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Clerk of the Board
Air Resources Board
1001 I Street
Sacramento, CA95814

Submitted via web: http://www.arb.ca.gov/lispub/comm/bclist.php

RE: Comments on the October 7 Workshop to Discuss Refineries and Related Industries

Dear Sir or Madam:

Chevron has been a California company for more than 130 years and is the largest Fortune 500 corporation based in the state. We have participated in stakeholder meetings, broad-based industry and environmental group meetings, and discussions with ARB and its staff in order to make the program and this proposed rule workable for California, while meeting the goals of AB 32.

We greatly appreciate ARB's proposal to use Complexity Weighted Barrels (CWB) as the basis for refinery benchmarking instead of $CO_2$ Weighted Tonnes (CWT). In response to the materials presented at the October 7, 2013 Workshop to Discuss Refineries and Related Industries, we are submitting comments on a number of new issues.

## Introduction

Chevron is pleased that ARB has proposed to use CWB instead of CWT for refinery benchmarking, as CWB provides a more equitable allocation of free allowances than CWT. However, Chevron has the following comments on ARB's proposed changes, which are further detailed in this letter and the attachments:

- Hydrogen plants internal to a refinery should not be separated from the CWB refinery benchmarking.
- We would like to review ARB's methodology for calculating the refinery benchmark.
- We would like to review ARB's case studies for treatment of imported electricity to ensure that results will be equitable in all cases.

- ARB should either adopt the process unit definitions provided by WSPA or defer all but the largest process unit definitions to guidance.
- We would like to bring up other, more minor issues.

## Hydrogen plants internal to a refinery should not be separated from the CWB refinery benchmarking

ARB proposes to apply the "best in class" benchmark that was developed for the six merchant hydrogen plants to all internal refinery hydrogen plants, without adjustment or changes. Treating facilities with similar functions as identical does not represent the best technical or feasible approach.…..Requiring refineries to put a virtual 'fence' for purposes of monitoring and benchmarking between the integrated hydrogen plant and all of the other processes in the refinery is technically inequitable, infeasible and not necessary given the robust CWB methodology proposed for the rest of the refinery. Hydrogen plants that are internal to refineries should not be segregated from the refinery for the purpose of benchmarking; instead, a refinery should be benchmarked for all the process units within its boundaries.

**Benchmarking merchant and internal hydrogen plants together is technically inequitable to the refineries with internal hydrogen plants.**

- Merchant plants are newer and have the advantage of utilizing newer technology. These plants were built after 1994 and all use the pressure swing absorption technology, which inherently has fewer emissions.
- The Solomon methodology under CWB recognizes that refinery hydrogen plants are integrated into the refinery. Therefore including hydrogen plants within the refinery benchmark as a whole provides a fair allocation of allowances to hydrogen units.
- MRR CWB rules do not require metering of steam, electricity and other systems between process units. If the internal hydrogen plants are benchmarked separately these systems may not be monitored or metered to a level required by the Mandatory Reporting Rules. It would be difficult to monitor the emissions due solely to hydrogen production because hydrogen units inside a refinery share steam and other utilities with the rest of the refinery; these transfers are not monitored in the same way that they would be with a merchant hydrogen unit. Merchant plants meter their outputs in order to transact their contracts with the refineries.
- Please see Attachment 1 for more details on differences between hydrogen plants embedded in refineries and merchant hydrogen plants.

**The proposed merchant hydrogen benchmark of 20 allowances/mscf for the hydrogen plant sector is not appropriate for benchmarking internal refinery hydrogen plants.**

- The currently proposed benchmark for hydrogen plants is based on 'best in class', and was developed to represent a benchmark for 6 merchant hydrogen plants. This is not an appropriate benchmark for the 18 hydrogen plants in California, many of which have a different design than the 'best in class' plant.

- Creating a hydrogen benchmark that is based on the most efficient merchant hydrogen unit is an unrealistic benchmark for hydrogen units within a refinery. Hydrogen units within the refinery are integrated into the refinery operations. A refinery might have optimized their hydrogen plant for additional steam rather than making steam elsewhere in the refinery; thus the hydrogen production would be lower and the emissions of their hydrogen unit would be higher than if the plant stood alone.

**Having two separate hydrogen benchmarks would be the most equitable solution with the least additional study and equipment**

A revised joint hydrogen plant benchmark could not be developed within the ARB's timeframe to meet regulatory deadlines for MRR. An attempt to calculate a separate benchmark that would include refinery and merchant hydrogen plants would be very difficult, since as described above, refinery hydrogen plants are closely integrated into the refinery, making it difficult to accurately assess and allocate emissions to the hydrogen plant. Substantial new data would be needed to correctly develop a technically sound benchmark. Many of the imports and exports into internal refinery hydrogen plants and the hydrogen and steam balance are not monitored at MRR level basis. Studies and equipment would be needed to obtain that data prior to creating a fair representative benchmark.

- ARB has created additional benchmarks when one benchmark is not representative or one group is substantially disadvantaged by the benchmark. ARB pointed out in the workshop that merchant plants are sufficiently different than hydrogen plants inside refineries such that merchant plants would receive as much as 20% more allowances under the CWB. This would be an indication that the two groups are significantly different in design and therefore demonstrates the justification two benchmarks.
- We recommend using the existing hydrogen plant benchmark of 20 allowances/mscf for merchant hydrogen plants and allowing internal hydrogen plants to be given allowances under the CWB benchmark with the rest of the refinery processes.

**If one benchmark is ARB's only answer, then merchant plants and internal hydrogen plants could benchmark based on CWB.**

- This concept avoids trying to artificially separate integrated systems and would reward merchant systems for their efficiency. We cannot comment on the benchmark for merchant hydrogen plants, but the general practice of using 'best in class' instead of 90% of average appears to be creating an unnecessary and inequitable penalty for these operators and leads one to question why the Solomon CWB factor was not used as a basis for the merchant hydrogen benchmark.

**In conclusion, we recommend that ARB include internal refinery hydrogen plants in the CWB benchmark for refining based on the technical and policy reasons described above.**

We recommend that ARB implement this change by including the CWB factor for hydrogen plants in the CWB table and specify that 'mscf' refers to net million standard cubic feet of hydrogen production.

## Proposed CWB Benchmark Calculation

We are concerned that the analysis presented on October 7 showed that the CWB benchmark for 2014 will not provide the expected 84.5% (0.944 cap * 0.9 stringency) allowances, but rather provides only 83%. We would like to review ARB's methodology for calculating the refinery benchmark, particularly with respect to the details of how hydrogen plants were treated.

## Equitable Treatment of Energy Generated Offsite and Onsite

We would like to see ARB's case studies for treatment of imported electricity to ensure that results will be equitable in all cases.

We understand that ARB will provide allowances for direct emissions and CPUC will provide allowance value for indirect emissions. These allocations would be based on production using the same CWB benchmark. ARB discarded WSPA's recommendation to use a ratio approach to level the playing field for onsite and offsite generation based on their expectation of the CPUC's regulatory action. Due to the separation of the two agencies and time lag in the CPUC rulemaking process, we recommend that ARB adopt a resolution that recognizes this issue and would allow ARB to reopen the matter if it is not resolved equitably.

## Proposed Mandatory Report Rule CWB Definitions

Process unit definitions that are too specific risk confusion and problems during verification and may require ongoing changes as new technology is developed. ARB can ease this issue by clearly listing these definitions under CWB and prefacing them as "intended for the purpose of guiding the calculation of CWB."

While we understand the need for a core description, there are also dangers in specific lists of feeds and products. If a specific definition does not include all possibilities, the verifier may not be able to match a process unit directly to its definition. We recommend that broader language in these areas be included in each of the definitions. For example, "feeds include but are not limited to…" and "products include but are not limited to…"

We suggest that ARB either adopt the process unit definitions provided by WSPA, since these adhere more closely to the definitions provided by Solomon in Appendix D of their May 17, 2013 document or defer all but the largest process unit definitions to guidance. If ARB does not use the Solomon definitions provided by WSPA, the changes outlined in Attachment 2 are necessary.

## Other issues

In addition to the issues raised above, Chevron has the following comments on other, less significant issues, which should be addressed by ARB nonetheless.

- Fuel gas sales and treating should be reported in hp, not hp/yr as shown in the proposed table of CWB Values. This factor is based on the size of the equipment, not how much it was actually used during the year. This is a reasonable simplification, since the CWB factor incorporates an assumed utilization based on Solomon's global data regarding refinery operations.
- Sulfur production should be reported in long tons not light tons. A light ton is not a recognized unit of measure.
- There are a few process units where the feed to one unit is NOT reported separately but is combined with another unit. For example, 'tail gas recovery unit' is already included in the sulfur recovery unit and should not be reported again—this is not explicitly in the May 17 document but was stated elsewhere by Solomon. The whole definition seems to be missing from the list provided by ARB on October 7.
- The footnotes to Appendix D of the May 17 document are not precisely included in ARB definitions.
    - The first footnote is about lubricants. ARB did not include the lubricants section from definitions in the May 17 document but instead broke out each of the lubricant processes. It would be preferable to include the lubricants as shown in the definitions.
    - The footnote about hydrogen plants should be included, and there should be a definition of 'hydrogen plant.'

Sincerely,

*(original signed by)*
Lloyd Avram
State Government Affairs

Enclosures

Cc: Edie Chang, ARB (echang@arb.ca.gov)
Steve Cliff, ARB (scliff@arb.ca.gov)

**Attachment 1**
**Detailed Comments on Differences between Embedded and Merchant Hydrogen Plants**

The benchmark for the refining sector should be used for the whole refinery for the following reasons:

1. The CWB approach to refinery benchmarking is based on emission intensity of worldwide refining operations. In order to equitably develop and apply a CWB-based benchmark to California refineries, all of the process units in each refinery (including hydrogen units) should be included in the benchmark for the refining sector, and in each refinery's CWB calculation.
2. The CA-CWB factors for hydrogen plants express emission intensity of worldwide hydrogen plants relative to atmospheric crude distillation; including feedstock conversion to hydrogen, fuel for the reforming furnace, imports or exports of thermal energy across unit boundaries, and power. These factors should continue to be used in calculating total CWB for a refinery.
3. Onsite hydrogen plants represent a broader range of technologies than merchant hydrogen plants. ARB should recognize that the inventory of on-site hydrogen plants, both worldwide and in California, includes various technologies for hydrogen production. All of the merchant plants in California utilize the "new" PSA technology.
4. Accounting for emissions in on-site hydrogen plants is less straightforward than in merchant hydrogen plants.
    a. Feedstocks for on-site hydrogen plants are metered and reported under the MRR, but fuel metering for the MRR may, in some cases, be metered upstream and include emission sources in other units. Feedstock and fuel for off-site hydrogen plants are normally supported by financial transaction meters.
    b. Imports and exports of thermal energy between a hydrogen plant and the rest of the refinery can include multiple levels of steam (e.g., high pressure, medium pressure, low pressure), steam to drive condensing or letdown turbines, low pressure steam from letdown turbines, and boiler feedwater (deaerated and/or preheated). Steam may also be used internally for the regeneration of a $CO_2$ absorbing solvent used to purify the hydrogen. The utility balance is an important part of the equation in determining the net energy use and net emissions profile for any given hydrogen plant, but the data and analysis required to support the utility balance for an on-site hydrogen plant normally requires some degree of manual readings and engineering estimates.
    c. The CWB factor for SMR (steam methane reforming) hydrogen plants is consistent with natural gas feed and fuel. In practice, SMR hydrogen plants process both heavier feeds (containing ethane, propane, butane, etc.) and lighter

hydrogen-rich feeds. Because of this, specific and equally efficient plants may have higher or lower emissions relative to the CWB factor and benchmark.

5. The proposed benchmark for refining, with hydrogen plants addressed separately, may be inequitable. Carving out hydrogen plants from the refinery CWB could potentially be inequitable to the refining sector unless the reduction in CWB, benchmark emissions, and allocations are exactly equal to the addition of benchmark emissions and allocation resulting from hydrogen operations. This analysis would need to include factors for offsites and non-energy utilities and sensible heat of non-crude feeds as well as consistent treatment of thermal energy and power. If the reduction in CWB is not offset by an equal increase associated with hydrogen operations, ARB is effectively applying a stricter stringency factor (more stringent than 90%) than that used for other sectors.
6. ARB stated that the policy goal of treating hydrogen separately were:
    a. Consistent incentives between on-site and off-site hydrogen production
    b. Avoiding over-allocation to off-site hydrogen that would occur if off-site hydrogen were allocated using CWB

    To meet both of these goals, ARB has proposed a more stringent benchmark for hydrogen that appears to be consistent with the most efficient state-of-the art plants. This in turn results in a stricter stringency standard for refining as a whole. This is a departure from the intent of using the Solomon factors, supported by broad international experience, for the benchmarking of refinery units.

**Attachment 2**
**Suggested modifications to refinery process unit definitions**

In order to minimize confusion, ARB should use the process unit definitions provided by WSPA, since these adhere more closely to the definitions provided by Solomon in Appendix D of the May 17, 2013 document provided to ARB by WSPA. If ARB does not use the Solomon definitions provided by WSPA, the changes below are necessary.

- The definitions should broadly acknowledge that they are intended for the purpose of guiding the calculation of CWB.
- In general, broader language should be included in each of the definitions. For example, "feeds to the unit include but are not limited to…" "Products include but are not limited to…"
- Add "C5" and "C9" to the definition for 'Alkylation/poly/dimersol' to read: "Alkylation/poly/dimersol means a range of processes transforming C3/C4/C5 molecules into C7/C8/C9 molecules…".
- Expand the definition of "Ammonia recovery unit" to read: "Ammonia recovery unit means a refinery unit in which ammonia-rich sour water stripper overhead is treated to separate ammonia suitable for reuse in the refinery, or sales, for fertilizer, for the reduction of NOx emissions, or other commercial activities. This unit is the second stage of a two stage sour water stripping unit. The ammonia recovery unit includes, but is not limited to, the adsorber, stripper and fractionator."
- Delete "and disposed of" in the definition of "Delayed Coker" as follows: "Delayed Coker means a refinery unit which conducts a semi-continuous process, similar in line-up to a visbreaker, where the heat of reaction is supplied by a fired heater. Coke is produced in alternate drums that are swapped at regular intervals. Coke is cut out of full coke drums as a product. For the purposes of analysis, facilities include coke handling and storage."
- In the definition of "Distillate Hydrotreating", "virgin kerosene" should be changed to "distillate", because hydrotreaters do not necessarily treat fresh feed—it may come from other refinery units.
- Revise the definition of "Flexicoker" to read: "Flexicoker means a refinery unit which conducts a proprietary process incorporating a fluid coker and where the [delete 'surplus'] coke is gasified to produce a so-called 'low BTU gas' which is used to supply the refinery heaters and surplus coke is drawn off as a product."
- In the definition of "Fluid Catalytic Cracking", we propose more general language such as "Fluid Catalytic Cracking means cracking of feedstocks such as vacuum gasoil and residual feedstocks over a finely divided catalyst."
- Delete "and disposed of" in the definition of "Fluid Coker" to read: "Fluid Coker means a proprietary continuous process where the fluidized powder-like coke is transferred between the cracking reactor and the coke burning vessel and burned for process heat production. Surplus coke is drawn off as a product."

- Add “or coker” the definition of “Propane/Propylene splitter” to read: “Propane/Propylene splitter (propylene production) means a refinery unit that conducts separation of propylene from other mostly olefinic C3/C4 molecules generally produced in an FCC or coker. Its products include propylene and must be chemical or polymer grade. "Chemical" and "polymer" are two grades with different purities.”
- In the definition of “Selective Hydrotreating of distillates”, 1) We propose that “of distillates” be replaced with “C3-C5 streams for alkylation.” Feeds to these units can include feeds that are lighter than distillates.
- Revise the definition of “Vacuum Distillation” to read: “Vacuum Distillation means distillation of atmospheric residues under vacuum.” Delete “The process line up must include a heater” because some units may have more than one main distillation column.
- Delete “vacuum gasoils usually destined to be used as FCC feed” from the definition of “VGO Hydrotreater” to read: “VGO Hydrotreater means a refinery unit which conducts desulfurization of a hydrocarbon stream typically made up of vacuum gasoils and cracked gasoils, principally destined to be used as FCC feed, over a fixed catalyst bed at medium or high pressure and in the presence of hydrogen.”