RISK-BASED PRIORITIZATION - A DECISION AID

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1.0 Introduction:

Risk is the potential for an adverse impact on the achievement of objectives. Environmental, health and safety (EHS) risks often threaten far beyond the EHS objectives. Risk management is the process by which risk is prevented, controlled or mitigated in a value focused manner, considering both benefit and cost sides of the risk equation. It is prudent to recognize that i) everything cannot be done at once, ii) some things are more important than others, and iii) it is best do the most important things first. The objective is to "**Work the right issues - fund the right opportunities**".

2.0 Risk-based Prioritization - a Critical Step in Risk Management:

Risk-based decision making for risk management typically involves four phases; 1) risk identification, 2) risk significance assessment and prioritization, 3) development of risk-reduction options - the 'project', and 4) prioritization of resource allocation using a benefits-to-cost ratio criteria. Phases 1 & 2 help identify the **right issues to work;** Phases 3 and 4 aid allocation of resources to the **right opportunities**. Benefit is the sum of mutually independent multi-attributes (such as Corporate Reputation, Employee Alignment, Health, Safety & Environmental Protection, Financial Performance, etc.) monetized on a compatible basis. Ever expanding demands of EHS obligations on finite resources have driven the development of risk-based prioritization. Risk-based prioritization is a decision aid and helps achieve acceptable levels of EHS risks in the most resource efficient manner by addressing phases 1 and 2 of the risk-based decision making process.

3.0 MobilRITE - The Risk-based Prioritization Tool:

MobilRITE (Risk Indexing Tool for Environment, Health & Safety) is a Mobil internal software that allows quick consistent relative ranking of environmental & safety impact risks utilizing risk analysis principles. The program simultaneously analyzes multiple pathways such as air, ground water, soil, surface water, flame and explosion. The steps involved in the tool development were: i) identification of parameters that are important for estimating impacts, ii) evaluating the degree of influence of each parameter through sensitivity analysis, iii) selection of appropriate parameters for impact scoring and iv) validation using known detailed risk quantification results. The program computes an impact score based on release magnitude, fate & transport, chemical property and the affected receptor. Also, built in is a set of modification factors that allow quick evaluation of the impact of risk reduction measures. It is a screening tool for risks.

4.0 The Business Need to Prioritize Remediation Project Sites:
Mobil's upstream operations in Western Canada had to address remediation of over 250 potentially hydrocarbon contaminated sites. Recognizing that everything cannot be done at once, some things are more important and it is best to do the most important things first, a prioritization process was needed. MobilRITE was selected as the tool capable of delivering to the management a risk-based prioritized ranking of the sites for remediation.

4.1 Prioritization Process:
The process involved 1) Identification of Risk Drivers, 2) Collection of Relevant Data & Customization of the Tool and 3) Risk-based Priority Ranking

4.2 Identification of Risk Drivers:
Most environmental regulations, define *risk* in terms of potential hazard to human health and the environment. However, for strategic planning of remedial actions at numerous sites, a broader, multi-attribute characterization of risk is required. Such potential impacts or *risk drivers* may include:
Health/Environmental: Exposure of human and/or environmental receptors above defined levels.
Regulatory Response: Enforcement action due to non-compliance.
Legal Exposure: Legal claims related to real or perceived damages.
Cost Increases: Rising remediation costs for sites with expanding, unstabilized problems.
Community Interest: Demand for excessive clean-up action because of misperceived risks.

4.3 Collection of Relevant Data & Customization of the Tool:
A questionnaire, 'Remediation Project Prioritization Data Sheet' was developed to serve as the program input data for evaluation. Because of the substantial uniformity of these remediation sites several simplifying assumptions were made. (All the sites were upstream oil and gas production related, and involved salt water and/or petroleum hydrocarbons, mostly crude oil). The impacted pathways to be analyzed were limited to ground water, surface water and soil. Information was collected on site identity, site contamination characterestics, adjacent land use, receptor type and locations, as well as other external drivers. Based on results from pilot testing of the questionnaire and using practical judgment, some default set of values were developed for use where the field did not and/or may not be able to provide answers to specific questions. MobilRITE was customized to evaluate only Ground water, Surface water and Soil pathways to human and ecological receptors. Additional changes were made to incorporate ease of data handling and results evaluation.

4.4 Risk-based Priority Ranking:
The output from the program yielded separate health/environmental risk scores for individual pathways. A composite health/environmental risk score was defined by assigning weightages as follows:
• Groundwater, Soil and Surface Water associated with human receptors - 22% each
• Groundwater, Soil and Surface Water associated with ecological receptors - 11% each
To account for the other risk drivers the composite scores were further adjusted as follows:
• Legal, Regulatory and Community interest - High (=1.5), Medium (=1.2) & Low (=1.0)
The complete population of sites were then ranked in a descending order of adjusted risk score

4.5 Prioritization Results:

The results were presented in the following format. The adjusted scores ranged from 50 to 1500. The actual numbers and site details are not presented. These are relative ranks and best utilized in grouping projects into high, medium and low bins as shown in the priority ranking chart below.

Site #	Individual Pathway RITE Risk Scores						Weighted RITE Risk Scores	Other Potential Factors			Prioritization	
	GWater Human	Gwater Ecological	Soil Human	Soil Ecological	SWater Human	SWater Ecological		Legal	Regulatory	Media	Adjusted Risk Score	Priority Rank Out of XXX

Priority Ranking of Remediation Sites
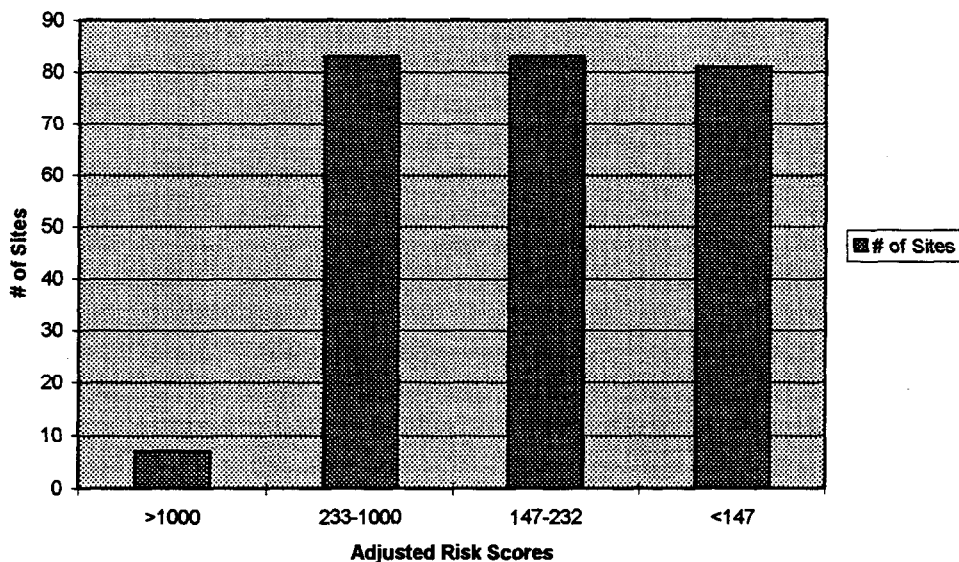
5.0 Future Direction - Integration of MobilRITE and RBCA:

Prioritizing remediation sites in terms of these risk drivers can provide the basis for strategic targeting of remediation resources toward optimizing costs, control and reduction of overall risks, as well as expedited closure of individual remediation sites. Mobil presently employs **RBCA** evaluation to many of its remediation sites (service stations, pipeline facilities, exploration & production facilities etc.) and these principles could be expanded to apply more broadly for systematic management of the full remediation portfolio. The RBCA process provides a framework for consistent yet flexible selection of site specific clean-up standards & remedial action.

Integration of risk-based prioritization using Mobil internal Risk Indexing Tool MobilRITE and the Risk-based corrective action (RBCA) process to provide the framework for consistent yet flexible selection of site specific clean-up standards & remedial action is underway as a comprehensive yet cost effective program. Integration of MobilRITE and RBCA will provide: 1) risk-based prioritization to rank all remediation sites on a common consistent basis for strategic planning and 2) remedial action prioritization to optimize resource allocation and scheduling of remedy implementation based on updated site risk categorization, strategic benefits and cost.