

SOCIO-ECONOMIC ANALYSIS OF PROPOSED UPDATED CRITERIA CANADA-WIDE STANDARD FOR PETROLEUM HYDROCARBONS IN SOIL

EXECUTIVE SUMMARY

The Canada-wide Standard (CWS) for Petroleum Hydrocarbons (PHC) in Soil was developed in 2000 by the Canadian Council of Ministers of the Environment (CCME) and was endorsed by the provincial and territorial environment ministers (with the exception of Quebec) in May 2001. Development of the original PHC CWS included a commitment to undertake a five-year review with the aim of updating the standard to reflect new scientific, technical and economic information. The review commenced in the fall of 2005 and culminated in the recommendation in late 2006 of a revised standard containing updated numerical criteria. The revised standard is expected to be finalized in 2007.

A socio-economic analysis has been completed in order to evaluate and compare the costs and benefits of implementing the current (2000) and proposed updated (2007) PHC CWS. Costs of remediation have been estimated by determining the remediation requirements for a number of scenarios, representing a range of PHC contaminated sites, under the 2000 and proposed 2007 standard. Using data from actual sites, provided by industry, remediation requirements and costs have been determined regionally for each scenario, and aggregated across the various industry sectors and on a national basis, in order to determine the total cost to remediate presently existing PHC contaminated sites to the 2000 and 2007 standards. The overall remediation costs have been compared to remediation industry data to determine the capacity of the industry to perform the work, and the likely timeline over which the work can be completed. The benefits of remediation, not only to the remediation industry, but also to operators, land owners, municipalities and the public, have also been considered, primarily in a qualitative manner.

In summary, the results of the socio-economic analysis indicate that the effects of the proposed 2007 revisions to the PHC CWS on overall remediation costs for PHC contaminated sites across Canada are relatively small. Total undiscounted remediation costs for all industries, in constant 2006 dollars, are projected to increase from \$40.1 billion to \$40.6 billion, an increase of approximately 1.4%. Costs for the remediation of upstream sites comprise approximately 82% of the total, and are projected to increase slightly (1.0%). Remediation costs for downstream sites and other (government, commercial and residential) sites represent 6% and 12% of the total costs, respectively; the respective increases in these costs are forecast to be 2.6% and 3.1%.

The very small increase in costs for upstream sites is attributed to the proposed increase in the F3 criteria and decrease in the F2 criteria for a number of the soil type, land and water use combinations. This results in a shift of governing fraction from F3 to F2. For downstream sites, the slightly greater increase in costs is due in part to the decrease in F2 criteria as well as a decrease in the F1 values for certain scenarios.

The estimated magnitude of remediation work associated with PHC contaminated sites is projected to exceed the current annual capacity of the remediation industry by more than 57

times. If reasonable growth in the sector is considered, the estimated time to complete remediation of all existing sites is approximately 30 years on a national basis. However, the largest PHC contaminated site liabilities are in the provinces with large upstream oil and gas industries; those provinces also have relatively small remediation industries in comparison with estimated remediation requirements, which may necessitate geographic redistribution of resources in order to meet demand.

Aside from the direct benefits to the remediation industry flowing from the expenditure of remediation costs, the primary tangible or monetizable benefits are the elimination or reduction of operators' balance sheet liabilities associated with contaminated sites and the increase in land values and/or revenues from productive land. The difference in market value between a contaminated site and the same site in an unimpacted or remediated condition is generally considered to be equal to the cost of remediation; the increase in land value in most cases is equal to the cost of remediation. In most cases, therefore, there is no net monetizable benefit to the economy as a whole associated with the remediation of a contaminated site, although the benefit may be transferred between stakeholders. Exceptions to the above apply in situations where the remediation cost exceeds the market value of the property, or in situations where remediation results in an added increase in land value due to the ability to redevelop the land for a more intensive and/or profitable purpose (e.g. low density commercial to high-rise residential).

Due to the neutrality of costs and benefits in most situations, and the difficulty in assessing the exceptions on a generic basis, the net benefits associated with increased land values have been discussed qualitatively herein but have not been quantified. Other societal benefits include improvements in health and environmental quality, increased enjoyment of the land, elimination or reduction of blight and reduction in contingent liabilities related to the potential for adverse impact. These are generally not considered to be monetizable benefits.

The estimation of overall remediation costs is subject to a number of uncertainties arising from variability in conditions and remediation requirements between sites and across regions, as well as variability in remediation unit costs. Those factors contributing significantly to the variability in overall cost include remediation unit costs, particularly for upstream sites, and the estimated soil remediation volumes associated with different scenarios. The variability of some of these factors has been characterized herein on the basis of actual data and used in a probabilistic analysis of total costs. This has permitted the generation of a probability distribution of total projected remediation costs. The median cost on a national basis is \$37.8 billion, and upper and lower deciles (90th and 10th percentiles) are \$134.1 billion and \$14.3 billion respectively.