Shell Downstream
Global Benzene HSE Strategy

Draft: June 29, 2007

Executive Summary

Problem Statement

At the present time, Shell has not systematically reviewed the overall HSE risks associated with benzene within Downstream and lacks formal assurance that we are satisfactorily managing the risks in a fully consistent, uniform, and efficient manner.

This observation represents a potential gap from the expectation of managing significant risks in a systematic manner in line with the RDS Risk Management Manual.

Background

In January 2006 the Aromatics business identified the need to conduct a review of benzene HSE issues. This was subsequently expanded to consider benzene risk management across Downstream. Acknowledging the work that had already been initiated toward adopting an internal standard for an Occupational Exposure Limit (OEL) for benzene, this work was formalized and evolved to support the development of a Shell Downstream Global Benzene HSE Strategy.

On *(date)*, a work team was chartered to identify other opportunities or areas for improvement. The scope of this work was health, environment, compliance, and reputation impact. The team was directed to consider relative risks, priorities, the existence of work already underway, and alignment with existing HSE policy and/or direction.

The Vision

The Vision for this work, as agreed by the Steering Team on ***(date)***, is that the Downstream's HSE benzene strategy will support the management of the risks associated with the manufacture, storage, transport, and marketing of benzene and benzene-containing products in a globally consistent way. The strategy shall encompass protection of people and the environment, as well as compliance assurance.

The Guiding Principle adopted for this work is:

- Consistent with Shell's Commitment to HSE and Policy, we aspire for excellence in Shell's benzene HSE performance by implementing controls that support the appropriate management of benzene risk.
- We will do this by:
  - –meeting, or exceeding legislative requirements;
  - –continuing to monitor and document our benzene HSE performance in the areas of worker exposure and environmental emissions;
  - –improving our reporting system to facilitate periodic reviews of global benzene HSE performance;
  - –aligning Shell with industry practice, actively participating in industry groups and sharing HSE best practices.

-Risk Assessment, Issue Assessment, and Priority Projects

The current benzene risk management profile has been defined using Shell Risk Assessment and Issue Assessment processes.

Risk Assessment: Benzene is rated as a C 4/5 hazard within the HSE MS framework. The rating is based on its "known human carcinogen" classification for human health and known fatalities in the industry from exposure to benzene. This rating requires proactive management to implement best practices for managing the risk.

Issue Assessment: Environmental Health (including Benzene) is rated potential "high impact" on reputation, "medium likelihood" on the Downstream Issues Matrix. This rating also requires proactive management, to establish appropriate steps to be taken to respond to emerging challenges and to internal and external inquiries into our methods for managing this risk.

Priority Projects: Consistent with the Vision and Guiding Principle, four initial projects have been identified as top priorities to improve and more proactively manage Shell's risk response.

- Implement Downstream Benzene OEL Standard. (already endorsed)
- Identify options to reduce barge degassing emissions on the Rhine River (discussions with the industry initiated)
- Ensure community fenceline risks are understood in a global risk framework, local regulations, and are aligned with existing commitments.

Implement a governance process, including an assurance process review, to support the Vision and Principles.

The four projects are summarized in the following table:

[MOVE PAGE 11 TABLE OF HSE PROJECTS HERE]

Project descriptions are attached for each of these four projects.

Action Proposal *(How does this proposal address or solve the Problem Statement?)*

Currently there are two separate leadership bodies sponsoring work on the OEL implementation and the benzene strategy. It is recommended that the responsibility of these two groups be combined to form a single executive body that has responsibility for overall sponsorship. An implementation team will also be added to provide more frequent oversight and review of project implementation. Individual project teams such as the OEL working team would report into this leadership group. A diagram of this governance model is provided as Attachment 1.

At this time, the Steering Team is asked to approve the formation of (1) Benzene Strategy Executive Oversight Team and (2) Benzene Strategy Implementation Team. A key role of the Executive Steering team would be the review of progress and resolving any barriers that cannot be easily overcome. The Implementation Team will responsible for:

- Overseeing the implementation of current projects
- Monitoring emerging issues to make recommendations for additional projects
- Reporting progress to the Benzene Strategy Executive Oversight Team

A proposed organizational structure is attached.

Discussion

This discussion summarizes a recently completed review on benzene HSE risk ***(Insert a reference for the review -- title & date)*** and outlines steps for future work.

Current Shell HSE management policies and processes and external commitments provide the framework for improvements for benzene risk. For example, all manufacturing sites have ISO certification and should have ***(should have? Don't you know** ?)* an environmental improvement process in place. All businesses have a common HSE risk management framework in place for achieving the desired performance level. This presents an opportunity for the coordinated oversight of key improvements across Downstream that will ensure consistency of approach and outcome of benzene risk management.

Focusing on selective improvement areas has been identified as a potentially high leverage approach that aligns with our intention to manage significant risks in a consistent way across Shell. Additionally, this is consistent with the view that chemical risks (in general) are quickly becoming part of a global discussion on product stewardship.

Benzene Risk

Benzene risk should be viewed in terms of the risk to health (workers, community and customers), risk to the environment, and risk to reputation. However, the environmental risk should be viewed thru the health lens (e.g. health risk of ingesting contaminated drinking water), shifting the focus to health risk and reputation risk.

Benzene toxicology remains controversial due to the lack of universal agreement on causation at low-level exposures, uncertainties surrounding toxic end points, and issues pertaining to societal risk tolerance.

Continuing developments in benzene toxicology and evolving commitments to global product stewardship initiatives may create a gap between current performance and external expectations if continuous improvement activities are not fully supported.

Data and Observations

The ***(insert date of review, as stated above)*** review analyzed current risk management processes, and highlights several key findings. The findings have shaped the strategy, priorities, and issues for next steps; they include:

- *Shell Downstream has adopted an internal Occupational Exposure Limit* of 0.5 ppm TWA (Time Weighted Average) and 2.5 ppm STEL (Short Term Exposure Limit) to set a consistent approach to worker exposure globally and to better align with industry practice.

  Available data suggest that the TWA is generally met but exposures may exceed the STEL due to specific tasks. Significant challenges in implementing this standard will include ensuring a

consistent understanding of where peak exposures occur and determining where controls can be different or should be the same.

- *Shell Health has initiated work to standardize employee exposure management and monitoring.* Programs include:
    1. Common Medical surveillance procedure implemented by YE07
       To include a benzene specific protocol for bio and medical monitoring
    2. More consistent documentation of Health Risk Assessments (HRAs)
    3. Implementation of supporting IT tools
    4. These actions should be viewed in terms of infrastructure improvements which will lead to increased standardization of tools and methods. They will indirectly lead to reduced exposure to benzene by improving information management.

- *Shell is sponsoring toxicology and epidemiology studies:*
    - Shanghai Health Study
    - Pooled Analysis of Petroleum Worker Epidemiology Studies - CONCAWE study
      Addresses the present uncertainty as to whether benzene is a causal factor in humans for chronic lymphocytic leukemia (CLL) -
    - Validation of a leukemia-related biomarker in human blood
    - Low dose/potentially threshold - related effects of benzene on chromosomes
    - US EPA's Voluntary Children's Chemical Evaluation Program

- *Shell does not have an internal standard on community exposure,* although we acknowledge that background urban levels of benzene are frequently less than 10 ppb. Regulatory approaches vary regarding this issue and are not well developed. The range of legislative values for the community is between xxx and yyy ppb. Texas is considering a permitting limit of 1-2 ppb. Although exposures at this level are not believed to represent a health risk, this issue remains controversial and is subject to periodic media attention. In 1990 Shell Oil Company in the US reviewed chronic emissions from US manufacturing plants to identify sites with potential impacts on communities above 10 ppb. This work has not been updated or expanded into the current manufacturing portfolio. We do not have a globally consistent position on this issue.

- *Chronic and episodic emissions from plants, marine operations and gasoline loading operations contribute to exposure potential.* A review of 2006 release data (spills and releases) indicates that within Manufacturing, Deer Park (25500 kg to air) and Berre (90300 kg to air) contribute the majority of releases.

- *Emissions from Rhine barge degassing* have been identified as an improvement opportunity by Shell and options to address this source of emissions are being reviewed.

- *A review by Shell remediation of manufacturing soil and groundwater contamination* has been completed and provides a basis for action plans to address uncertainty of data and level of risk. While not specifically delineated, it is assumed that benzene would be addressed within this context. A limited number of sites warrant further discussion with regard to benzene to ensure that a consistent level of health protection is provided. .

- *We are not aware of any regulatory non-compliances* specifically regarding benzene, nor have we identified any exceptions in the Assurance Letter process. Audits however do not necessarily focus on benzene compliance.

- *Under REACH*, it is anticipated that benzene will have to undergo Authorization and this will require a demonstration of appropriate risk management along the Supply Chain.

Processes Used In Performing The ***(insert date of review, as stated above)*** HSE Review

- ToR developed
- Steering Team and Working Team identified
- Guiding Principle developed
- Risk Assessment and Issues Matrices completed
- Interviews with Group experts and Stakeholders
- Cataloging data and activities
- Project proposals
- Implementation Team proposal

Risk Assessment

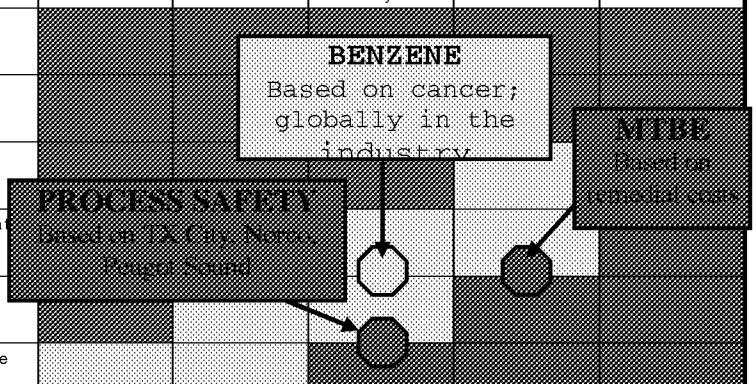
The Shell HSE framework requires that appropriate management controls be in place to address risk. For chemical exposure, the process defers to the Shell Health Risk Assessment (HRA) process. The HRA process classifies benzene as "C4" ***(This is stated as C4/5 on page 2 above. Which is correct? Should the chart be adjusted?)*** on the Shell Risk matrix based on its health hazard, current exposure levels and likelihood of adverse outcome in current operations. This placement requires that all practical steps be taken to systematically manage and minimize exposure to benzene including the:

- Identification of successful global practices;
- Elimination of unnecessary exposures;
- Election of pragmatic approaches to achieving the lowest practical exposure level, also described as ALARP.

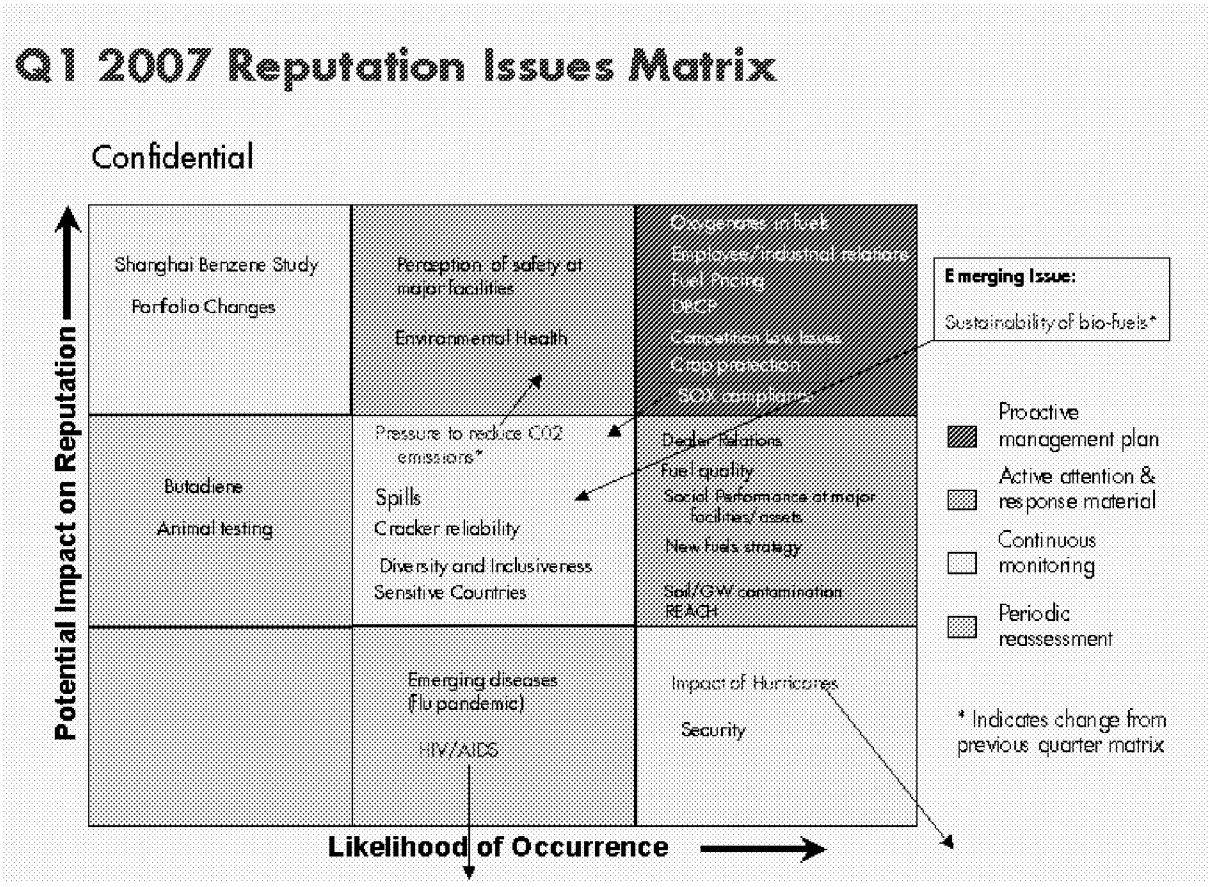
Implementation of the revised OEL is an example of an action to manage the risk, and shift it to the Yellow area of the matrix.

Downstream Risk Assessment Matrix shows the relative position of benzene to other hazards managed within Downstream. Process safety, MTBE, and benzene need to be managed to the same level within Shell, or to ALARP. The placement of the risk bubble does not change after risk management controls have been implemented but highlights the importance of sustaining those controls. Prioritization can be driven by the degree of gap that exists between where you are and where you want to be. At the present time, the size of that gap is unknown, but may be significant.

Severity	Consequences				Increasing likelihood				
	People	Assets	Environment	Reputation	A	B	C	D	E
					Never heard of in the Industry	Heard of in the Industry	Has happened in the Organisation or more than once per year in the Industry	Has happened at the Location or more than once per year in the Organisation	Has happened more than once per year at the Location
0	No injury or health effect	No damage	No effect	No impact					
1	Slight injury or health effect	Slight damage	Slight effect	Slight impact					
2	Minor injury or health effect	Minor damage	Minor effect	Minor impact					
3	Major injury or health effect	Moderate damage	Moderate effect	Moderat impact					
4	PTD or up to 3 fatalities	Major damage	Major effect	Major impact					
5	More than 3 fatalities	Massive damage	Massive effect	Massive impact					

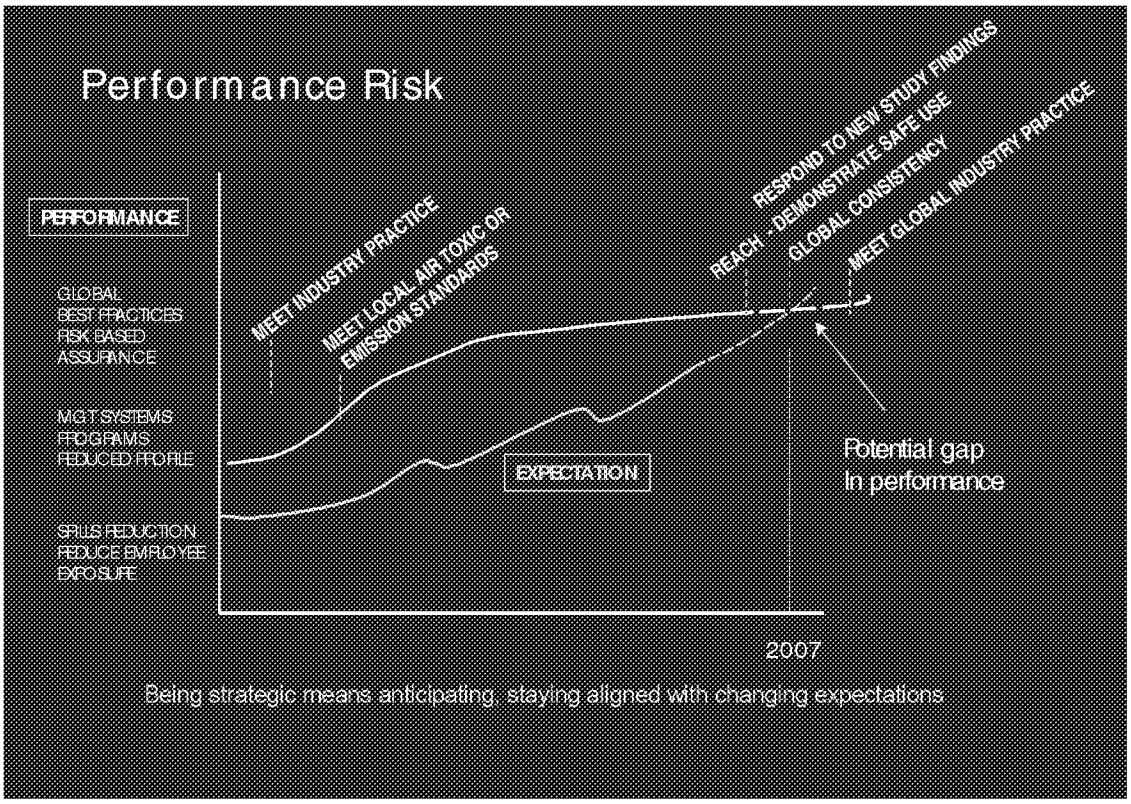


The Group Issues Management Process provides a framework for considering the relative priority and importance of a business risk. In this context an issue *is an emerging or unresolved matter that could impact on the Group's business and affect reputation*. The issues process in Downstream has identified benzene as an issue within the context of Environmental Health, an area with significant potential impact to reputation.



Performance Risk

Managing business risks that involve Environmental Health requires selectively addressing those areas that have the greatest leverage to improve our ability to meet changing expectations. The diagram below illustrates the gradual increased regulatory and societal expectations on managing chemical hazards, perceived or real and the possibility of a gap opening if these trends are not sufficiently visible or addressed ***(Insert a source or reference for the diagram)***. A key function of the Shell Downstream Global Benzene HSE Strategy will be to meet these challenges.



Other Projects

Projects that were considered, but are not included in the priority projects and may be brought forward in the future, include:

- Identify options for vapor recovery for marine loading in Japan
- Develop a Shell Standard where regulations appear to be inconsistent in worker*(?)* protection
- Prepare an updated environmental target for benzene emission reduction (see current Chemicals target)
- Evaluate the feasibility of industry low-level exposure worker study.

PROGRESS TOWARDS IMPLEMENTING BENZENE HSE PROJECTS IN SUPPORT OF GUIDING PRINCIPLE								
RISK AREA	% To Desired State						Objective	Recommended Action
Priority Projects	20	40	60	80	100			
NO HARM TO PEOPLE								
OEL Implementation	execute					YE09	Known gaps closed	Establish practices and cross organization improvements that validate the OEL is implemented.
ENVIRONMENTAL / REPUTATIONAL								
Barge degassing	initiated					YE09	Reduce Benzene emissions, by shipping under dedicated charters	Alternatives assessed to eliminate degassing of Benzene / Benzene containing feedstock movements of Chemicals barges under contract on the Rhine / in ARA.
Community fenceline guidance value	initiate					YE10	Ensuring Shell's approach to community exposure is globally consistent	Develop a global guideline and screen operation for possible improvements
ASSURANCE PROCESS								
Assurance process review	initiate					YE08	Robust assurance process in place to support benzene	Execute project to understand strengths and weaknesses in compliance - focusing on benzene.