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EOS CLIMATE™

September 27, 2011

California Air Resources Board
Sacramento, California

RE: *2nd Revisions (September 2011) to Compliance Offset Protocol for ODS Projects and to Cap-and-Trade Regulations*

ODS Protocol

We agree with the proposed addition of CFC-13 to the list of eligible gases. However, we disagree with the values ascribed to two parameters in the Protocol that would significantly impact the amount of greenhouse gas emissions associated with a potential CFC-13 project:

1- the annual average emission rate of CFC-13; and
2- the GHG emissions of CFC-13 substitutes

We believe the proposed values for these parameters in the September 2011 draft of the ODS Protocol are based on either indirect or out-of-date information. The proposed values are for these parameters are inaccurate and would make any CFC-13 project economically non-viable. Projects that would otherwise provide real and permanent GHG emission reductions will not happen with the proposed values. We are providing here updated market data and assumptions that we believe ARB should rely upon.

Average Emission Rate
ARB has proposed an average annual emission rate of 9% for CFC-13. We assume this is derived from a single data point in the database that ARB has compiled from SCAQMD Rule 1415 reporting. In that database, one facility reported an annual leak rate of 9.4% for CFC-13 equipment. We believe this is overly conservative, based on insufficient data.

A survey conducted by the Climate Action Reserve ODS working group reported a range of annual leak rates for CFC-13 between 7 and 33%. The 2005 IPCC/TEAP Special Report on Safeguarding the Ozone Layer and Global Climate System listed an average leak rate for commercial refrigeration and industrial process refrigeration of 17% and 18% respectively.

CFC-13 has been used in low temperature commercial and industrial applications, including ultra-low temperature laboratory freezers as well as larger units. Based on our work with refrigerant reclaimers and facility owners and operators, demand for CFC-13 remains in high demand to recharge high value older equipment. According to the companies who are servicing the equipment, these older units commonly leak because of their age and high-pressure requirements; in many cases 100% of the refrigerant charge is released. We believe a more accurate, and conservative leak rate for CFC-13 is 17%.

GHG Emissions of CFC-13 Substitutes

EPA's SNAP (Significant New Alternatives Policy) program lists the following refrigerants as acceptable alternatives to CFC-13.

	GWP
R-403B	4,458
R-508A	13,214
R-508B	13,396
HFC-23	14,800
R-744 (CO2)	1

When CFC production ended, R-508 became the industry standard replacement for CFC-13. With growing concern over the global warming potentials of refrigerants, producers of ultra-low temperature freezers have been phasing out use of R-508. This has already happened in Europe, and is now underway in the United States.

As is the case across many sectors, there are additional, viable "third-generation" alternatives for CFC-13 that are in use which have not been submitted for SNAP review nor proposed by EPA for addition to the list of SNAP acceptable substitutes:

	GWP
R-404A	3,922
R-134A	1,430
Ethane	5.5

The following leading manufacturers of ultra-low temperature freezers are marketing in the U.S. new units using hydrocarbons, CO2, R-134A and R-404A.

Product: Hydrocarbon "Green" -86°C Ultra-Low Temperature Laboratory Freezers
- Refrigerants: Hydrocarbons
- "Green" High-Efficiency Lab Freezers (50Hz voltages only) use hydrocarbon-based refrigerants to achieve a 5 - 10% decrease in power consumption over our already energy efficient Innova and Premium freezers"
- "New Brunswick Scientific is proud to offer our first hydrocarbon-based ULT freezers, in an effort to deter global warming and meet the environmental requirements of today's laboratory. Our new hydrocarbon freezers not only have the same advanced features as our original Innova® U725 and Premium U570 models, but also offer a 5-10% decrease in power consumption. The result is a decrease in yearly operating costs, an eco-friendly energy-saving design, and the elimination of the use of detrimental HFC refrigerants that contribute to global warming."
http://www.nbsc.com/freezers.aspx

Product: Thermo ScientificHarris Classic -85ºC Chest Freezers
- Refrigerants: Ethane and other hydrocarbons
- "Humm Technnology is not refrigerant specific. It can use any of a variety of off-the-shelf cooling fluids as DuPont SUVA 95, hydrocarbons such as Ethane (widely used in Europe), or other refrigerants commonly used in global markets for household refrigerators and consumer goods."
http://www.labrepco.com/data/coldstorage_documents/ULT25%20Brochure-2.pdf

Product: Tempure Scientific Glass Pharamcy Lab Freezer
- Refrigerant: R404A
http://www.tempurescientific.com/medical-refrigerators/laboratory-freezers/pharmacy-laboratory-freezer-2-door-hinged

Product: Sanyo VIP Series -86°C Ultra Low Freezers
- Refrigerants: HFC blends and ethane

- Phone meeting with Sanyo Biomedical/USA. They reported they are in the process of refilling their freezers with ethane.
- http://www.coolerdirect.com/images_templ/sanyo-medical-ref-mdf-u33v.pdf

For all of the CFC refrigerants, the CAR and ARB ODS Protocols include an estimated emission factor associated with the substitute refrigerants based on market penetration of various substitutes and the average charge size and leak rates. In the September draft protocol, the emission factor for CFC-13 substitutes is **7,144 lbC_2OE / lbODS destroyed**.

To generate an updated emission factor for CFC-13 substitutes, EOS conducted market research via consultations with the manufacturers of ultra-low temperature freezers (see above) and reclaimers on the market penetration of CFC-13 alternatives; our analysis is as follows:

R-13 Replacement	GWP	Est. % of Market
R-403B	4,458	5%
R-508A*	13,214	0%
R-508B	13,396	15%
HFC-23	14,800	0%
R-744 (CO2)	1	30%
R-404A	3,922	10%
R-134A	1,430	15%
Ethane	6	25%

*To be conservative, we assume all R-508 that is used as an R-13 replacement is R-508B as it has a higher GWP.

Calculation of the emissions factor also requires charge size and leak rate assumptions:

- Typical R-13 charges in ultra-low temperature freezers are between 0.5 and 1.0 lbs. In other refrigerant applications, the charge size of hydrocarbons, HFCs and other CFC substitutes typically are half the charge size as the original ODS. Using this, we assume an average charge size of 0.5 lbs for CFC-13 substitutes.
- Based on the leak rates for commercial and industrial refrigeration equipment in the IPCC/TEAP report and the CAR working group survey (see above), we conservatively assume a 15% leak rate.

Based on the current market analysis, and the assumptions made above on replacement charge size and leak rate, the CFC-13 substitute emission factor is calculated as **1,141 lbC_2OE / lbODS destroyed**. This is approximately 16% of the substitute emission factor given in the September 2011 Protocol.

Cap-and-Trade Regulations

The proposed revised language in Section 95985(b) on timing of invalidation of ARB Offset Credits from ODS projects could be interpreted in different ways:

- Credits from ODS projects may be invalidated within 3 years of credit issuance;
- Credits from ODS projects may be invalidated within 3 years of credit issuance but only if those projects are "re-verified" within those 3 years – otherwise the credits may be invalidated up to 8 years after credit issuance;
- Early action credits from ODS projects conducted before 2014 that are re-verified may be invalidated within 3 years of credit issuance – credits from ODS projects that are not re-verified that are completed after 2014 cannot be invalidated.

Because we do not know the intent of the revision, we are not proposing alternative language but we do recommend that the language be clarified.

We applaud the staff for their tremendous work in developing the AB 32 regulatory program and we look forward to implementing projects that will prevent GHG emissions because of these new regulations.

Sincerely,

Jeff Cohen,
Senior Vice President, Science & Policy