

aftertreatment devices) and additional sheet metal assuming that the body cladding of a piece of equipment (*i.e.*, the hood) might change to accommodate the aftertreatment system. Variable costs also include the labor required to install these new pieces of hardware. For engines >75 horsepower—those expected to incorporate CDPF and NO_x adsorber technology—the amount of sheet metal is based on the size of the aftertreatment devices.

For equipment of 150 horsepower and 500 horsepower, respectively, we have estimated the costs to be roughly \$60 to \$140. Note that we have estimated costs for equipment in all horsepower ranges,

and these estimates are presented in detail in the draft RIA. Throughout this discussion of engine and equipment costs, we present costs for a 150 and a 500 horsepower engine for illustrative purposes.

3. Overall Engine and Equipment Cost Impacts

To illustrate the engine and equipment cost impacts we are estimating for the proposed standards, we have chosen several example pieces of equipment and presented the estimated costs for them. Using these examples, we can calculate the costs for a specific piece of equipment in several

horsepower ranges and better illustrate the cost impacts of the proposed standards. These costs along with information about each example piece of equipment are shown in Table V.C–1. Costs presented are near-term and long-term costs for the final standards to which each piece of equipment would comply. Long-term costs are only variable costs and, therefore, represent costs after all fixed costs have been recovered and all projected learning has taken place. Included in the table are estimated prices for each piece of equipment to provide some perspective on how our estimated control costs relate to existing equipment prices.

TABLE V.C–1—NEAR-TERM AND LONG-TERM COSTS FOR SEVERAL EXAMPLE PIECES OF EQUIPMENT^a
(\$2001, for the final emission standards to which the equipment must comply)

	GenSet	Skid/steer loader	Backhoe	Dozer	Ag tractor	Dozer	Off-highway truck
Horsepower	9 hp	33 hp	76 hp	175 hp	250 hp	503 hp	1,000 hp
Incremental engine & equipment cost							
Long-term	\$120	\$760	\$1,210	\$2,590	\$2,000	\$4,210	\$6,780
Near-term	\$170	\$1,100	\$1,680	3,710	\$2,950	\$6,120	\$10,100
Estimated equipment price when new ^b	\$3,500	\$13,500	\$50,000	\$235,000	\$130,000	\$575,000	\$700,000
Incremental operating costs ^c	–\$90	\$40	\$370	\$1,550	\$1,320	\$4,950	\$12,550
Baseline operating costs (fuel & oil only) ^c	\$940	\$2,680	\$7,960	\$77,850	\$23,750	\$77,850	\$179,530

Notes:

^a Near-term costs include both variable costs and fixed costs; long-term costs include only variable costs and represent those costs that remain following recovery of all fixed costs.

^b “Estimated Price of New Nonroad Example Equipment,” memorandum from Zuimdie Guerra to docket A–2001–28.

^c Present value of lifetime costs.

More detail and discussion regarding what these costs and prices mean from an economic impact perspective can be found in section V.E.

D. Annual Costs and Cost Per Ton

One tool that can be used to assess the value of the proposed standards for nonroad fuel and engines is the costs incurred per ton of emissions reduced. This analysis involves a comparison of our proposed program to other measures that have been or could be implemented.

We have calculated the cost per ton of our proposed program based on the net present value of all costs incurred and all emission reductions generated over a 30 year time window following implementation of the program. This approach captures all of the costs and emissions reductions from our proposed program including those costs incurred and emissions reductions generated by the existing fleet. The baseline (*i.e.*, the point of comparison) for this evaluation is the existing set of fuel and engine

standards (*i.e.*, unregulated fuel and the Tier 2/Tier 3 program). The 30 year time window chosen is meant to capture both the early period of the program when very few new engines that meet the proposed standards would be in the fleet, and the later period when essentially all engines would meet the proposed standards.

As discussed in section IV, the proposal contains two separate fuel programs. We are proposing a 500 ppm sulfur cap on nonroad, locomotive, and marine fuels beginning in 2007. This fuel program, the first step in our two step fuel program, provides significant air quality benefits through reduced SO₂ and PM emissions from both new and existing nonroad, locomotive, and marine engines. In sections V.D.1 and 2, we summarize the cost for this program as if it remained in place for 30 years, even though it would be supplanted by the second step of our fuel program in 2010. We also provide an analysis of the cost per ton for the SO₂ reductions that would be realized by the 500 ppm fuel

program for the same 30 year time window. In this way, the cost per ton of the SO₂ reductions realized by the 500 ppm fuel program can be compared to other available means to control SO₂ emissions. The significant PM reductions are not accounted for in the relative cost per ton estimate, but are accounted for in our inventory analysis presented in section II and in the benefits analysis presented later in this section. Additional detail regarding all of the estimates presented here are available in the draft RIA.

We are proposing a second step in the fuel program that would cap nonroad fuel sulfur levels at 15 ppm beginning in 2010. This fuel program enables the introduction of advanced emission control technologies including CDPFs and NO_x adsorbers. The combination of the two-step fuel program and the new diesel engine standards represents the total Tier 4 program for nonroad diesel engines and fuel proposed today. In sections V.D.3 and 4, we present our estimate of the annual and total costs for