

toxic pollutant residuals important in the food chain.

Plant studies have found foliar damage due to chlorine emissions, decreased levels of chlorophyll a and b, decreased leaf areas, obvious chlorosis, and a decline in fruit production due to chlorine emissions.

There is evidence of effects to animals due to accidental and/or catastrophic exposures, but the chlorine concentrations of these exposures are unknown. However, there are no data on exposure to historic or atmospheric concentrations.

More information is available on the effects of chlorine from aquatic exposures. However, there is no evidence that suggests that emissions of chlorine from industrial sources in the air contribute significantly to aquatic concentrations of chlorine.

One study reported a significant decrease in phytoplankton activity following exposure to 0.1 ppm chlorine in cooling tower water. Additional laboratory studies showed that continuous exposure to 0.002 milligrams per liter (mg/L) total residual chlorine (TRC) resulted in depressed algal biomass in naturally-derived microcosms.

When exposed continuously for 96 hours to 0.05 mg/L TRC, the Eurasian water milfoil showed a significant reduction in shoot and dry weights, shoot length, and chlorophyll content.

Aquatic invertebrates are very sensitive to chlorine and reaction products of chlorine, with early life stages showing the most sensitivity. For example, free chlorine, monochloramine, and dichloroamine have been shown to reduce the rate of oyster larvae survival. Many studies have been performed, and the results are highly variable depending on the chlorine species, the life stage of the invertebrate, and other factors such as salinity. The most sensitive aquatic species appears to be molluscan larvae, with lethal concentration 50% (LC<sub>50</sub>) of 0.005 mg/L. Sublethal effects have also been studied, including reduced growth, reduced motility, and reproductive failure.

The effects on fish also vary depending on the life stage and fish species and environmental factors, such as the pH, temperature, and type of chlorine species. Larval stages are more susceptible to effects, and freshwater species are more sensitive than marine species. Free chlorine is generally more toxic than residual chlorine; where the form of chlorine is dependent on the pH of the water. Sublethal effects such as avoidance, reduction of diversity in chlorinated effluents, reduction or

elimination of spawning, abnormal larvae, reduced oxygen consumption, and gill damage have been noted. Many LC<sub>50</sub> values were reported, ranging from 0.08 mg/L after 24 hours of exposure to TRC to 2.4 mg/L after 0.5 hours of exposure to TRC.

Acute and chronic exposures to predicted chlorine and HCl concentrations around the sources are not expected to result in adverse toxicity effects. These pollutants are not persistent in the environment. The chlorine and HCl emitted should not significantly contribute to aquatic chlorine concentrations and are not likely to accumulate in the soil. Chlorine rapidly converts to HCl in the atmosphere, and chlorine and HCl are not believed to result in biomagnification or bioaccumulation in the environment. Therefore, we do not feel there will be adverse ecological effects due to chlorine and HCl emissions from mercury cell chlor-alkali plants.

#### *C. What Issues Were Raised Regarding the Compliance Date?*

*Comment:* Commenters requested an extension of the compliance date, which was proposed to be 2 years from the effective date of the final rule. The commenters recommended that the compliance date should be changed to 3 years after promulgation. The commenters stated that affected facilities are being required to install costly, complex control and monitoring equipment, as well as establish additional operating and maintenance procedures at their facilities in order to ensure compliance with the emission limitations and work practice requirements of the proposed rule. The commenters believed that 2 years was not a sufficient period of time to complete such tasks, specifically the continuous monitoring requirements.

*Response:* We agree that since the existing sources are required to install complex monitoring equipment and to establish additional operating and maintenance procedures, it is reasonable to allow more time than the proposed 2-year compliance period. Section 63.6(c)(1) of the NESHAP General Provisions states that “\* \* \* in no case will the compliance date \* \* \* exceed 3 years after the effective date of \* \* \*.” Therefore, the final rule specifies that the compliance date for existing sources is 3 years after the effective date of the final rule.

#### *D. What Issues Were Raised Regarding the Emission Limitations?*

*Comment:* One commenter, which submitted comments after the close of

the comment period, recommended that EPA re-define MACT to ban the use of mercury cell technology. The commenter explained that this would be easily achievable because the majority of the chlorine production industry already uses other, superior technologies such as membrane cells and diaphragm cells. The commenter claimed that EPA abused its authority to establish subcategories of emission sources by creating a subcategory of “mercury cell chlor-alkali plants” within the chlorine production source category which limits the pool of facilities upon which the MACT floor is based to those who create dangerous pollution, as opposed to those industry leaders that use non-polluting and readily available equipment.

The commenter further listed a lack of confidence that the mercury cell process could be adequately controlled. The commenter explained that the work practice requirements which are proposed to address fugitive emissions, the largest source of emissions from this process, are too weak.

Finally, the commenter stated that converting all mercury cell plants to membrane cells would still be cost-effective, and that their estimate of the cost to convert all mercury cell plants to other technologies (\$920 million) was justifiable given the significant threat to public health and the environment posed by mercury.

*Response:* We disagree with the commenter that we abused our authority to create subcategories by subcategorizing the chlorine production industry and only including mercury cell plants in the MACT floor analysis. It is our general policy to subcategorize when there are technical distinctions among classes, types, or sizes of sources, and manufacturing processes of sources, that would impact setting an appropriate emission limit even when creating the subcategories leads to some with a small number of sources. This policy is supported by the broad discretion provided to the Agency to establish subcategories under CAA section 112(c), the legislative history, and EPA's prior rulemakings.

In general, EPA has previously taken the position that subcategorization is appropriate where types of emissions and/or types of operation make use of the same air pollution control technology infeasible. The EPA's rulemakings reflect this general understanding and provide criteria for subcategorization that focus on the appropriateness of applying similar technology-based requirements at different sources.