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James S. Rhodes, III, Ph.D.
Private Consultant
7825 Fay Avenue, La Jolla, CA 92037

John Courtis
California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Subject: Innovative Methods of Crude Oil Production within the Low Carbon Fuel Standard

Dear Mr. Courtis,

Thank you very much for the opportunity to provide input to the Air Resource Board's (ARB's) process to implement the provisions of the Low Carbon Fuel Standard (LCFS) amendments related to "innovative methods" of crude oil production. These provisions represent a critical new component of the LCFS with the potential to motivate substantial emissions reductions within petroleum fuel supply chains. Innovative crude oil production methods, including those that employ CCS technologies, can enable production of low carbon fuels and advance the objectives of the LCFS. These methods need to be consistently supported and encouraged by the LCFS to motivate their development. Some key points in this regard are outlined here and described in greater detail below.

- Implementation of "innovative methods" provisions should reflect design principles and policy features consistent with the balance of the California LCFS policy.
- Decision criteria applied to qualify production methods as "innovative" should be simple and objective, minimizing subjective determinations that may have multiple interpretations.
- The California LCFS should provide broad and consistent support for all petroleum fuels produced using CCS technologies that reduce lifecycle fuel carbon intensity.
- Lifecycle accounting methodologies and assumptions used to calculate carbon intensity for established fuel pathways—including system boundaries and the treatment of co-products—should be applied consistently in quantifying emissions reductions and LCFS credits from innovative methods of crude production.

I work with a number of parties interested in developing low carbon intensity fuel pathways to support LCFS compliance by regulated parties. As such, my goal in providing this input is to support ARB's efforts to implement the "innovative methods" provisions in a manner that stimulates innovative approaches to petroleum fuel supply to deliver meaningful lifecycle emissions reductions, are consistent with the broader structure and incentives of California's LCFS policy, and that provide clear signals and coherent incentives to parties developing low carbon fuel pathways.

The importance of "innovative methods" provisions to the LCFS policy's success is elevated by the decision to assign "average" CI values to all petroleum-derived fuels except those using "innovative methods". This implies that the "innovative methods" provisions are the primary mechanism by which LCFS policy objectives will be advanced within petroleum fuel supplies. While this approach has the potential to motivate significant innovation in petroleum fuel supplies, it puts considerable pressure on the effective implementation of the "innovative methods" provisions.

The LCFS is a strategically designed policy capable of creating strong incentives for innovation. Its design reflects considerable analysis into policy mechanisms for motivating emissions reductions from transportation fuels. The "innovative methods" provisions represent a significant departure from the policy's original design. To minimize potential distortions from this departure, **the "innovative methods" provisions should arguably be implemented in a manner that reflects design principles and policy features consistent with the balance of California's LCFS policy**. Two particular examples are discussed here to illustrate this general point:

- Technology neutrality; and
- LCA methodology.

Technology neutrality is a central principle underlying the LCFS policy design. It reflects the well documented notion that technology innovation and technological change (which the LCFS is designed to motivate) are fundamentally hard to predict, particularly in the energy sector. The LCFS's structure as a technology neutral performance standard deliberately avoids putting policy makers in the position of "picking" technological winners and losers. The notion that some methods of crude oil production will be classified as "innovative" (and thereby eligible to generate LCFS credits) while others are not raises some particular challenges with respect to technology neutrality. Technology neutrality is, however, a design principle worth preserving.

With this in mind, **classification of crude oil production methods as "innovative" should arguably follow decision rules that are simple and objective, minimizing subjective determinations that may be open to multiple interpretations**. This will insulate regulators from the trap of picking technological "winners" and "losers" through the process of designating crude production methods as "innovative". The decision rules provided in the approved regulatory amendments, such as "implementation . . . during or after the year 2010", provide good examples in this regard [paragraph 95486(b)(2)(A)3 of the Modified Regulation Order].

By extension, categories of qualified "innovative methods", such as those incorporating carbon capture and storage (CCS), should be interpreted broadly. It is often the case that multiple options exist for implementing emerging technologies. This is certainly true in the case of CCS. Several parties I work with are developing innovative petroleum fuel pathways that include CCS. Some of these pathways may be consistent with current expectations of how CCS can be applied to deliver fuel carbon intensity reductions while others may not. The notion that qualifying "innovative methods" might be limited to current expectations for how CCS will be deployed contradicts the basic tenets of technology neutrality and innovation. Therefore, to advance technology neutrality and to fully leverage the creative and innovative potential of market participants, **the "innovative methods" provisions of the California LCFS should arguably treat equally all pathways employing CCS technologies to reduce lifecycle emissions from petroleum fuel supplies**.

More generally, the key questions for qualifying "innovative methods" should focus on (i) whether the fuel pathway is new or innovative (i.e. is the activity in widespread commercial use or is its development meaningfully facilitated by the LCFS) and (ii) whether it yields measurable reductions in lifecycle fuel carbon intensity. Qualifying "innovative methods" should not depend on how well the pathway reflects current expectations for how emergent technologies will be deployed.

Lifecycle analysis methodology is another key area where consistency is critical to ensuring the "innovative methods" provisions provide consistent and coherent incentives. Lifecycle analysis is a cornerstone of the LCFS policy framework. This is necessary and appropriate, as the sources of emissions and their relative contributions in delivering transportation fuel energy varies widely across alternate fuels types and fuel pathways. However, lifecycle analysis is also highly sensitive to methodological decisions, presenting challenges for ensuring policy incentives are consistent and coherent. ARB has addressed these challenges by requiring carbon intensities of all fuels to be determined using the California-Modified GREET (CA-

GREET) model, or an equivalent analytic framework using assumptions and methodologies equivalent to those in the CA-GREET model.

Lifecycle analysis of petroleum fuel pathways is in the process of being migrated over to the OPGEE model, which is currently still in development. This may be useful in enabling more refined analysis of petroleum fuel pathways, for example. However, to ensure that resulting policy incentives are consistent across all regulated fuel pathways (e.g., those modeled in OPGEE and CA-GREET), the OPGEE model should (and I expect will) be developed and implemented using assumptions and methodologies consistent with those already embodied in the CA-GREET model.

Similarly, analyses adopted to characterize the emissions benefits of "innovative methods" should adopt methodologies and assumptions consistent with those embodied in the CA-GREET (and OPGEE) model. For example, system boundaries for the CA-GREET model include all direct material and energy inputs to production, and the emissions effects of fuel co-products are generally treated using system expansion. Independent from the merits of these particular methodological decisions, to provide consistent and coherent policy incentives **lifecycle analysis methodologies used to evaluate carbon intensity values for established fuel pathways—including particularly the use of broad system boundaries and co-product treatment via system expansion—should be applied consistently in quantifying emissions reductions resulting from "innovative methods" of crude oil production**.

Thank you again for the opportunity to provide input to ARB's work to implement the "innovative methods" provisions of the LCFS amendments. I appreciate your thoughtful consideration of my comments and look forward to any additional opportunities to support effective implementation of the California LCFS.

With kindest regards,

James S. Rhodes, III, Ph.D.
Private Consultant