Product Stewardship at Advanced Refining Technologies

Introduction

Advanced Refining Technologies (ART) is dedicated to the highest standards of health, safety and regulatory compliance. ART's goals are to establish an outstanding record of product safety and to practice strong corporate citizenship. To achieve these goals ART has embraced Product Stewardship by implementing numerous significant refinements to its existing product stewardship program and is committed to continuous product stewardship improvement. Like many chemical suppliers, ART defines Product Stewardship (PS) as the responsible management of the health, safety, environmental and regulatory issues of a product throughout its life cycle. A robust product stewardship program provides ART a competitive advantage that should also benefit its customers.

The ART PS program is global in nature to support a portfolio of products that is manufactured at facilities worldwide operated by Grace and other partners. The ART program employs aspects from both partners of the joint venture. Grace provides the lead PS support to the joint venture, incorporating PS into all ART business decisions. Product stewardship is also a fundamental component of Chevron's Operational Excellence (OE) framework, creating commitment by both partners in the ART venture to the PS program.

New Product Development

During new product development health, safety, and environmental considerations are integrated along with sustainability and other critical product stewardship elements into the process. From development through disposal ART applies PS focus to all steps shown in Figure 1. ART also works with other stakeholders such as customers, suppliers, and transporters to assure that our products can be handled safely, with acceptable risk and in compliance with all applicable regulations.

The ART PS program has been redesigned to improve the management of both today's applicable chemical inventory laws and consideration of similar emerging chemical control regulations. A high level of focus is also placed on addressing other regulatory requirements such as the evolution of the Globally Harmonized System (GHS) for standardizing and harmonizing the classification and labeling of chemicals.

The foundation systems employed by ART are the stage gate product development PRISM (PRoduct Innovation and Strategic Marketing) process shown in Figure 2, and Management of Change (MOC).

The PRISM process is used to balance the business potential of a new product with the cost and technical risk associated with the development effort. As a new product advances through the stages, the benefits that it will bring to customers in improved performance

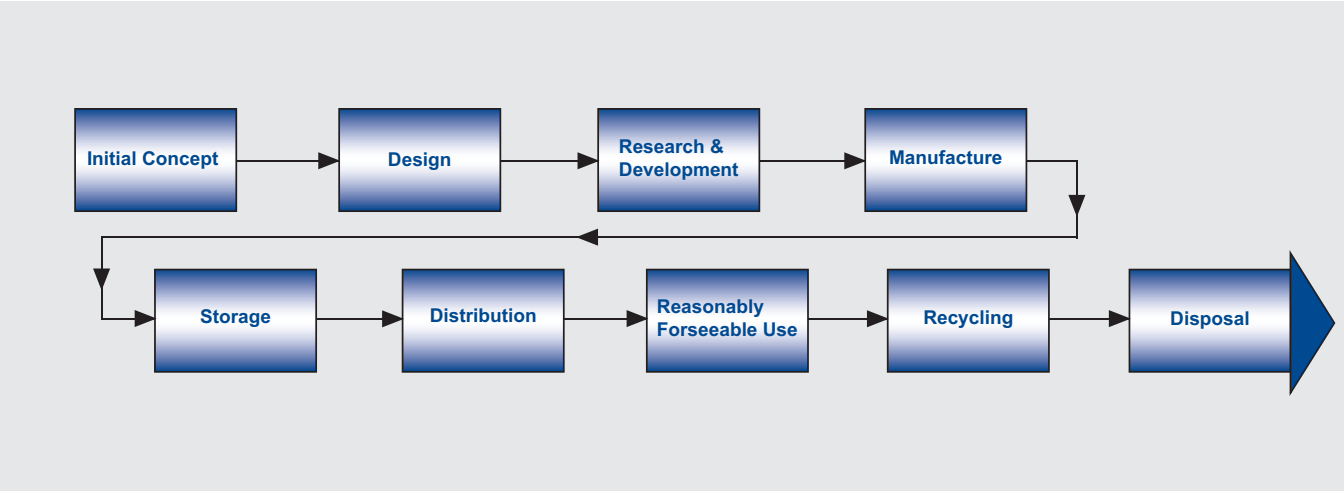

FIGURE 1: Product Stewardship considers the entire product life-cycle

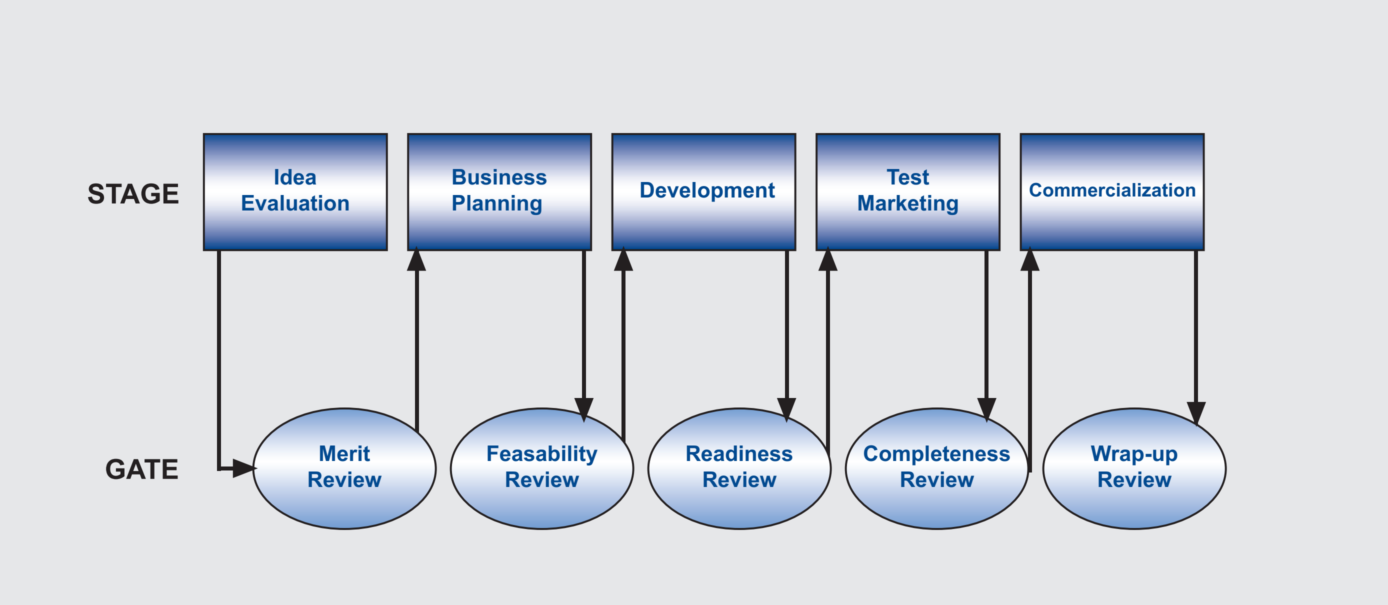

FIGURE 2: PRISM Stage Gate Process

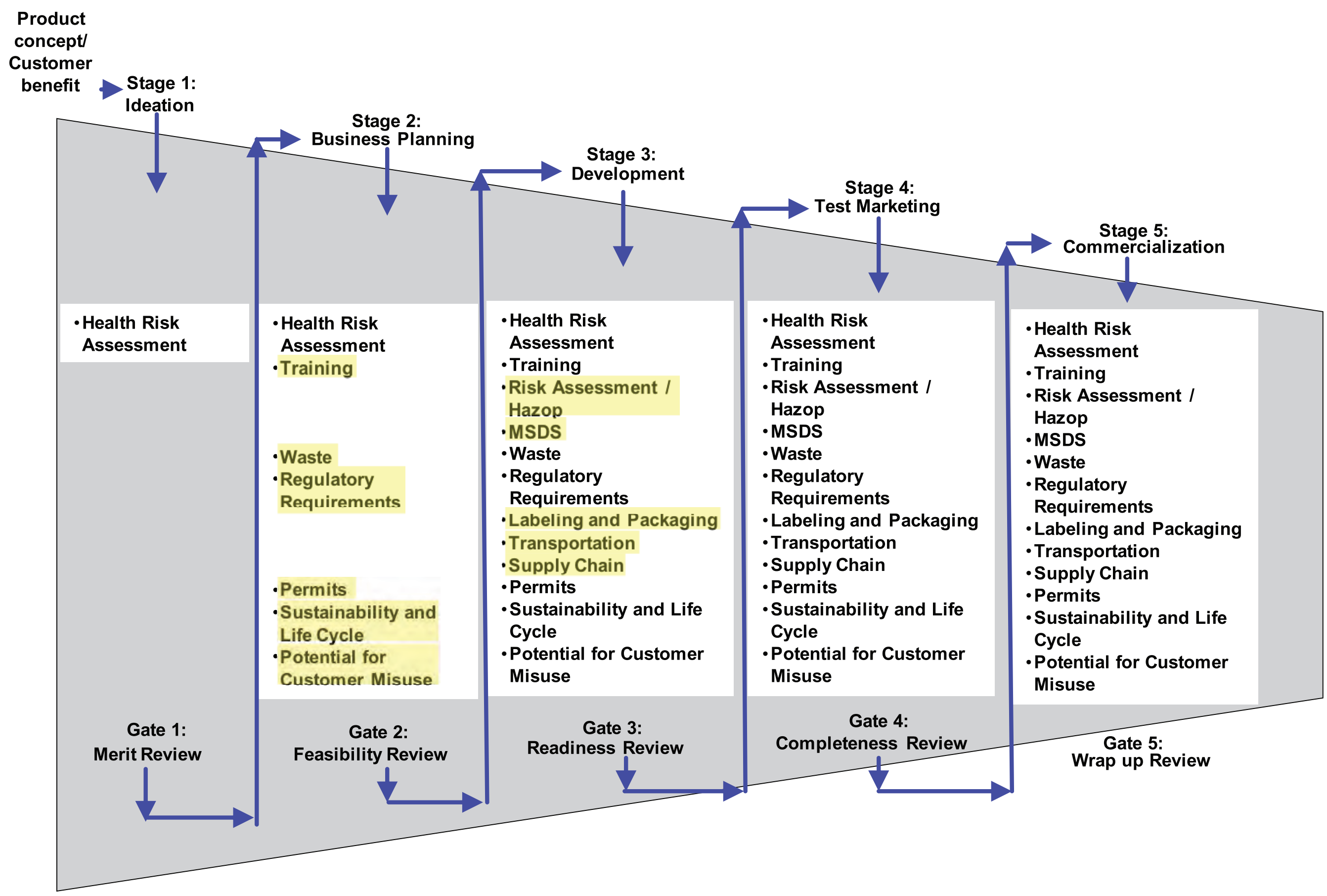

FIGURE 3: PRISM PS Deliverables

are weighed against the requirements needed to bring the product to market. As a result, the early stages of PRISM are used to evaluate the PS impact of the project both from a product composition and manufacturing process standpoint.

A detailed PS checklist is employed to specifically focus product introduction on the regulatory requirements and Environmental, Health and Safety (EHS) best practices that are addressed at each Stage in the PRISM process. During the Idea Evaluation Stage, a preliminary Risk Assessment is conducted. Often during this stage, a number of candidate technologies and possible formulations are explored simultaneously to determine if any of them would meet the product concept. The preliminary risk assessment allows the business leaders to understand if there are potentially higher PS or EHS risks associated with one formulation over another. Products or technologies with higher risk may be de-selected at this stage and would only advance if the hazards and risks can be adequately controlled.

Once the Risk Assessment has occurred, subsequent stages require additional PS actions as shown in Figure 3. Deliverables listed in multiple stages reflect escalating requirements as the product development process advances.

Product Composition

Product composition is the starting point for most product stewardship activities. It is also a major focus of ART's PS program due to regulations such as Europe's REACH (Registration, Evaluation, and Authorization of Chemicals), a newly created chemical inventory in Taiwan, on-going changes in China's chemical management programs and expected changes to programs in Korea and other growing markets. These new or significantly revised regulations coupled with the expanding implementation of GHS require a heightened level of attention to the regulatory implications of product composition in order to minimize the potential for negative business impacts. If new substances are identified then they must be registered in those countries with chemical inventories (e.g., Canada, China, Japan, Korea) to assure compliance when products are imported into that country.

Proper registration of the substances contained in a product is both expensive and resource demanding. Approval of the registration application by the national agency assigned this responsibility can also be very lengthy, and there is always the potential for application rejection should the information provided not be complete or adequate. Recent applications submitted by ART are often over several hundred pages long, and full approval by the regulatory agency can take well in excess of nine months. For this reason, substance registration is performed early in the PRISM process; thereby also insuring that the potential for disruption of product supply, should a regulating agency question composition is diminished.

FIGURE 4: UN Approved Catalyst Bags with Appropriate Labeling

Substance registration typically requires submission of a significant amount of technical data on the substance, which must be generated through testing. The technical data requirement has resulted in large amounts of new data that ART has incorporated into MSDS's and product information, affording our customers improved information on safe handling of ART catalysts and mitigating product risk.

For example, the European CHemicals Agency (ECHA) announced in February 2012 that boron oxide, a substance that would be contained in any commercial boron based hydroprocessing catalyst, would be classified as a Substance of Very High Concern (SVHC) based on toxic impact on reproduction. This classification likely will mean that the substance will be incorporated into the Authorization process, which is a supplemental regulatory obligation that is both costly and rigorous in terms of reporting requirements for users. ART is phasing out products containing boron in anticipation of other countries adopting a similar position on boron oxide. This proactive approach is an advantage to ART customers who can be assured that our product portfolio is routinely adjusted to reduce regulatory risk.

Product Packaging

In the Development stage of PRISM, manufacturing process consideration such as product labeling and packaging are evaluated, and any special handling of the packaged material is also finalized. The vast majority of ART Fixed Bed Resid (FBR) and Distillate HydroTreating (DHT) products are delivered in bulk bags, which ART recommends not be reused. The bags are UN approved Intermediate Bulk Containers (IBCs – see Figure 4) which are specifically required for hazardous materials such as cobalt when shipped internationally.

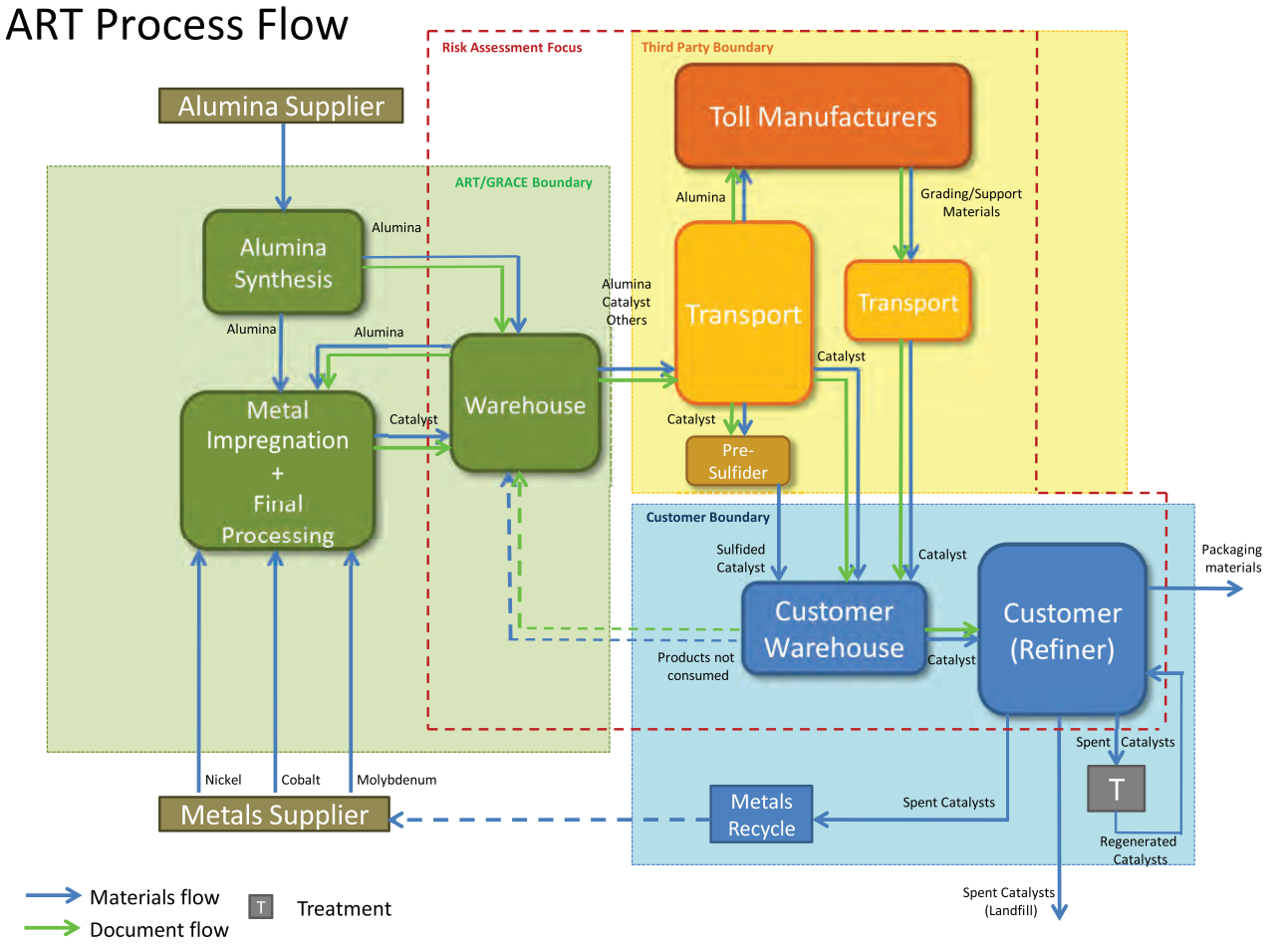

FIGURE 5: ART Risk Assessment

ART recommends that used bags be shredded and discarded according to all state and local environmental regulations. Bags that are not shredded should be disposed of according to local environmental regulations and in a manner such that the bags cannot be reused for any other purpose. If products are packaged in drums, labels should be removed and drums should be reclaimed, recycled or reused. If drums are reused, ART recommends that all labels be removed and those that contained nickel, cobalt or molybdenum products be triple rinsed before reuse

PS Legacy Product Review

Recognizing the product stewardship benefits resulting from the PRISM process, ART products commercialized prior to the adoption of this program were reviewed using the PS elements defined in PRISM. Legacy products were reviewed to confirm that they are also managed safely and in compliance with all regulatory requirements. This PS review was conducted across all 3 segments (Fixed Bed Resid, Ebullating Bed Resid, Distillate Hydrotreating) with significant focus downstream of the manufacturing process as shown in Figure 5.

This analysis considered potential hazards and risks of existing products, along with control measures such as MSDS, labels, customer communications, regulatory and other documents. Priorities for additional control measures were identified as part of a continuous improvement plan.

Customer Communications

A significant portion of PS information generated during the PRISM process is only useful if there are systems in place to effectively distribute the information to the users of ART products. Customer communications have been enhanced through a comprehensive program recently introduced to provide product regulatory conformance information to all current and new ART customers. This program includes annual PS reviews with customers to ensure that the latest versions of MSDS's are available for all ART products that are at the customer site. A PS folder was created to contain the MSDS's supplied to the customer during the review, highlight ART's commitment to the program, and provide handling guidelines for ART products. This folder, along with other key PS documentation, is available on the www.e-catalysts.com website in the Technical Service/Product Stewardship section.

ART sales and service personnel also encourage customers to distribute MSDS's for ART products to any 3rd party facilities or personnel who may store or handle the products. This is often relevant when products are purchased and require storage well in advance of planned turnarounds and when outside personnel are used to load the materials. Technical guidelines provided to customers by ART such as startup or loading procedures are vetted by PS personnel to ensure they contain recommendations that are consistent with the information provided in the MSDS.

Additional Advantages

The focus of ART's PS program is now centered on increased customer involvement. By incorporating customer PS objectives into the program, customers who purchase products from ART will have greater confidence that they will receive the support necessary to help address their PS and associated requirements. ART is achieving its commitment to global regulatory requirements with support from dedicated Grace PS personnel located around the world. These personnel review new country requirements and incorporate them into existing programs to maintain global regulatory compliance. Some examples of the ways that customers can use ART PS resources include: to increase safety awareness for non-refinery personnel and new employees, to support refinery MOC programs, to resolve shelf life questions, to provide current MSDS's for various products on site, and to support customer reporting obligations for REACH or other regulatory programs.

Conclusion

Our customers and neighboring communities can be confident that ART follows established environmental, health and safety (EHS) programs and that we are continuously working to reduce the impact our facilities and products have on the global environment. For additional information please call your ART sales and service personnel.