Response to OIG Recommendations 3.1 & 3.2:
Update on the Development of Higher Level Measures for the Pollution Prevention Programs

I. Background:

The Pollution Prevention Program is responding to recommendations 3-1 and 3-2 by EPA's Office of Inspector General (OIG). In 2008, the EPA's OIG initiated a review of the P2 Program's Program Assessment Rating Tool (PART) score for fiscal year 2007 received from the Office of Management and Budget's application of PART. The OIG validated the high PART score the P2 Program earned, and also made recommendations about improving the program's measurement and reporting of performance results.

II. OIG Recommendation 3-1: "Focus on the select P2 pollutants where health effects are known and develop higher level performance indicators that address reductions of environmental risks or impacts to the ecology or human health."

Status Update: In August, 2009, the Design for the Environment (DfE) Program developed a higher-level performance measure to track the potential reduction in known lung and respiratory effects, such as asthma, to workers and local communities resulting from reduced exposures to diisocyanates from implementing DfE best practices in automotive refinishing operations across the country. Diisocyanates are the leading attributable cause of asthma in the workplace. However, asthma and other serious health effects could be of concern to anyone exposed to either a single high-level concentration or continued exposure to small-levels of diisocyanates. Diisocyanates are also widely-used in weatherization and consumer products, compounding the potential for exposure.

Experience with the Pilot Automotive Refinishing Risk Measure

In response to Recommendation 3-1, the Design for the Environment (DfE) Program developed a pilot risk measure in August, 2009. The DfE measure focuses on the reduced risks to human health to workers and communities achieved in the DfE Automotive Refinishing Project through providing thousands of shop workers and owners access to workshops and then their implementation of best practices in their shops. The DfE Auto Refinishing Program identified a set of best practices[1] for reducing emissions and decreasing worker exposure to diisocyanates and other chemicals of concern in the automotive coatings. Best practices include using personal protective equipment including full-faced supplied air respirators, use of high volume low pressure spray guns, switching to water-based lower VOC coatings, specialized training in spray techniques to reduce over-spray, and spraying in the confines of a booth with adequate filters to capture diisocyanates in over-spray mist that would otherwise migrate to local communities. Diisocyanates was the focus of this measure because it is a recognized health hazard and is linked to asthma, and reported deaths, in the workplace.

> *Pilot Project Measure: EPA's Design for the Environment Auto-Refinishing Program will track: Number of workers and community members protected from lung and respiratory effects as a result of reduced exposures to diisocyanates accomplished through the implementation of best practices in automotive refinishing operations.*

[1] http://www.epa.gov/opptintr/dfe/pubs/auto/trainers/index.htm

To assist in quantifying and estimating the reduced health effects to workers in auto refinishing shops, the Auto Refinishing Program created an Emissions Reduction Calculator.[2] Inputs to the Calculator included the best practices implemented in each shop, the average pounds of pollutant emissions (diisocyanates, particulates, VOCs, material usage) reduced per best practice, the assumed number of workers per shop (based on data collected during site visits and regional workshops, the average number is 10 employees), the number of shops (i.e., in 2008, over 400 job shops committed to implementing best practices), the assumed number of workers in a shop that would be protected by implementing best practices (all), and the known exposure potential in the absence of best practices (diisocyanates are potent sensitizers via inhalation[3] and skin exposures that can trigger a potentially fatal asthma attack in sensitized persons at very low exposures,[4] and are the leading occupational cause of asthma, especially for workers who spray primers and clear coats.[5] This allows the program to link reductions in diisocyanates exposure to reduced health effects of workers that would have been exposed to diisocyanates in the absence of best practices.

Since 2007, DfE best practices workshops have been held in New Hampshire, Massachusetts, New York, DC, Delaware, Maryland, West Virginia, Michigan, Tennessee, Indiana, Colorado, Arizona, and Washington. Additional workshop requests are outstanding from states in EPA Regions 4, 8, and 10. DfE has also been approached about the possibility of conducting workshops for the 14 non-attainment states, including such states as Maine and Northern Virginia, impacted by the Ozone Transport Commission's new proposal that will require automotive refinishing shops to switch to waterborne paints (another DfE best practice) to meet lower VOC standards. In order for this pilot to be successful and achieve annual targets, the ability to continue workshops is critical, especially throughout 2010.

Reducing diisocyanate exposures also provides positive health benefits for persons living nearby automotive refinishing shops. DfE is developing a framework for determining the protection to surrounding community members using Geographical Information System (GIS) modeling and the Internet Graphical Exposure Modeling System (IGEMS), which integrates several EPA environmental fate and transport models and some associated data for ambient air, surface water, soil, and ground water. IGEMS can be used in combination with GIS and chemical screening tools. IGEMS takes up to 150 area release inputs at a time and calculates concentrations, release rates, risks in vulnerable and general populations, and ranges from and rings around a facility. DfE will take the spatial locations of shops using best practices and analyze their distance from buildings (such as schools, day care centers, and homes) that may contain sensitive populations. This would be especially relevant to low-income neighborhoods located near a cluster of auto body shops. Modeling efforts will allow the program to calculate a reasonable percentage of people likely to be protected.

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[2] http://www.epa.gov/dfe/pubs/projects/auto/emission_reduction_calculator052008.xls.

[3] Bello D, CA Herrick, TJ Smith, SR Woskie, RP Streicher, MR Cullen, Y Liu and CA Redlich. Skin exposure to isocyanates: reasons for concern. Environmental Health Perspectives 115(3); 328-33 (2007).

[4] See Redlich CA, D Bello, AV Wisnewski. Isocyanate exposures and health effects. Environmental & Occupational Medicine, 4th Edition, Ch30, p 502-16 (2006); and NIOSH health alerts at http://www.cdc.gov/niosh/docs/2006-149/default.html.

[5] http://www.hse.gov.uk/asthma/vehicle.htm

III. OIG Recommendation 3-2: **Using the results of Recommendation 3-1, design a strategy for developing P2-wide PART higher level measurements that could be used as a model to further develop P2 Program-wide higher level measurements.**

The P2 Program is carefully considering its experience with the pilot worker and community health effects measure for diisocyanates in automotive refinishing for addressing the addition of higher-level performance measures. The P2 Program is using the lessons-learned from the pilot measure described in 3-1 for proceeding with program-wide higher level measures.

Lessons-learned from 3-1:

- The measure represents an explicit statement about the health of an identified population in relation to a specific chemical exposure with known health effects.
- The automotive refinishing pilot measure needs time to fully evolve, including assuring that workshops continue and best practices are widely adopted. The measure has been defined; however, the extrapolation of shop emissions using the calculator tool based on workshop inputs and then extrapolating this data to map community-based exposures is still a work-in-progress. If this was that easy to do, there should not even have to be a pilot to develop this methodology.
- Most P2 Program projects do not seek to influence workplace or community exposures to a specific chemical substance of known significant health effects. This suggests the pilot measure experience may be replicable in limited instances for the P2 Program.
- Many P2 Program projects rely on the authority of the P2 Act, a policy instrument that aims more broadly to promote a national policy of preventing pollution at the source and helping business realize the attendant cost savings, and Executive Orders which make explicit the aim of protecting resources as a component of pollution prevention.
- In instances where chemical hazard, exposure, monitoring and surveillance information is readily available, or reasonably ascertainable, a P2 Program project will explore employing data extrapolations and/or modeling to the extent feasible and verifiable. However, this approach currently cannot be universally applied across all P2 programs because robust chemical data that might support a higher level indicator currently is not attainable in many instances.

Discussion: In conversations with the individual P2 Programs, it is not feasible or perhaps desirable to develop and mandate a program-wide chemical risk-based measure applicable to all P2 Programs. At best, the experience of the DfE risk measure is being broadly shared with the other P2 Programs for consideration in future project design and goals. However, risk assessment driven by chemical-specific hazard and exposure data is not readily available for most P2 Programs, nor is it the focus of their typical information collection efforts since most P2 Program projects are not focused on a specific chemical of concern. OPPT's experience, even in the core TSCA programs, recognizes that the availability of valid exposure data is a challenge. IUR data often provides only generic information, such as "used in a consumer product". Further, the mission of the P2 Programs is to serve as a balance in a multi-media role. P2 Programs strive to achieve multiple co-benefits from program activities including conserving water, energy, and virgin materials; greening energy sources; minimizing use of hazardous and high global-warming-potential materials; creating safer chemicals and technologies, avoiding pollutant

transfers among air, water, and land; greening engineering processes, products and services; and achieving a financial payback in the near or longer term.

Where it is plausible that chemical-specific health effect measures can be developed by P2 Programs, the ability to do so will continue to be dependent on the availability of health or ecological effects data, chemical fate and transport data, the knowledge of exposures, uses, as well as the magnitude of such impact on particular populations, such as workers, consumers, or the general population in communities. Where individual P2 Programs develop a chemical-specific focus and have access to known health or ecological effects data, it may be appropriate to extrapolate to risk-based outcomes. For example, chemical-specific health or ecological effects measures could be explored for greener chemistries that promote risk reduction benefits (possibly consolidated in aggregate to avoid appearance of product endorsement), where extrapolated results could be further shared to educate facilities on a range of potentially avoidable impacts through chemical substitution.

It may also be reasonable for projects that have some aspect of targeted chemical focus to develop chemical-specific hazard only reduction measures, particularly where a known chemical hazard may be removed from the marketplace and substituted with safer alternatives. In this type of P2 intervention, any exposure reduction to workers and others is a co-benefit of removing the concern or avoiding the use of hazardous materials in the first place. This type of P2 action is not by direct best practices training. Not being able to quantify exposure reductions through direct intervention, such as best practices workshops, presents another challenge in program-wide adoption of any risk measure. The program will explore the development of hazard-based measures further. This could be considered for projects that cannot extrapolate to risk-based outcomes due to highly variable exposure scenarios but still have a sufficiently concentrated single-chemical impact.

In some cases, risk-based findings are not the goal of a P2 approach. The P2 Programs are also considering broader sets of measures based on a life-cycle assessment. A lifecycle assessment produces impact scores for indicator categories that include not only toxicity and ecotoxicity but also a larger number of several other categories ranging from resource depletion to climate change.

Some P2 Programs are also considering outcome measures that might capture the environmental and economic components of sustainability. Sustainability considerations would also bring in economic sustainability, an area where the P2 Program is uniquely suited to contribute.

The P2 Programs welcome the challenge that the OIG has presented in 3-2; however, as described above, a one size fits all approach to higher measures does not reflect the diverse nature and purpose of the P2 programs. It is not appropriate for all programs to develop a risk measure but where feasible, will apply the lessons-learned to develop higher level measures with a foundation in a hazard assessment, a lifecycle assessment, or a sustainability assessment.