



CONTROLLING EMISSIONS
PROTECTING THE ENVIRONMENT
CONTINUOUS IMPROVEMENT

NORTH AMERICA PROGRESS REPORT 2008



**The Voluntary Emissions Control
Action Program for Brominated
Flame Retardants**





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CONTINUOUS IMPROVEMENT**

**VECAP NORTH AMERICA PROGRESS REPORT
THROUGH DECEMBER 2008**

Introduction to VECAP

VECAP, the Voluntary Emissions Control Action Program, is a proactive industry initiative to understand, control and reduce emissions of flame retardants (FRs) to the environment in a sustainable and measurable manner, both from manufacturing facilities and processor sites throughout the supply chain.

As global producers of plastic additives, including flame retardants, we are committed to ongoing efforts to achieve excellence in product stewardship. This voluntary initiative, which has produced significant reductions in emissions of flame retardants since the program was introduced in Europe in 2004, was launched in North America in 2006. Since then, a majority of the companies that handle and use flame retardants in the United States and Canada have committed to implementing the VECAP program.

As VECAP begins its third full year of implementation in North America, the member companies of the Bromine Science and Environmental Forum (BSEF) are committed to closely monitoring its effectiveness and making information on the program's progress, results and future plans available to U.S. and Canadian regulatory agencies as well as the general public.



About VECAP

ALLIANCE OF AUTOMOBILE MANUFACTURERS

“Members of the Alliance of Automobile Manufacturers encourage supplier initiatives and programs, such as VECAP. These types of programs are effective at reducing emissions of substances used by industry and show how voluntary efforts can benefit the environment.”

Charles Territo

Director of Communications
Alliance of Automobile Manufacturers

VECAP was originally designed to manage, monitor and minimize the potential for industrial emissions of a single flame retardant by establishing partnerships with companies who use that product in their manufacturing or production processes. VECAP has now expanded to include other flame retardants, and some program participants have even begun to use VECAP generally, applying its principles and approaches to their overall manufacturing process and environmental controls systems to reduce emissions of a variety of materials and substances. Emissions reductions programs are expected to enhance the sustainability of the products to which they are applied and, with specific regard to flame retardants, to allow them to continue providing benefits in fire safety, human health and environmental protection.

BSEF was established so that bromine manufacturers could work together to support activities promoting:

- Public health and safety;
- Transparency with public authorities;
- Scientific research;
- Environmental stewardship; and,
- Fire safety in an environmentally sustainable manner.

The BSEF member companies are also committed to the chemical industry’s broader Responsible Care® program, which is focused on employee and public safety as well as reducing emissions of chemicals generally. BSEF views VECAP as a logical extension of the Responsible Care® program.

How Does VECAP Work?

VECAP is based on the development and application of “Best Practices” for the use of flame retardants and on recognized environmental management programs, such as ISO 14001 and the European Union’s Eco-Audit and Management Scheme (EMAS), but simplified to focus on the target chemicals and to allow small and medium enterprises to participate in the program.

THE SCOPE OF VECAP

In typical production process, there are differences between the amounts of materials that enter a process and the amounts that subsequently leave as part of a finished good. VECAP uses a structured “mass balance” approach to understand and account for those differences. By using a mass balance approach to account for material entering and leaving a system, emissions that might have been unknown or difficult to measure can be identified.

A major component of the VECAP program is to help manufacturers and other users understand and address the potential for direct and indirect emissions of BFRs to land, air and water, and to define to the greatest degree possible the mass balance. VECAP encourages and offers specific guidance to users on how to look critically at their product flows and processes in order to identify potential efficiency improvements and, in doing so, reduce their potential for emissions to land, air and water.

Put more simply, the VECAP approach provides a clear structure for:

- Qualitatively assessing land, air and water emissions; and,
- Quantitatively assessing emissions to land, air and water, which can then be used to establish the mass balance for the process.

1 → COMMITMENT TO THE VECAP CODE OF GOOD PRACTICE

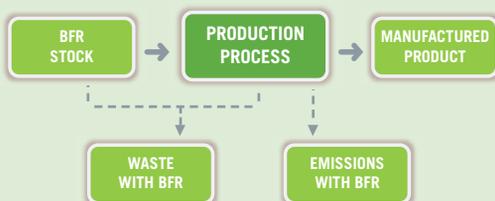
The VECAP system starts with the user’s commitment to the program, adopting the Industry’s Code of Good Practice and implementing these principles into the procedures and work instructions of daily operations.

2 → SELF AUDIT

With the self-audit, the company identifies the production flow sheet of its operations.

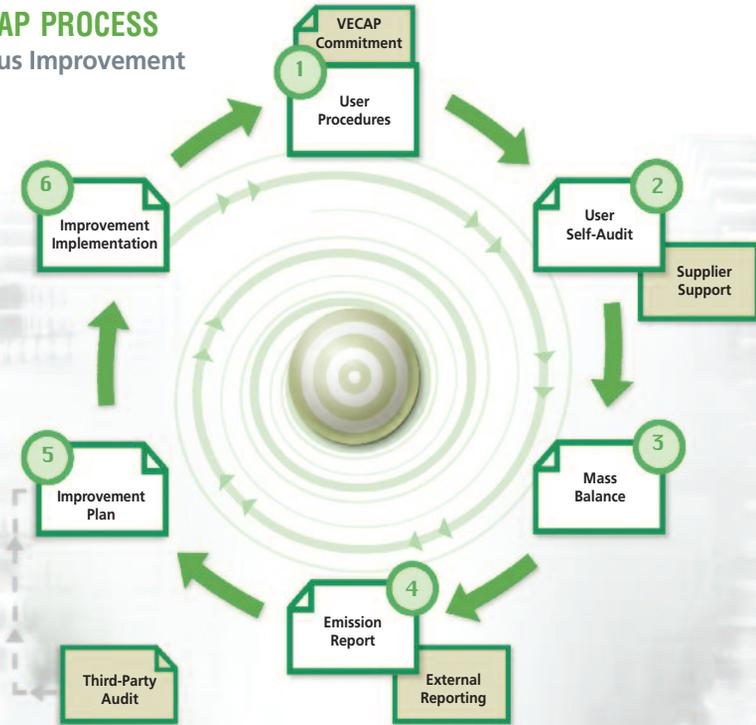
3 → MASS BALANCE APPROACH

The company completes and closes the BFR mass balance (signaling the gap in the amount of BFR entering and leaving the production process).



THE VECAP PROCESS

Continuous Improvement



4 → BASELINE EMISSIONS SURVEY

The company uses the obtained results as a baseline to demonstrate actual performance and to detect future emission reduction priorities.

5 → EMISSIONS IMPROVEMENT PLAN

An emission improvement plan is determined in accordance with the company's own objectives and policies.

6 → IMPLEMENTATION AND CONTINUOUS IMPROVEMENT

Once the improvement plan is implemented, operational results are evaluated and potential for further emission reductions investigated, ensuring effective continuous improvement.

July 2007 to December 2008 Accomplishments

STAKEHOLDER MEETINGS

When VECAP was introduced in North America in 2006, representatives from environmental non-governmental organizations, original equipment manufacturers and government officials were invited to a series of VECAP stakeholder workshops. During these workshops, industry representatives introduced plans for the implementation of VECAP in the U.S. and Canada and invited attendees to provide feedback regarding the program. From July 2007 to December 2008, industry representatives continued to introduce the VECAP program and the importance of product stewardship to dozens of organizations, companies and individuals through one-on-one meetings and conference presentations in the U.S. and Canada.

BFR MANUFACTURING

BSEF member companies continue to apply VECAP methodology and principles to their own manufacturing facilities and processes by identifying potential sources of emissions and implementing appropriate procedural and/or process improvements to reduce or eliminate emissions or the potential for emissions.

These efforts are fully supported by the BSEF member company CEOs, who have personally and publicly committed to working to reduce emissions to the greatest degree possible.

USER COMMITMENTS TO APPLY VECAP PRINCIPLES

The focus of VECAP in its second year in North America was an expansion of the program to include HBCD and TBBPA, as well as an ongoing effort to introduce VECAP to additional stakeholders and seek commitments from flame retardant users to adopt and implement the program in the United States and Canada.

“Commitment” to VECAP is defined as a flame retardant user formally agreeing to implement the principles in the Code of Good Practice by signing a Letter of Commitment and/or by participating in the VECAP process. The participating company then completes an individual baseline assessment of flame retardant emissions from its production facility, which forms the basis for measuring future emission reductions and continuous improvements.

BASELINE EMISSIONS SURVEY

Mass balance data acquired to date will be used to calculate emissions for participating facilities. The emissions data from individual VECAP participants will then be aggregated to determine an overall baseline of emissions by region and industry. This aggregated industry baseline provides a benchmark of present environmental performance, and will serve as a reference point against which future emission reduction progress can be measured.

In late 2008, it was announced that VECAP program participant Eagle Performance Products had been awarded the “Enabling Technologies in Processes and Procedures” award from the Society of Plastics Engineers for their aggressive implementation of VECAP.

Eagle Performance prepares textile backcoatings for use in automobiles, aircraft, military, construction and health care applications. By using the VECAP program in their own facilities, as well as with their supply chain, Eagle implemented waste and emissions reductions measures that have saved approximately:

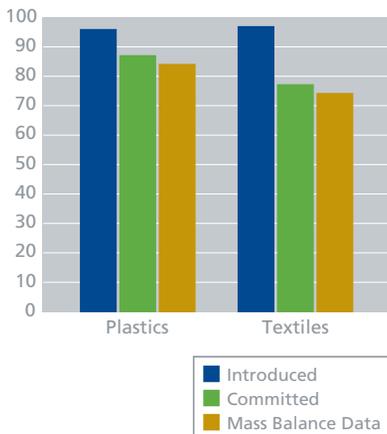
- 6,000 Kg/yr of formulated material and 11,500 Kg/yr of plastic additives at Eagle’s own plant; and,
- 36,000 Kg/yr of formulated product at customer facilities.

DECA-BDE RESULTS

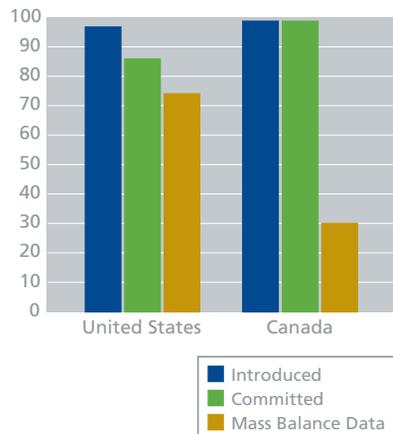
VECAP was launched with a focus on understanding, controlling and reducing emissions for Deca-BDE. From mid-2007 through 2008, the program has continued to make significant strides in engaging Deca-BDE users, including their volumes in our overall program and reporting, and in enhancing our understanding and control emissions.

- Participation levels of Deca-BDE customer in both the plastic and textile market segments remained strong, with more than 75 percent of each segment committed to the program; and,
- All Canadian BSEF Deca-BDE customers were introduced to the program and have committed to participation.

Deca-BDE Participation by Market



Deca-BDE Participation Level by Country



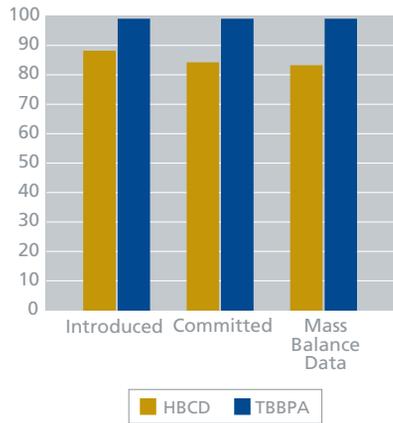
EXPANSION TO OTHER FRS

Based on the positive responses from Deca-BDE users in the supply chain, as well as regulatory officials and agencies, VECAP was expanded in 2008 to include users and distributors of two other high production volume brominated flame retardants: HBCD and TBBPA.

HBCD AND TBBPA RESULTS

- By the end of 2008, 89 percent of the HBCD users by volume and 99 percent of TBBPA users by volume had been introduced to VECAP;
- More than 80 percent of HBCD and TBBPA users by volume committed to participate in VECAP in 2008; and,
- Most HBCD and TBBPA customers that agreed to participate in VECAP supplied mass balance data in 2008.

HBCD and TBBPA Participation Levels



PROGRESS 2007–2008

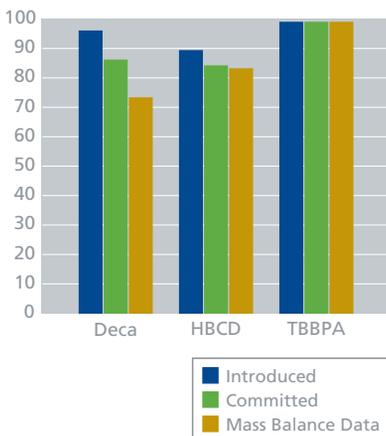
Since our initial 2007 North America Progress Report, VECAP has continued to make solid progress in participation levels for all products:

- Deca-BDE increased from approximately 50 percent to more than 75 percent of customer volume supplying mass balance data; and,
- HBCD and TBBPA customer participation went from zero to averaging more than 80 percent.

2007 Levels of Participation



2008 Participation Levels by Product



Wildlife Habitat Council

“It was a pleasure to be introduced to the innovative Voluntary Emission Control Action Program (VECAP), designed to reduce and, where possible, eliminate avoidable emissions of brominated flame retardants into the environment from manufacturing processes. The Wildlife Habitat Council supports voluntary efforts by industry to go beyond regulatory requirements and adopt management practices, such as VECAP. We look forward to working with this industry sector and help them improve their overall sustainable management practices to include wherever possible management strategies that promote wildlife habitat improvement and on site conservation education for the benefit of the local community.”

Robert H. Loftur-Thun

Vice President, External Affairs, Marketing and Development
Wildlife Habitat Council

Providing Support to VECAP Users

VECAP TOOLKIT

The VECAP Competence Center has developed toolkits to assist flame retardant users in performing self-audits and preparing their own mass balances, both of which are central to the VECAP implementation process. These toolkits are available in several languages and include the following elements:

- **Code of Good Practice:** Provides working procedures and good housekeeping measures aimed at controlling and reducing emissions. The Code of Good Practice has been specifically developed for the various industrial sectors using flame retardants;
- **Self-Control Guidance Document:** Supports users in defining their compliance with Code of Good Practice procedures;
- **Process Flow Chart:** Assists the individual user in identifying where potential material losses can occur within their processes; and,
- **Mass Balance Sheet:** Provides information indicating which data should be measured, recorded and managed.

BEST PRACTICES DOCUMENT

A “best practices” document has been developed in order to provide answers to technical questions related to the VECAP program. This document helps users of BFRs reduce and control environmental emissions by providing valuable insights on:

- Available emission abatement technologies;
- Best practices on waste handling and disposal;
- Waste water sampling and analysis; and,
- How to compile a mass balance.

BEST PRACTICES IN ACTION: MANAGING PACKAGING WASTE

A prime example of VECAP and its “best practices” approach in action can be found in a simple, but important, aspect of managing flame retardants: properly emptying and managing the packages in which flame retardants are shipped.

The residue left in flame retardant shipping packages was found to represent a significant opportunity to capture material that would otherwise be disposed of or potentially escape into the environment. In North America, discarded flame retardant packaging was most likely to be disposed of in municipal landfill. However, through the VECAP program, the bromine industry has identified packaging disposal as a potential source of emissions to the environment, and has developed specific recommendations for VECAP participants on how to thoroughly empty flame retardant packages and engage in environmentally preferred end-of-life options for product packaging.



The end result is a reduced potential for emissions, less flame retardant loss for users, which means slightly lowered raw materials costs, more saleable product and lower waste costs, and better disposal methods for materials that cannot be re-used or recycled.

Additional best practices documents will be developed and provided to VECAP participants as other potential emissions sources are identified and management solutions are developed.

Owens Corning

“I often tell people that ‘we don’t know what we don’t know.’ Using a distinctive mass balance methodology, VECAP provides a very simple approach to uncover emissions that you ‘don’t know’ exist in your process. VECAP is well aligned with Owens Corning’s ongoing sustainability initiatives and environmental commitments, and provides us with tools that can help us with our societal and corporate responsibility to continuously improve our process and our environmental footprint.”

Dr. Nikoi Annan

Foam Science & Technology
Owens Corning

Additional VECAP Program Activities

PROVIDING SUPPORT TO VECAP USERS

The VECAP Competence Center provides support to VECAP users in their ongoing implementation of the program. The information and data generated by the VECAP Competence Center also serves as a basis for broad communications about the program to regulatory authorities, elected officials and the general public.

PRODUCT STEWARD SUPPORT

During 2008, the North American VECAP program was supported by the European VECAP program's independent, third-party Product Steward. As the global VECAP program continued to expand in 2008, the need for a North American VECAP Product Steward became apparent, and in the 4th quarter, Marsh Risk Consulting was retained to provide third-party support for the VECAP program in North America as it continues to grow.

INDEPENDENT CERTIFICATION AND AUDITING

In order to increase the credibility and transparency of the VECAP program, and to provide VECAP participants with formal, independent validation and recognition for their compliance efforts, VECAP worked with the international auditing organization Bureau Veritas to develop and implement a certification program similar to, and compatible with, the ISO 14001 and 9000 programs. This approach provides external auditors with a common and internationally-recognized basis for independently assessing VECAP compliance. The draft certification protocol was utilized for trial audits at the end of 2008, with full introduction to users planned in 2009.

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For further information and access to documents cited in this report, please visit www.vecap.info



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For further information:

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VECAP is a voluntary initiative of the Bromine Science and Environmental Forum – BSEF.

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