

EPA used data from scientific literature, USDA data on beef and dairy mortality from poisoning and gastrointestinal illness, EPA data on rural groundwater quality, and published recommendations for livestock drinking water quality, to estimate the potential to reduce on-farm beef and dairy cattle mortality associated with pathogens and nitrates in ground water. From this, EPA estimated the avoided cost of replacing cattle mortalities. The ELG requirements are expected to reduce nitrate and pathogen contamination of ground water at Large CAFOs and, as a result, reduce annual cattle mortality from nitrate poisoning and pathogens at Large CAFOs by approximately 4,300 mature cattle and 3,900 calves. Using a replacement value of \$1,185 for mature cattle and \$54 for day-old calves (2002 dollars), the monetary benefit of reduced on-farm beef and dairy cattle mortality at Large CAFOs is estimated at \$5.3 million annually.

#### *D. Other (Non-Water Quality) Environmental Impacts and Benefits*

In analyzing the effects of this rule, EPA also considered how the requirements promulgated today would affect the amount and form of compounds released to air, as well as the energy that is required to operate the CAFO. In addition to the water quality impacts and benefits discussed above, EPA's analyses for this rule have also evaluated these other types of environmental impacts, often referred to as non-water quality environmental impacts. These non-water quality environmental impacts include changes in air emissions from CAFO production areas and land where CAFO-generated manure is spread, changes in energy use, and improvements in soil properties. EPA's estimates of changes in air emissions and energy use are described in more detail in the *Technical Development Document*.

To assess the potential changes in air emissions resulting from this rule, EPA quantified the releases from the production area, including animal housing and animal waste storage and treatment areas; land application activities; and emissions from vehicles, including the off-site transport of waste and on-site composting operations.

EPA projects increased emissions of criteria air pollutants (particulate matter, volatile organic compounds, nitrogen oxides, and carbon monoxide) related to increased fuel consumption as excess manure is transported away from the CAFO. The contribution of these projected increases is limited compared to the national criteria pollutant

inventory. For example, for the year 2000, the total national inventory for nitrogen oxides was 25 million tons. The contribution of the projected increase in CAFO emissions of nitrogen oxides is less than 0.01 percent of that amount. The national inventory values for other criteria pollutants are also much larger than the projected changes in emissions from CAFOs.

CAFOs are a source of ammonia, which is a contributor to the formation of fine particulate matter. This rule is not expected to significantly alter ammonia emissions from CAFOs. During the rulemaking, EPA evaluated a number of regulatory options and, as part of those analyses, considered the potential air quality benefits associated with changes in ammonia emissions. For further discussion of those analyses, refer to Chapter 13 of the *Technical Development Document* and Section 22 of the rulemaking record.

CAFOs are also a source of hydrogen sulfide emissions. EPA's calculations indicate that today's rule will reduce hydrogen sulfide emissions from Large CAFOs by 12 percent nationally. Reductions in hydrogen sulfide emissions are expected to lead to human health benefits, but EPA has not been able to calculate the economic value of these reductions.

Finally, CAFOs are a source of greenhouse gases. Emissions of nitrous oxide at CAFOs arise mainly from the feedlot area during denitrification of nitrogen compounds during waste storage on the drylot and from fields where animal wastes are land applied. Emissions of methane also mainly arise during waste storage, created during the anaerobic decomposition of carbon compounds. CAFOs currently contribute approximately 3 percent of all U.S. nitrous oxide emissions and a similar percentage of U.S. methane emissions. EPA estimates that emissions of nitrous oxide at Large CAFOs will increase by 4 percent as the requirements of today's rule are implemented, and emissions of methane will decrease by 11 percent.

EPA also expects that the properties of the soil at a number of land application areas might improve because of reduced overapplication of manure. The soil properties of cropland that does not currently receive manure, but becomes a recipient as additional manure is hauled away from CAFOs that have excess manure are also expected to benefit from the organic matter content (improving tilth) and the micronutrients present in manure.

### **VIII. Costs and Economic Impacts**

This section presents EPA's estimate of the total annual costs and the economic impacts that would be incurred by the livestock and poultry industry as a result of today's rule. This section also discusses EPA's estimated effects on small businesses and presents the results of the Agency's cost-effectiveness and cost-benefit analysis. All costs presented in this section are reported in pre-tax 2001 dollars (unless otherwise indicated).

EPA estimates the total monetized social costs of the final regulations at about \$335 million annually. These costs include compliance costs borne by CAFOs and also administrative costs to federal and State governments. EPA estimates the total compliance cost for Large CAFOs at \$283 million per year (pre-tax, \$2001). Costs to Medium CAFOs are estimated at \$39 million per year. Costs to Medium and Small operations that are designated as CAFOs are estimated at \$4 million per year. EPA estimates that the administrative cost to federal and State governments to implement this rule is \$9 million per year.

For the veal, dairy, turkey, and egg laying sectors, the final regulations are not expected to result in any CAFO level business closures. In the beef cattle, heifer, hog, and broiler sectors, however, the final rule is expected to cause some existing CAFOs to experience financial stress. These operations might be vulnerable to closure as a result of complying with the final regulations. Across all sectors, an estimated 285 existing Large CAFOs might be vulnerable to facility closure. This accounts for approximately 3 percent of all Large CAFOs. By sector, EPA estimates that 49 beef operations (3 percent of affected beef CAFOs), 22 heifer operations (9 percent), 204 hog operations (5 percent of affected hog CAFOs), and 10 broiler operations (1 percent) might close as a result of complying with the final regulations. These results are based on an analysis that does not consider the longer-term effects on market adjustment and also available cost share assistance from federal and State governments.

Detailed information on estimated compliance costs are provided in the *Technical Development Document* and the *Cost Support Document*, which are in the administrative record for today's rule. EPA's detailed economic assessment can be found in *Economic Analysis* which is also in the administrative record.