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Bringing a New Chemical Product to Market under the Toxic Substances Control Act (TSCA):

The New Paradigm for Success and EPA's Sustainable Futures Program

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guest author

*The **Toxic Substances Control Act** requires manufacturers and importers of new chemical substances to submit a notice called a Premanufacture Notification (PMN) to the Environmental Protection Agency (EPA) at least 90 days in advance of the actual manufacture or importation of the substance for commercial purposes. Completion of the 13-page PMN form may appear to be simple and straight forward, however, errors in or omissions of information have been known to lead to delays in completing the standard 90-day review by EPA for two years or more. Further, errors may cause EPA to impose mandatory regulation of the PMN substance due to risk factors they identify as a result of incorrect or incomplete information. Such regulatory action may result in the inability to market the new chemical substance.*

EPA has recently announced a new pilot program that will help chemical companies conduct initial risk screening for new chemicals prior to PMN submission. The new program also helps meet EPA's objective of incorporating risk reduction and pollution prevention into the product development process. A major benefit to the chemical industry resulting from this Sustainable Futures (SF) Program is a mechanism that allows a company to make a preliminary determination as to whether EPA is likely to consider a regulatory action for the PMN chemical based on Risk Characterization. Under the "New Paradigm," an early risk characterization can readily be made as one component of a sound New Product Development program. The basis of the new program is an outreach initiative by EPA first announced formally in a Federal Register Notice titled "Sustainable Futures" on December 11, 2002.

The Sustainable Futures program provides public access to industry to the tools used by EPA to assess potential risk to human health and the environment from the commercialization of a new chemical. This article focuses on the conventional way of dealing with potential regulatory consequences under TSCA and the opportunity afforded by the Sustainable Futures program to allow for prediction of regulatory outcomes based on risk characterizations performed during the research phase.

New and Existing Chemicals under the Toxic Substances Control Act

New chemicals under TSCA (those that are not on the TSCA Inventory) must be notified to the EPA at least 90 days prior to manufacturing for a non-exempt commercial purpose (Editor's note: TSCA's exclusions and exemptions will be the subject of a future article in *Chemical Pilot Magazine*). Compliance with this provision of TSCA is achieved through the Premanufacture Notification (PMN). This process involves submitting Form 7710-25 plus any hazard, exposure, and/or risk data that is available to EPA. The completed form, plus attached data will allow EPA to conduct a risk assessment for the new substance. Risk under TSCA refers to

Representative of the models used by EPA are as follows:

1. ECOSAR (Ecological Structure Activity Relationships) – this model is used to predict aquatic toxicity, an increasingly important component of EPA's risk assessment program. It should be noted that EPA has a large information database for chemicals that have been the subject of PMNs but for which the PMN was submitted as confidential information. This is an excellent example of a situation in which relying on the models alone will not predict EPA's response to a PMN.

2. ONCOLOGIC – this is a newly available model used to predict carcinogenic potential in humans.

3. ChemSTEER (Chemical Screening Tool for Exposures and Environmental Releases) – this model provides screening-level estimates of environmental releases from, and worker exposures to, a chemical manufactured, processed, and/or used in industrial and commercial workplaces.

the probability that a chemical may cause harmful effects to humans or the environment. Risk can be characterized by the simple relationship shown below in which risk is defined as a function of the inherent toxicity of the substance multiplied by exposure probability. In other words, if exposure is zero, then risk is theoretically zero. In practice, of course, risk is never quite zero, a reality conveyed by characterizing a best-case scenario as "low risk."

Risk = f (Hazard x Exposure)

Often EPA is provided very little data regarding exposure in the PMN. As a result, EPA uses very conservative assumptions in assessing risk. Therefore, lack of exposure data may lead to regulation of the substance, or to delays in processing of the PMN. Either of these outcomes has the potential to delay a product's launch.

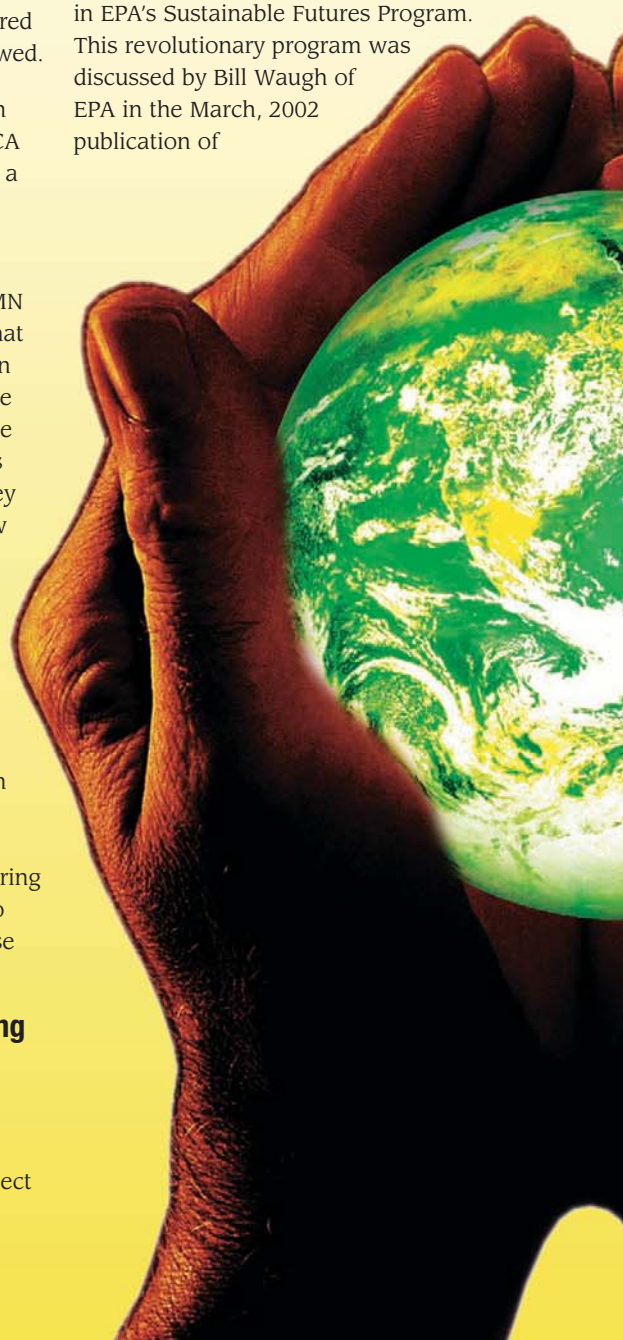
For many PMN submissions, about 80% according to EPA, review is completed within 20 days or so and the PMN is given a "Dropped" designation, meaning that further review is not required. About 10% are cleared through a simple exchange of information between EPA and the submitter. The remaining 10% are problematic and may encounter extensive delays. Further, EPA may not be able to determine whether or not the new substance will present a risk to human health or the environment and therefore they must regulate the new substance. Regulations may take the form of a 5(e) consent order and/or by promulgation of a Significant New Use Rule (SNUR) that will bind all companies to certain requirements if they manufacture or use the new substance. These provisions may require that testing be done prior to exceeding stated production volumes, that certain protective equipment be used or that specific labeling requirements be followed. EPA may even ban the substance under Section 5(f) until required test data has been generated and reviewed.

Historically, companies have dealt with the regulatory requirements under TSCA when they are ready to commercialize a new product. Thus, after the specific chemical has been identified for commercialization, information is assembled in order to complete the PMN form, leaving blanks for information that is not readily available. EPA then fills in the blanks by making very conservative assumptions and by doing a worst-case analysis. Some enlightened companies have developed programs in which they assess the regulatory climate for a new substance one year in advance of forming the intent to commercialize a specific chemical. At that time, a team is assembled consisting of business representatives, chemists, toxicologists, regulatory specialists, and others as needed. The charter of this team is to develop a plan to obtain the information that will be used to fill out the PMN form, to predict problem areas that are likely to be identified during EPA's review, and, most importantly, to provide data to attempt to resolve these issues in advance.

The New Paradigm for Submitting a Successful PMN: EPA's Sustainable Futures Program

EPA categorizes certain classes of chemicals as repeatedly being the subject of regulatory action during the PMN process. These groupings of chemicals are called "Categories of Concern" by EPA, most having in common certain risk characteristics. For example, there are presently over 50 "Categories of Concern" representing such classes of substances as acrylates, epoxides, and dianilines. For each category EPA identifies specific concerns (such as carcinogenic potential or aquatic toxicity) and defines up front testing that can be conducted in order to provide data demonstrating that the specific PMN chemical need not be regulated, even though it falls into one of the Categories of Concern. This certainly provides a good start in terms of identifying problematic substances in advance of submitting the PMN.

A basic and more detailed methodology for making an early determination of risk lies in EPA's Sustainable Futures Program. This revolutionary program was discussed by Bill Waugh of EPA in the March, 2002 publication of



Chemistry Business, in which he stated that "Believe it or not, getting the product to market in less time with less risk and for less money is a value for regulators as well as industry."

The SF methodology that Mr. Waugh described was formally announced as a voluntary pilot program in a Notice in the December 11, 2002 *Federal Register*. The Pilot Program consists of a free 2-day seminar conducted by EPA and is followed by Agency support in the form of ongoing education in SF, one-on-one technical training, and technical assistance. This training and assistance may include a complete free assessment of a chemical of interest to the companies attending the seminar. An independent third party conducts the follow-up. The output of an SF assessment consists of a 10-15 page summary report, depending on the complexity of the assessment. For example, if no hazard to human health or the environment is found in the initial stage of the assessment, then a detailed assessment of exposure is not needed, although it will be included in the free assessments for educational purposes. Note that what is involved here is a prediction of risk using the two elements of risk assessment as described previously, hazard and exposure.

The basis of the Sustainable Futures methodology is a series of models that are used, along with professional judgment and other data, by EPA in order to determine whether a PMN lacking relevant data may pose an unreasonable risk to human health or the environment. Most of the models used by EPA are now available to the regulated community as well as the general public at various Web sites. The 2-day free course provides an integrated explanation as to how the models are used in conjunction with other information to make risk characterizations and reach regulatory conclusions. The individual models are used to predict toxicity to humans and aquatic life. They are also used to predict exposure of the chemical to humans and the environment, and together provide a semi-quantitative estimate of the risk posed by the chemical. The resulting risk characterization provides one important component to be used as a basis for making a determination of whether commercialization of the chemical may present an unreasonable risk to humans or the environment.

Use of the Sustainable Futures Approach by the Research Chemist

Consider now the fact that Sustainable Futures methodology can ideally be incorporated into the product development process by the research chemist. In other words, the regulatory actions assessment is not relegated to a regulatory person at the end of the research process, but rather it is incorporated into the research process by the responsible chemist. Suppose that a research chemist identifies six new synthetic approaches to solving a market need, and each represents a new and different chemical. In the traditional approach, the chemist and supporting business and technical personnel identify a preferred approach based on issues such as cost, equipment fit, raw material availability, and a host of other factors, to commercialize the new product. One of these issues is the regulatory status of the chemical substance. What a surprise it would be if EPA were to inform the company that its carefully designed new chemical may pose an unacceptable risk to humans or the environment and therefore it will be regulated in a way that will not allow or severely limit the potential for marketing the product successfully. What a shock also to learn that the chemical chosen for commercialization after perhaps two years of development and enormous cost, was the only one of the original six that presented this regulatory problem. One important, and relatively inexpensive, solution to this dilemma is an early assessment of the potential risk to humans and the environment, in other words the Sustainable Futures Program.

For more information regarding EPA's Sustainable Futures Program please contact the author at jplamondon@cermonline.com or Bill Waugh at Waugh.bill@epa.gov or call 202 564-7657.

Dr. Joe Plamondon has spent a total of 35 years in the chemical industry as a research chemist, business development manager, and, for the past 20 years, as a TSCA and PreManufacture Notification (PMN) Regulatory Manager and Consultant. Joe currently advises companies on a variety of TSCA and Sustainable Futures issues as the Director of Regulatory Affairs for the Consortium for Environmental Risk Management (CERM).