

another way of quantitatively characterizing the same possible benefit categories. This analysis compares the estimated baseline and post compliance in-stream pollutant concentrations in

affected waterways to ambient water criteria for protection of human health. The comparison included AWQC for protection of human health through consumption of organisms and for

consumption of organisms and water. Pollutant concentrations in excess of these values indicate potential risks to human health. Table IX-2 presents results of this analysis.

TABLE IX-2.—ESTIMATED MP&M DISCHARGE REACHES WITH MP&M POLLUTANT CONCENTRATIONS IN EXCESS OF AWQC LIMITS FOR PROTECTION OF HUMAN HEALTH

Regulatory status	Number of reaches with MP&M pollutant concentrations exceeding human health-based AWQC limits		Number of benefitting reaches			
			All AWQC exceedances eliminated		Number of AWQC exceedances reduced	
	For consumption of water and organisms	For consumption of organisms only	For consumption of water and organisms	For consumption of organisms only	For consumption of water and organisms	For consumption of organisms only
Selected Option: Traditional Extrapolation						
Baseline	78	21	N/A	N/A	N/A	N/A
Post-Compliance	78	21	0	0	0	0
Selected Option: Post-Stratification Extrapolation						
Baseline	112	21	N/A	N/A	N/A	N/A
Post-Compliance	112	21	0	0	0	0

Source: U.S. Environmental Protection Agency.

EPA estimates that in-stream concentrations of 4 pollutants (*i.e.*, arsenic, iron, manganese, and n-nitrosodimethylamine) will exceed human health criteria for consumption of water and organisms in 78 receiving reaches nationwide as the result of baseline MP&M pollutant discharges. EPA estimates that there are human health AWQC exceedances caused by n-nitrosodimethylamine (NDMA). However EPA did not consider NDMA pollutant reductions in its national benefits analyses because of the low number of detected values for that pollutant (*See* Chapter 7 of the TDD). EPA estimates that the final rule will not eliminate the occurrence of pollutant concentrations in excess of human health criteria for consumption of water and organisms and for consumption of organisms on any of the reaches on which baseline discharges are estimated to cause pollutant concentrations in excess of AWQC values.

5. Uncertainties and Assumptions of the Human Health Benefits Analysis

Because of the uncertainties and assumptions of EPA's analysis, the estimates of benefits presented in this section may either overstate or understate the benefits to recreational fishers, subsistence fishers, and members of the general population who consume drinking water obtained from intakes located downstream of MP&M discharges. Some of the major

uncertainties and assumptions of EPA's analysis include the following:

- In estimating cancer risks and evaluating the risk of non-cancer health effects other than those related to lead exposure, EPA did not consider the potential for interactions between pollutants. EPA estimated cancer risk or non-cancer hazard attributable to each pollutant and summed the pollutant-specific estimates as appropriate (that is, EPA summed all pollutant-specific cancer risk estimates for each pathway of exposure, and summed pollutant-specific hazard quotients across target organs for each pathway of exposure). This approach does not account for the possibility that pollutants may interact synergistically or antagonistically such that the cancer potency or non-cancer hazard of the mixture of the pollutants is more or less than that calculated from the cancer potencies or RfDs of the individual pollutants.

- Population risk for cancer is based on mean exposure. Using mean exposure parameters for non-cancer could either over- or under-estimate HI exceedances.

- EPA's estimates of cancer cases were calculated using cancer potency factors that are upper bound estimates of cancer potency, potentially leading to overestimation of cancer risk.

- The analysis benefits from reduced incidence of cancer did not account for a cessation-lag, the time between when exposures are reduced and when reduction in risk occurs. Ignoring a

cessation lag may lead to overestimation of cancer-related benefits.

- EPA assumed that the number of subsistence fishers would be an additional 5% of the licensed fishing population. This could be either an overestimate or underestimate of the actual number of subsistence fishers.
- Hazard indices estimated in this analysis may understate actual health risk because possible additional sources of pollutants, such as background pollutants and MP&M pollutants from upstream dischargers, were not considered in the analysis.

Additional details on methodology and the uncertainties and limitations of EPA's analysis of human health risk from the final effluent guidelines, particularly assumptions related to exposure parameters, are presented in Chapter 13 and Chapter 14 of the EEBA report.

C. Improved Ecological Conditions and Recreational Uses

EPA expects the final regulation to provide ecological benefits by improving the habitats or ecosystems (aquatic and terrestrial) affected by the MP&M industry's effluent discharges. Benefits associated with changes in aquatic life may include restoration of sensitive species, recovery of diseased species, changes in taste- and odor-producing algae, changes in dissolved oxygen (DO), increased assimilative capacity of affected waterways, and improved related recreational activities. These activities include swimming,