



Emergency Management Issues Special Interest Group Annual Meeting



The Responsible Care® Program & The Dow Chemical Company

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Topics

- Why does Dow care about Responsible Care®?
- Responsible Care® overview
- Product Safety
- Process Safety
- Drive to Zero
- Sustainability
- Responsible Care® Awards

Dow Introduction

- Customers in approximately 160 countries
- In high growth sectors such as electronics, water, energy, coatings and agriculture.
- Annual sales of \$45 billion
- Employ approximately 52,000 people globally
- >5,000 products are manufactured at 214 sites in 37 countries across the globe

Responsible Care® Practitioners at Dow

- >200 Toxicologists
- 43 Industrial Hygienists
- >100 scientists
- 41 Product Leaders
 - 210 Product Stewards
- 83 Operations Leaders
- ~1200 EH&S Specialist “Delivery” personnel in facilities

What is Responsible Care®?

Responsible Care is the chemical industry's unique voluntary global initiative that drives continuous improvement in health, safety and environmental performance, together with open and transparent communication with stakeholders

Global Chemical Management system with accountability from “cradle to grave”:

- **Measuring and publicly reporting performance;**
- **Implementing the Responsible Care Security Code;**
- **Applying the modern Responsible Care management system to achieve and verify results; and**
- **Obtaining independent certification that a management system is in place and functions according to professional standards.**

Responsible Care® Management Standard

Policy & Leadership

- Leadership Responsibility – Commitment at the CEO Level

Planning (PLAN)

- Define Risks/Hazards - Objectives & Targets
- Process/Program Development - Communications

Implementation, Operation & Accountability (DO)

- Training - Documentation
- Procedures - Management of Change and Employee Empowerment

Performance Measurement & Corrective Action (CHECK)

- Self-Assessment - Incident Investigations
- Internal Audits - Records Management
- Corrective/Preventative Action - Measurements

Management Systems Review (ACT)

- Management Systems Review

Responsible Care® at Dow

- Today, Responsible Care is taking Dow above and beyond our prior accomplishments, to achieve
 - even higher standards of performance and
 - generate greater value for their businesses.
- January 2008 → Dow signed on to these more stringent Responsible Care Guiding Principles with other members of the U.S. American Chemistry Council (ACC).
- These Principles apply to Dow globally.

Global EH&S Responsible Care® Standards

This page contains links to standard meeting Operating Discipline Management System (ODMS) Responsible Care requirements:

- [6.01 - Community Awareness & Outreach](#)
- [6.02 - Distribution](#)
- [6.03 - EH&S Engineering Design / Control](#)
- [6.04 - Emergency Preparedness & Response](#)
- [6.05 - Employee Health and Safety](#)
- [6.06 - Non-Dow Services](#)
- [6.07 - Pollution Prevention](#)
- [6.08 - Process Safety](#)
- [6.09 - Product Stewardship](#)
- [6.10 - Security](#)

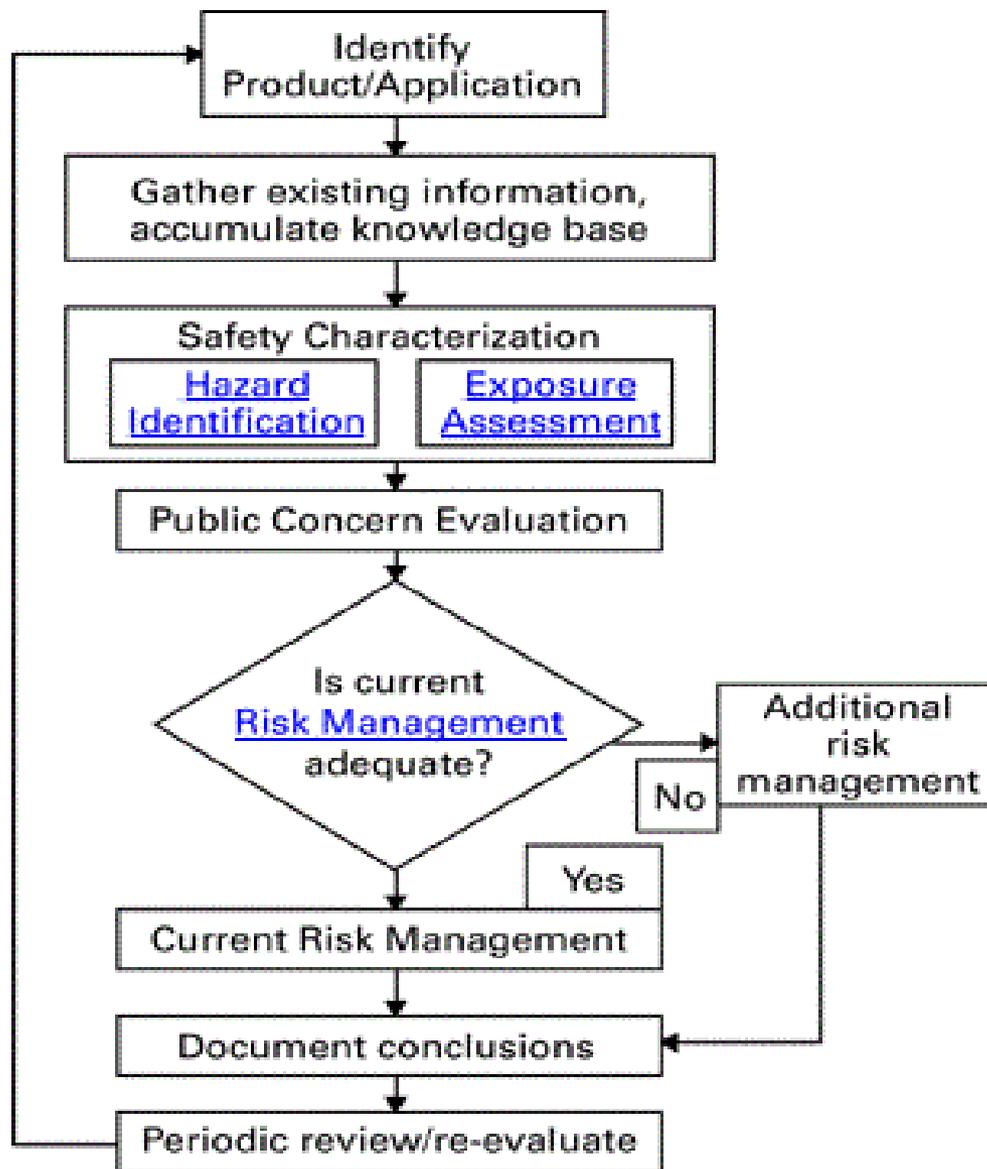
Principles of RC® at Dow

- To lead our companies in ethical ways that increasingly benefit society, the economy and the environment.
- To design and develop products that can be manufactured, transported, used and disposed of or recycled safely.
- To work with customers, carriers, suppliers, distributors and contractors to foster the safe and secure use, transport and disposal of chemicals and provide hazard and risk information that can be accessed and applied in their operations and products.
- **To design and operate our facilities in a safe, secure and environmentally sound manner.**
- To instill a culture throughout all levels of our organizations to continually identify, reduce and manage process safety risks.
- To promote pollution prevention, minimization of waste and conservation of energy and other critical resources at every stage of the life cycle of our products.



Principles of RC® at Dow

- **To cooperate with governments at all levels and organizations in the development of effective and efficient safety, health, environmental and security laws, regulations and standards.**
- To support education and research on the health, safety, environmental effects and security of our products and processes.
- To communicate product, service and process risks to our stakeholders and listen to and consider their perspectives.
- **To make continual progress towards our goal of no accidents, injuries or harm to human health and the environment from our products and operations and openly report our health, safety, environmental and security performance.**
- To seek continual improvement in our integrated Responsible Care Management System® to address environmental, health, safety and security performance.
- To promote Responsible Care® by encouraging and assisting others to adhere to these Guiding Principles.



Product Safety – Chemical Testing

- Dow’s internal guidelines and the policies of countries in which Dow does business govern the testing of new and existing industrial chemicals to determine hazards
 - Tiered approach determines which studies are conducted
- Dow conducts appropriate tests and modeling to determine the potential health and environmental effects of its products.
 - The tests also help determine the specific levels of exposure that produce these effects, in particular **the level at which no adverse effect is observed.**
 - Points of departure for each endpoint are determined in rodents and published
 - OELs, Community Values, and ERPGs are developed from this data



Product Safety – Dose Response

- “All substances are poisons, there is none which is not a poison. The right dose differentiates a poison from remedy.”
(Paracelsus, 1493-1541)
- **A dose-response assessment shows the relationship between the dose of a chemical and the anticipated incidence of an adverse health or environmental effect in an exposed population.**

Product Safety - Exposure Assessment

- Evaluate the potential exposures to humans and the environment from the production, distribution, use, disposal and recycle of a chemical substance.
- Exposure assessment is just as important as hazard identification in determining risk from a chemical substance, because risk is a function of both hazard and exposure.
- There are four considerations in any exposure assessment:
 - Likelihood of exposure
 - Magnitude of exposure
 - Route of exposure
 - Population exposed

Exposure Assessment

- Consumer Use
- Workplace Exposures
- Environmentally-mediated Exposures



Product Safety - Hazard Identification

- **Hazard:** A potentially dangerous inherent property of a substance.
- **Hazard Identification:** Recognition of the potential of a substance to cause harm to human health or the environment.
- **Risk:** Probability that a given exposure to a substance will cause harm. Risk is a function of the intrinsic hazard of a substance and the dose of exposure to that substance.

Product Safety -- Risk Values

- A risk characterization consists of conducting a qualitative or quantitative assessment of the probability that a given chemical will produce an adverse effect at a given dose or exposure level.
- Conversely, an assessment could determine levels of exposure at which a chemical would not be expected to present a risk.
 - OELs
 - Acceptable Daily Intake: The Acceptable Daily Intake (ADI)
 - ERPGs (TEELs, AEGLs)
 - Community Exposure Values

Product Safety -- Customer Handling

- Foster proper use, handling, recycling, disposal and transmittal of information to downstream users
- Dow routinely declines to sell products into applications where we are not comfortable that the product can be used safely and in a manner protective of human health and the environment.
 - When an improper practice is identified involving a Dow product, we work with the product receiver to improve those practices.
 - If improvement is not evident, then we will take further measures — up to and including termination of product sale.

Product Safety - Transportation

- 2015 sustainability Goals include taking steps to:
 - reduce the number of hazardous material transportation leaks, breaks and spills (LOPCs) by 75 percent, and eliminate highly hazardous (toxic Inhalation hazard and flammable gas) material releases.
 - reduce the number of tonne-miles (a measure of how much we're shipping and how far) by 50 percent from our level in 2005, which was 1,410 million tonne-miles.
- We'll work to accomplish this by looking at ways to redesign our supply chain to reduce or eliminate many shipments or the distances they must travel.

(A tonne-mile is one metric ton of freight moved 1 mile or 1.6 km.)

Product Safety -- Disposal

- All disposal methods must be in compliance with applicable governmental requirements. These requirements may vary in different locations.
- Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

Product Safety -- Working with Our Distributors

- When Dow identifies improper practices involving a product, we work with the distributor to improve those practices.
- If, given a reasonable amount of time, improvement is not evident, then Dow will take further measures — up to and including termination of the business relationship.

Product Safety - Environment, Health and Safety (EH&S) Resources

- Product stewardship is a team effort, requiring the knowledge and expertise of a variety of disciplines.
- Each Dow business employs a Global EH&S Product Leader whose responsibilities include:
 - Developing, maintaining and leveraging resources to ensure implementation of a global product stewardship plan for the business

Product Safety - Environmental Fate

- We evaluate and characterize a chemical's environmental fate → what happens *after the* chemical has been released into the environment.
 - Amount & frequency of a chemical's release, as well as the environmental medium — air, water, or soil — into which it's released are important considerations
- Environmental toxicologists study representative species in the lab and extrapolate results to many species in the environment.

Sustainability

Responsible Care embraces the development and application of sustainable chemistry, helping our industry contribute to sustainable development while allowing us to meet the world's growing need for essential chemicals and the products those chemicals make possible.

- every business, function, geography and individual to understand their role and drive change to help Dow deliver sustainable solutions that solve world challenges
- Dow's Four Pillars of Sustainability:
 - Innovations for Tomorrow
 - Partners for Change
 - Smart Solutions for Today
 - Responsible Operations



Responsible Operations

Our infrastructure has a positive impact on our company, our communities and ourselves; our operations are a model for others, wherever we operate.



Innovations For Tomorrow

We contribute to the sustainability of society and our planet by developing innovative technologies for current and future markets.



Partners For Change

We are leaders in advancing all aspects of sustainability, openly collaborating with customers, suppliers, communities, civil society and governments.



eston, South Carolina

Loss and Prevention Analysis – CAERE®

- Layers of Protection are used to determine tank farm limits and transportation limits based on Quantitative Risk Assessments using:
 - PAC values (ERPGRs, AEGLs, TEELs)
- Probits calculated for more precision of probabilities for desired effects and risks.
- Same values used around the globe for consistent standard of care.

Worker Health and Safety

- Industrial Hygiene programs and requirements for all stressors (19 rubrics)
- >1200 Industrial Hygiene Guidelines (IHGs) + AIHA WEELs and ACGIH TLVs®
 - Qualitative and Quantitative Exposure Assessments
 - Health Surveillance annually
- Injury / Illness metrics are best in class

Aiming for Zero – The Golden Thread

- We will make continuous progress toward the vision of no accidents, injuries or harm to the environment and will publicly report our global health, safety and environmental performance.
- We will lead our companies in ethical ways that increasingly benefit society, the economy and the environment while adhering to the following principles:



Drive to Zero

- **Drive to Zero - The Future**
- In 2010, we began the expansion of Drive to Zero, and it continues.
- Can you imagine:
 - Zero Dow employees dying from preventable medical conditions?
 - Zero deviations from our environmental permits?
 - Zero Hazardous Material Spills of Dow Product in the transportation of goods?
 - Zero children in the world without access to clean drinking water?
 - Zero impact on a carbon-neutral footprint?

What is YOUR vision of Zero?

Drive to Zero Dashboard

Drive to Zero



**48 People
hurt this year**

	Feb 2011	2011 YTD	2011 Target
Injury/Illness Rate	0.28	0.30	0.24
Injury/Illness Severity Rate	1.28	1.35	1.01
LOPC Count	25	50	333
Process Safety Incidents	2	3	30
Process Safety Severity Rate	0.056	0.090	0.096
Severe MVA Rate	0.26	0.32	0.20

May 2

[EH&S performance](#) [Milestone Awards](#)
[2011 Targets](#)

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Drive to Zero Roadmap

To learn more about our goals, visit us on the Intranet, keyword: **Drive to Zero**



Awards

- 7 U.S. Presidential Green Chemistry Challenge Awards - Dow has won more U.S. Presidential Green Chemistry Challenge Awards than any other organization. Given by the Environmental Protection Agency (EPA)
- TIME Magazine – DOW™ POWERHOUSE™ Solar Shingle - The 50 Best Inventions of 2009
- The GLOBE Foundation - 2010, DOW™ POWERHOUSE™ Solar - “Environmental Excellence in Emerging Technology.”
- The American Chemistry Council - numerous Responsible Care® Energy Efficiency Awards



The International Award

ROBERT W.
RWC
CAMPBELL
AWARDSM

is supported by a network of 22 Global Partners across five continents and founded on the belief that EHS is intrinsic to business excellence and sustainability.

Award Recipients

The Dow Chemical Company – 2010

Schneider Electric North America – 2009

Fluor Hanford – 2008

Gulf Petrochemical Industries Company – 2008

The Bahrain Petroleum Company – 2007

Alcan Inc. – 2006

DynMcDermott Petroleum Operations – 2006

Johnson & Johnson – 2005

Noble Corporation – 2004



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