available, install~~ **Install** a portable pressurized separator ~~if no pressure separator is available~~ immediately upstream of the separator or tank that can be used to collect **crude oil, condensate, and produced water samples.**

9.6 Prepare for sampling: **Verify that the gas pressure in the piston cylinder is greater than the pressure of sample liquid. If not, additional gas pressure must be applied to the piston.**

9.7. With valve B closed and valve A open, slowly open valve C to the full open position, then slowly open valve D until the pressure indicated on Gauge N is equal to Gauge M **and then close valve D momentarily.**

9.89.7 Collect liquid sample: Slowly open Valve D to allow liquid to enter the piston cylinder at a rate ~~of 150 to 200~~ **not to exceed 60** milliliters per minute **by using the indicator and scale on the piston cylinder. Continue until a maximum of 80 to 95** percent of the cylinder is filled with liquid. Then close valves C and D.

9.99.8 Record the ~~steady state~~ pressure and temperature on Form 1.

9.109.9 Record the cylinder volume and volume of liquid sampled on the cylinder identification tag and on Form 1.

9.119.10 Disconnect the sample cylinder from the sampling train and verify that both valves are sealed.

9.129.11 Remove sampling train: Place the outlet of valve B into the waste container and slowly open valve B to purge all liquid from the sampling train. Then close valves A and B. Disconnect the sampling train from the pressure separator or portable pressurized separator.

9.139.12 Verify that all of the data requirements are recorded on the cylinder identification tag and on Form 1.

9.149.13 Transport the cylinder to the laboratory for conducting the laboratory methods as specified in section 12.

10. LABORATORY REQUIREMENTS AND METHODS

10.1 Quality Control, Quality Assurance, and Field Records

(b) Each day of sampling, at least one field duplicate sample shall be collected per matrix type (crude oil, condensate, produced water). The field duplicate samples are collected to demonstrate acceptable method precision ~~by the laboratory at~~

the time of analysis. Through this process the laboratory can evaluate the consistency of sample collection and analytical measurements as well as matrix variation. The laboratory should establish control limits based on relative percent difference to evaluate the validity of the measured results.

10.2 Laboratory Flash Analysis Equipment

- (d) The laboratory apparatus equipment, including sample lines, must be temperature controlled and allow for the independent control of the sample cylinder and flash analysis equipment temperatures. used for heating sample cylinders must be capable of heating and maintaining the steady state temperature measured at the time of sampling as reported on Form 1.
- (e) A gas volume meter with the capability of measuring volume in increments of one (1) milliliter minimum is required. The laboratory apparatus used for collecting gas flashed from liquids must be capable of precisely measuring gas volume, temperature, and pressure.
- (f) The laboratory vessels (e.g., glassware, cylinders, etc.) and equipment used for collecting flash gas flashed from liquids must be capable of collecting or storing gas for chromatography analysis without sample degradation and without compromising the integrity of the sample are required.
- (g) A metering pump for introducing deionized water into a sample cylinder that can meter the water in precise increments (e.g., 0.01 milliliters) is required.
- (h)(e) Additional sample preparation guidance can be found in GPA 2174-93, GPA 2261-00 and GPA 2177-03, all of which are hereby incorporated by reference, and fully identified in section 14 of this appendix, under References.

10.3 Bubble Point Pressure and Sample Integrity Check Laboratory Flash Analysis Procedure

This procedure is used to determine the bubble point pressure at sample collection temperature of a pressurized hydrocarbon liquid prior to conducting a flash or any compositional analysis. These results determine the integrity of the sample and provide a means of verifying the sampling conditions reported on Form 1. When heating is required, safety precautions must be taken due to thermal expansion within a pressurized cylinder. This procedure is performed with the use of a Double Valve cylinder and is not applicable for Floating-Piston cylinders. Samples gathered with the use of a Floating-Piston cylinder must be transferred to a Double Valve cylinder using a water displacement method prior to conducting this procedure.

- (a) Fix the cylinder in an upright vertical position using a ring stand or similar device. This ensures that headspace gas remains at the top of the cylinder.

- (b) Connect a pressure gauge and source of pressurized deionized water to the bottom of the sample cylinder using a metering pump for measuring the volume of water introduced into the sample cylinder.**
- (c) Slowly condition the cylinder to the measured sample collection temperature reported on Form 1 while monitoring pressure for a minimum of 2 hours or until a change of no more than 1 psi in pressure over 15 minutes is observed.**
- (d) Introduce deionized water while slowly mixing the sample by tilting the cylinder no more than 60 degrees from vertical in either direction to ensure that headspace gas remains at the top of the cylinder and liquid remains on the bottom. Continue adding deionized water to increase the pressure to above the pressure reported on Form 1, while mixing to ensure the sample returns to a single phase liquid.**
- (e) Record the stabilized pressure reading on the laboratory report.**
- (f) Remove a small increment of deionized water (approximately 0.5 milliliters) to reduce the pressure and allow it to stabilize. Document the sample pressure and the volume of deionized water (pump volume) on the laboratory report. Repeat until at least three (3) pressure readings above and three (3) pressure readings below the reported value on Form 1 are gathered.**
- (g) Graph the results of sample pressure and volume of deionized water (pump volume). Draw a line between the points above the measured value on Form 1. Draw a second line between the points below the measured value on Form 1. The intercept of the two lines denotes the bubble point pressure.**
- (h) Record the bubble point pressure on the laboratory report.**
- (i) Any sample that fails to achieve the following Pass/Fail criteria, which is the percentage difference between the bubble point pressure and the sample collection pressure reported on Form 1, shall be discarded:**

<u>Pass/Fail Criteria for Bubble Point Pressure Measurements</u>
<u>+/- 5% for > 500 psig</u>
<u>+/- 7% for 250 - 499 psig</u>
<u>+/- 10% for 100 - 249 psig</u>
<u>+/- 15% for 50 - 99 psig</u>
<u>+/- 20% for 20 - 49 psig</u>
<u>+/- 30% for < 20 psig</u>

10.4 Laboratory Flash Analysis Procedure

This procedure is used to determine the volume and composition of gas flashed from a pressurized liquid. This procedure is conducted after performing the bubble point pressure measurement to verify sample integrity.

- (a) Condition the sample cylinder to the collection temperature recorded on Form 1 for a minimum of 2 hours. This step may be expedited by performing in conjunction with the Bubble Point determination.
- (b) Connect a pressure gauge and source of pressurized deionized water to the bottom of the sample cylinder using a metering pump for measuring the volume of water introduced into the sample cylinder.
- (c) Connect the top of the sample cylinder to a temperature controlled flash chamber that can be heated or cooled independently from the sample cylinder. The chamber shall be of sufficient volume to allow for the flash process and the collection of the flashed liquid. Located at the top of the chamber will be an inlet for the liquid, and an outlet for the gas. The gas vent line will allow the flash gas to be routed through a constant volume gas cylinder and on to a gas meter (e.g., gasometer).
- (d) Throughout the flash process, maintain the transfer lines, flash chamber, and constant volume gas cylinder and gas meter at the target temperature.
- (e) Before introducing pressurized liquid into the flash chamber, evacuate the entire system and purge with helium. Vent the helium purge gas to atmosphere through the meter and then re-zero the gas meter.
- (f) Introduce deionized water into the bottom of the liquid sample cylinder to increase the pressure to a start pressure above the bubble point pressure. This step ensures that the sample remains single phase when introduced into the flash chamber.
- (g) Document the start pressure. The flash study will be performed at this pressure and not at the field recorded sample pressure.
- (h) Partially open (*crack-open*) the liquid sample inlet valve to allow for a slight drip of liquid into the flash chamber. It is critical to maintain the pressurized liquid as close as possible to the start pressure.
- (i) After liquid hydrocarbon and gas have been observed, terminate the flash procedure by closing the liquid inlet valve. Document the volume and/or weight of the residual liquid and the volume of gas collected. Document the volume of pressurized liquid sample introduced into the system.
- (j) Isolate the gas sample in the constant volume gas cylinder by closing both valves. Detach the cylinder and analyze via GPA 2286. Before analyzing,

condition the gas sample for a minimum of two hours at a temperature of at least 30°F above the target temperature. Assure that the GC inlet line is heat traced to maintain sample integrity upon injection.

- (k) Measure the pressurized liquid density at the start pressure and temperature. Also measure the density at a second pressure also above the bubble point pressure and the start pressure. Extrapolate the density of the pressurized liquid at the collection pressure recorded on Form 1.
- (l) Correct the pressurized liquid volume from the start pressure to the sample collection pressure recorded on Form 1 using the density measurements.
- (m) Document corrected liquid volume.
- (n) Perform all necessary calculations including that of the GOR or GWR.
- (o) A mass balance (analytical integrity check) may be performed by comparing the weight of pressurized liquid used for the flash (determined from the corrected volume used and the density at sample conditions) to the sum of the weight of the liquid and the weight of the gas.
- ~~(a) Heat the sample cylinder to the sample collection temperature as reported on Form 1 and allow the temperature to stabilize for a minimum of 30 minutes.~~
- ~~(b) After the cylinder temperature has stabilized, open the cylinder and collect all gas flashed from the liquid for a minimum of 30 minutes while monitoring the gas pressure and temperature.~~
- ~~(c) After all gas has flashed from the cylinder for a minimum of 30 minutes, ensure that the gas pressure has stabilized at ambient pressure with no changes in gas pressure observed. In the event that the gas pressure changes or remains above ambient pressure after 30 minutes, continue to allow the cylinder to flash until the gas pressure stabilizes at ambient pressure. The collected gas sample can now be used for gas chromatography analysis.~~
- ~~(d) At least 0.20 standard cubic feet of sample gas per barrel of liquid is required to conduct the laboratory procedures specified in this procedure. If insufficient gas volume is collected during the flash analysis procedure, additional laboratory analyses cannot be completed while maintaining the accuracy requirements specified in this procedure.~~
- ~~(e) After the flash analysis procedure is completed, remove all liquid from the sample cylinder and measure the total liquid volume and volume fractions (for example, 300ml total volume, 285 ml crude oil, 15 ml water) and adjust for any displacement liquid that was not displaced during the sample collection procedure.~~

10.510.4 Gas-Oil and Gas-Water Ratio Calculation Methodology

- (a) Convert the volume of gas vapor measured during the laboratory flash analysis procedure to standard atmospheric conditions as derived from the Ideal Gas Law as follows:

$$\underline{Vapor_{Std} = \frac{(Volume_{Lab})(459.67 + 60F)(P_{Lab})}{(459.67 + T_{Lab})(14.696)}} \quad \text{Equation 1-4}$$

Where:

Vapor_{Std} = Standard cubic feet of vapor at 60°F and 14.696 psia.

Volume_{Lab} = Volume of vapor measured at laboratory conditions.

T_{Lab} = Temperature of vapor at laboratory conditions, °F.

P_{Lab} = Pressure of vapor at laboratory conditions, psia.

459.67 = Conversion from Fahrenheit to Rankine

60F = Standard temperature of 60°F.

14.696 = Standard atmospheric pressure, psia.

- (b) Convert the volume of crude oil, **condensate**, or produced water measured after conducting the laboratory flash analysis procedure to standard conditions as follows:

$$\underline{Liquid_{Std} = \left(\frac{Mass_{Liquid}}{Density_{60F}} \right) \left(\frac{1 \text{ gallon}}{3785.412 \text{ ml}} \right) \left(\frac{1 \text{ STB}}{42 \text{ gallons}} \right)} \quad \text{Equation 2-5}$$

Where:

Liquid_{Std} = Standard volume of post-flash liquid at 60°F, barrels.

Mass_{Liquid} = Mass of liquid at laboratory conditions, grams.

Density_{60F} = Density of liquid at 60°F, grams/milliliter.

3785.412 = Conversion from milliliter to US gallons.

STB = Stock Tank Barrel.

42 gallons = Volume of a stock tank barrel at 60°F.

- (c) Calculate the Gas-Oil or Gas-Water Ratio as follows:

$$\underline{G = \frac{(Vapor_{Std})}{(Liquid_{Std})}} \quad \text{Equation 3-6}$$

Where:

G = The Gas-Oil or Gas-Water Ratio.

Vapor_{Std} = Standard cubic feet of vapor at 60°F and 14.696 psia.

Liquid_{Std} = Standard volume of post-flash liquid at 60°F, barrels.

Note: For condensate, the volume of liquid used for calculating the Gas-Oil Ratio shall be obtained from the piston cylinder measurement reported on Form 1 at the time of liquid sampling due to the rapid flashing of condensate that occurs during the laboratory flash analysis procedure.

10.610.5 Analytical Laboratory Methods and Requirements

The following methods are required to evaluate and report flash emission rates from crude oil, condensate, and produced water.

- (a) Oxygen, Nitrogen, Carbon Dioxide, Methane, Ethane, Propane, i-Butane, n-Butane, i-Pentane, n-Pentane, Hexanes, Heptanes, Octanes, Nonanes, Decanes+: Evaluate per GPA 2286-95, ASTM D-1945-03, and ASTM D-3588-98, and ~~ASTM D-2597-10 (GC/TCD)~~, all of which are hereby incorporated by reference, and fully identified in section 14 of this appendix, under References.
- (b) BTEX: Evaluate per EPA 8021B (GC/FID) or use ~~ASTM D 7096-16D-3710-95~~, GPA 2286-95, EPA 8260B, EPA TO-14A, and EPA TO-15 as alternate methods, all of which are hereby incorporated by reference, and fully identified in section 14 of this appendix, under References.

- (f) ~~Water and Sediment in Crude Oil by Centrifuge Method per ASTM D-4007-08, which is hereby incorporated by reference, and fully identified in section 14 of this appendix, under References~~

11. CALCULATING RESULTS

The following calculations are performed by the owner or operator in conjunction with the data requirements specified in section 7 and the laboratory reports specified in section 12. The same calculations are used for crude oil, condensate, and produced water.

11.1 Calculate the volume of gas flashed from the liquid per year using the Gas Oil or Gas Water Ratio obtained from the laboratory report as follows:

$$\underline{Ft^3 / Year = (G) \left(\frac{Barrels}{Day} \right) \left(\frac{Days}{Year} \right)} \quad \underline{\text{Equation 4-1}}$$

Where:

Ft³/Year = standard cubic feet of gas produced per year

G = Gas Oil or Gas Water Ratio (from laboratory report)

Barrels/Day = barrels per day of liquid (**DOGGR certified reports** Form 4)

Days/Year = days of operation per year (owner/operator Form 4)

11.2 Convert the gas volume to pounds as follows: Equation 5-2

$$\underline{\underline{Mass_{Gas} / Year = \left(\frac{Ft^3}{Year} \right) \left(\frac{gram}{gram - mole} \right) \left(\frac{gram - mole}{23.690 l} \right) \left(\frac{28.317 l}{Ft^3} \right) \left(\frac{lb}{454 grams} \right)}}$$

Where:

Mass_{Gas}/Year = pounds of gas per year

Ft³/Year = cubic feet of gas produced per year (Equation 41)

Gram/Gram-Mole = Molecular weight (from laboratory report)

23.690 l/gr-mole = molar volume of ideal gas at 14.696 psi and 60°F

11.3 Calculate the annual mass of methane as follows:

$$\underline{\underline{Mass_{Methane} / Year = \left(\frac{WT\% Methane}{100} \right) \left(\frac{Mass_{Gas}}{Year} \right) \left(\frac{metric ton}{2205 lb} \right)}}$$
 Equation 6-3

Where:

Mass_{Methane}/Year = metric tons of methane

Mass_{Gas}/Year = pounds of gas per year (Equation 52)

WT% Methane = Weight % of methane (from laboratory report)

12. LABORATORY REPORTS

12.4 Laboratory reports shall include, at minimum, a listing of results obtained using the laboratory methods specified in this procedure and as specified in Table 1.

Table 1: Laboratory Data Requirements

<u>WT% CO2, CH4</u>
<u>WT% C2-C9, C10+</u>
<u>WT% BTEX</u>
<u>WT% O2</u>
<u>WT% N2</u>
<u>Molecular Weight of gas sample (gram/gram-mole)</u>
<u>Liquid phase specific gravity of produced water</u>
<u>Gas Oil or Gas Water Ratio (scf/stock tank barrel)</u>
<u>API gravity of whole oil or condensate at 60°F</u>
<u>Water and Sediment of whole oil (ASTM D-4007-08)</u>
<u>Post-Test Cylinder Water Volume</u>
<u>Post-Test Cylinder Oil Volume</u>

14. REFERENCES

ASTM D-2597-10 — Standard Test Method for Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography, 2010.

ASTM D-3710-95 — Standard Test Method for Boiling Range Distribution of Gasoline and Gasoline Fractions by Gas Chromatography, Reapproved 2009.

ASTM D-4007-08 — Standard Test Method for Water and Sediment in Crude Oil by the Centrifuge Method (Laboratory Procedure), 2008.

ASTM D-7096-16 — Standard Test Method for Determination of the Boiling Point Range Distribution of Gasoline by Wide Bore Capillary Gas Chromatography.

FORM 1
Flash Analysis Testing Field Data Form

<u>Date of Testing:</u>	
<u>Production Company Name:</u>	
<u>Address:</u>	
<u>City:</u>	
<u>Contact:</u>	<u>Phone:</u>
<u>Sampling Company Name:</u>	
<u>Address:</u>	
<u>City:</u>	
<u>Contact:</u>	<u>Phone:</u>
<u>Sample Information</u>	
<u>Portable Pressure Pressurized Separator ID:</u>	
<u>Pressure Separator Vessel ID:</u>	
<u>Steady State Sample Pressure:</u>	<u>psi</u> ag
<u>Steady State Sample Temperature:</u>	<u>°F</u>
<u>Atmospheric Tank or Separator Temperature</u>	<u>°F</u>
<u>Crude Oil or Condensate Throughput:</u>	<u>Barrels/Day</u>
<u>Produced Water Throughput:</u>	<u>Barrels/Day</u>
<u>Gas Flow Rate (if metered):</u>	<u>Mcf/Day</u>
<u>Days of Operation of Separator and Tank System per Year:</u>	
<u>Percent Water Cut:</u>	<u>%</u>
<u>Number of wells in system:</u>	
<u>Cylinder Type (Double Valve or Piston):</u>	
Sample Type (circle one): crude oil condensate produced water	
<u>Sample Cylinder ID Number:</u>	
<u>Cylinder VolumeType:</u>	<u>ml</u>
<u>Displacement Liquid:</u>	
<u>Cylinder SampleVolume:</u>	<u>ml</u>
<u>Outage DisplacedVolume of Liquid Collected:</u>	
<u>ml</u>	