

## Chapter VIII: Sulfur Control in Alaska & Territories

### A. What is the Authority For Exemptions?

Section 211(c) of the Clean Air Act allows EPA to regulate fuels where emission products of the fuel either: 1) cause or contribute to air pollution that reasonably may be anticipated to endanger public health or welfare, or 2) will impair to a significant degree the performance of any emission control device or system which is in general use, or which the Administrator finds has been developed to a point where in a reasonable time it would be in general use were such a regulation to be promulgated. EPA's authority to establish emissions standards for heavy-duty engines and vehicles is based on section 202(a)(3), directing EPA to establish regulations under section 202(a) that produce the greatest achievable reductions, considering various factors such as technological feasibility, cost, and lead-time. Under section 211(c), EPA is required to consider available scientific and economic data, including a cost benefit analysis comparing emission control devices or systems which are or will be in general use and require the proposed control or prohibition with emission control devices or systems which are or will be in general use and do not require the proposed control or prohibition.

Sections 211(i) and 211(g) of the Clean Air Act restrict the use of high-sulfur diesel fuel in highway vehicles. Section 211(i)(1) prohibits the manufacture, sale, supply, offering for sale or supply, dispensing, transport, or introduction into commerce of motor vehicle (highway) diesel fuel which contains a concentration of sulfur in excess of 0.05 percent by weight (500 ppm), or which fails to meet a minimum cetane index of 40, beginning October 1, 1993. Section 211(i)(2) required EPA to promulgate regulations to implement and enforce the requirements of paragraph (1), and authorized EPA to require that diesel fuel not intended for highway vehicles be dyed in order to segregate that fuel from highway vehicle diesel fuel. Section 211(i)(4) provided that the states of Alaska and Hawaii may seek an exemption from the requirements of subsection 211(i) in the same manner as provided in section 325<sup>a</sup> of the Act. Section 211(g)(2) of the Act prohibits the fueling of highway vehicles with diesel fuel containing sulfur in excess of 500 ppm or which fails to meet a cetane index of 40 beginning October 1, 1993.

Section 325 of the Act provides that upon request of Guam, American Samoa, the Virgin Islands, or the Commonwealth of the Northern Mariana Islands, EPA may exempt any person or source, or class of persons or sources, in that territory from any requirement of the Clean Air Act,

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<sup>a</sup> Section 211(i)(4) mistakenly refers to exemptions under Section 324 of the Act (“Vapor Recovery for Small Business Marketers of Petroleum Products”). The proper reference is to section 325, and Congress clearly intended to refer to section 325, as shown by the language used in section 211(i)(4), and the United States Code citation used in section 806 of the Clean Air Act Amendments of 1990, Public Law No. 101-549. Section 806 of the Amendments, which added paragraph (i) to section 211 of the Act, used 42 U.S.C. 7625-1 as the United States Code designation, the proper designation for section 325 of the Act. Also see 136 Cong. Rec. S17236 (daily ed. October 26, 1990) (statement of Sen. Murkowski).

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with some specific exceptions. The requested exemption could be granted if EPA determines that compliance with such requirement is not feasible or is unreasonable due to unique geographical, meteorological, or economic factors of the territory, or other local factors as EPA considers significant.

The EPA highway vehicle diesel fuel regulation at 40 CFR 80.29 implements the sulfur and cetane requirements of section 211(i) of the Clean Air Act. In addition, that regulation establishes the requirement to dye diesel fuel that is not intended for highway vehicles. It specifies that any diesel fuel that does not show visible evidence of the dye solvent red 164 is considered to be available for use in highway vehicles and subject to the sulfur and cetane index requirements.

### **B. Alaska Exemption From the 500 ppm Sulfur Standard**

#### **1. Why Are We Considering an Exemption for Alaska?**

On February 12, 1993, Alaska submitted a petition<sup>b</sup> to exempt highway vehicle diesel fuel in Alaska from paragraphs (1) and (2) of section 211(i), except for the minimum cetane index requirement. The petition requested that we temporarily exempt highway vehicle diesel fuel in communities served by the Federal Aid Highway System from meeting the sulfur content specified in section 211(i) and the dye requirement for non-highway diesel fuel of 40 CFR 80.29, until October 1, 1996. The petition also requested a permanent exemption from those requirements for areas of Alaska not reachable by the Federal Aid Highway System - the remote areas. On March 22, 1994, (59 FR 13610), we granted the petition based on geographical, meteorological, air quality, and economic factors unique to Alaska.

On December 12, 1995, Alaska, submitted a petition for a permanent exemption for all areas of the state served by the Federal Aid Highway System, that is, those areas covered only by the temporary exemption. On August 19, 1996, we extended the temporary exemption until October 1, 1998 (61 FR 42812), to give us time to consider comments to that petition that were subsequently submitted by stakeholders. On April 28, 1998 (63 FR 23241) we proposed to grant the petition for permanent exemption. Substantial public comments and substantive new information were submitted in response to the proposal. To give us time to consider those comments and new information, we extended the temporary exemption for another nine months until July 1, 1999 (September 16, 1998, 63 FR 49459). During this time period, we started work on a nationwide rule to consider more stringent diesel fuel requirements, particularly for the sulfur content (i.e., today's proposed rule). To coordinate the decision on Alaska's request for a permanent exemption with this

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<sup>b</sup> Copies of information regarding Alaska's petition for exemption and subsequent requests by Alaska and actions by EPA are available for inspection in public docket A-96-26 at the Air Docket of the EPA, first floor, Waterside Mall, room M-1500, 401 M Street SW., Washington, D.C. 20460. A duplicate public docket is at EPA Alaska Operations Office-Anchorage, Federal Building, Room 537, 222 W. Seventh Avenue, #19, Anchorage, AK 99513-7588.

nationwide rule on diesel fuel quality, we extended the temporary exemption until January 1, 2004 (June 25, 1999 64 FR 34126).

### **2. Who Commented on the 1998 Proposal for a Permanent Exemption?**

Comments in support of the permanent exemption were submitted by a fuel producer association (Alaska Oil and Gas Association), individual fuel producers (Mapco Alaska Petroleum, Petro Star, Arco Alaska, and BP Exploration), fuel distributors (Yutana Barge Lines, Kodiak Oil Sales, and Petro Marine Services), a trade association (Resource Development Council of Alaska), a utility association (Alaska Rural Cooperative Association), and some individual businesses including the Anchorage International Airport and Alaska Railroad Corporation, and the Alaska Department of Environmental Conservation.

Comments opposed to the permanent exemption were submitted by individuals and the Trustees for Alaska (Trustees). Represented by the Trustees, besides itself, are the Cook Inlet Keeper, the Oregon Chapter Sierra Club, the Alaska Chapter Sierra Club, the Alaska Clean Air Coalition including the Alaska Center for the Environment, the American Lung Association of Alaska, the Alaska Health Project, the Anchorage Audubon Society, and the League of Women Voters of Anchorage. Their comments generally related to Alaska's geography, meteorology, economics and health and welfare. The specific comments submitted by individuals generally were the same as some of the specific comments submitted by the Trustees.

Comments opposed to the permanent exemption were also submitted by the Engine Manufacturers Association (EMA). Its comments related to engine manufacturer warranty and recall liability, and the impact of operating advanced technology engines on Alaska's high-sulfur diesel fuel.

### **3. What are the Relevant Factors Unique to Alaska?**

*[It should be noted that while the following section discusses factors unique to Alaska in the context of the 500 ppm sulfur standard (vis-a-vis the exemption), in general we believe these factors are relevant to the proposed low sulfur standard as well.]*

#### **a. Geography, meteorology, and fuel production, distribution, usage**

Alaska is about one-fifth as large as the combined area of the lower 48-states. Because of its extreme northern location, rugged terrain and sparse population, Alaska relies on barges to deliver a large percentage of its petroleum products. No other state relies on this type of delivery system to the extent Alaska does. Only 35 percent of Alaska's communities are served by the Federal Aid Highway System, which is a combination of road and marine highways. Approximately 19 percent of these communities (approximately 18 communities) are part of the Alaska Marine Highway

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System and have heavy-duty diesel vehicles registered with the Alaska Division of Motor Vehicles and rely on barge deliveries.<sup>c</sup> The remaining 65 percent of Alaska's communities are referred to as "off-highway" or "remote" communities, which are all served by barge lines. Although barge lines can directly access some off-highway communities, those communities that are not located on a navigable waterway are served by a two-stage delivery system: over water by barge line and then over land to reach the community.

Ice formation on the navigable waters during the winter months restricts fuel delivery to the areas served by barge lines. Therefore, fuel is generally only delivered to these areas between the months of May and October. For example, Kodiak Oil commented to the 1998 proposal that during the winter of 1989, Cook Inlet (inlet to Anchorage) froze and "we were down to our last gallons when a barge arrived from Seattle. We even had to borrow jet fuel from the U.S. Coast Guard to use as heating oil." This distribution problem also restricts the ability of fuel distributors in Alaska to supply multiple grades of petroleum products to these communities.

The Alaska Department of Environmental Conservation reported construction costs are 30 percent higher in Alaska than in the lower-48 states.<sup>d</sup> This increase is due to higher freight costs for materials, and higher electrical, mechanical and civil costs due mostly to higher labor costs. Also, because of the State's high latitude, it experiences seasonal extremes in the amount of daily sunlight and temperature, which in turn affects the period of time during which construction can occur.

According to Alaska's petition, its extreme northern location places it in a unique position to fuel transcontinental cargo flights between Europe, Asia, and North America. Roughly 75 percent of all air transit freight between Europe and Asia lands in Anchorage, as does that between Asia and the United States. The result is a large market for jet fuel (Jet-A kerosene) produced by local refiners, which decreases the relative importance of highway diesel fuel to these refiners. Based on State tax revenue receipts and estimates by Alaska's refiners, diesel fuel consumption for highway use represents roughly five percent of total Alaska distillate fuel consumption.<sup>e</sup> The Trustees commented that, according to 1996 and 1997 information from the Alaska Department of Revenue, on-road diesel actually represents between 11 percent and 13 percent of the distillate market. We

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<sup>c</sup> Letter from Alaska Department of Environmental Conservation to EPA dated August 11, 1998.

<sup>d</sup> IBID.

<sup>e</sup> EPA independently verified the distillate consumption estimates based on statistics from the Federal Highway Administration and the Department of Energy. These statistics show that in 1997 the proportion of jet fuel consumption compared to total distillate consumption was approximately 66 percent for Alaska, compared to approximately 27 percent for the United States. The proportion of diesel fuel consumption for highway use compared to total distillate consumption was approximately 5 percent for Alaska, compared to approximately 30 percent for the United States.

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could not confirm the Trustees' figures. Using the tax data submitted in Appendix A<sup>f</sup> of the Trustees comments to the 1998 proposal, we calculated that Alaska used 5.9 percent and 6.3 percent of its total distillate consumption for motor vehicles for the fiscal years ending June 30, 1996, and June 30, 1997, respectively.<sup>g</sup> Using that same data, the Alaska Department of Environmental Conservation reported to us that it derived "approximately 5 percent" for these same years.<sup>h</sup> In that same submittal, the Alaska Department of Environmental Conservation also reported that industry calculations based on the same data source show 4.2 percent for 1996. The above calculations ranging from 4.2 percent to 7 percent agree reasonably well with the original estimate of 5 percent.

Alaska's highway diesel vehicle fleet is relatively small, particularly outside the Federal Aid Highway System, and these vehicles are predominantly older than the national average. There are less than 9000 diesel vehicles in Alaska, with less than 600 of these vehicles in all of rural Alaska. By comparison, there are about 7.2 million diesel vehicles in US. Thus, the Alaska diesel fleet represents only about 1/800 of the national diesel fleet. These vehicles are also older on average. The average age of the diesel fleet in the areas served by the Federal Aide Highway System is about 14 years, and the average age of the vehicles in the rural areas is about 18 years. Only about 200 to 400 new model year diesel vehicles are added to the state's diesel fleet each year, and only about 5 to 15 in the state's rural areas. By comparison, the average age of the national diesel fleet is about 10 years, and about 300,000 to 500,000 new model year diesel vehicles are added to the national diesel fleet each year.<sup>i</sup>

Information provided to us by the State of Alaska indicates that refiners supply and distribute conventional diesel fuel in the summer which has a sulfur content of approximately 3000 ppm, and supply and distribute Jet-A kerosene in the winter as an Arctic-grade diesel, which has a sulfur content between 650 and 1100 ppm from Alaskan refiners, and 300 ppm from one refiner in the lower-48 states. Where the Jet-A kerosene is used as conventional diesel fuel and not for aviation, it is generally mixed in the same tanks with conventional diesel fuel. The fuel type

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<sup>f</sup> Attachment A from the comments submitted by the Trustees in response to the proposal included state tax revenue data from the Alaska Internet site at <http://www.revenue.state.ak.us/iea/>. Attachment A includes Table 9 - Taxable Motor Fuel Gallons Sold in Alaska for the fiscal year ending June 30, 1996, and Table 6 - Taxable Fuel Gallons Sold in Alaska for the fiscal year ending June 30, 1997.

<sup>g</sup> These ratios were derived by dividing the adjusted diesel used for highway purposes by the total distillate. The adjusted diesel usage was calculated by subtracting all non-highway usage from the reported "gross gallons sold" of highway diesel. The fuel subtracted included "exemptions" for fuel used for heating, exported, off-highway, utilities, power plants, and drilling well injection. The total distillate was calculated as the sum of the gross "highway" diesel, Jet fuel, and marine diesel.

<sup>h</sup> Letter from ADEC to EPA dated August 11, 1998.

<sup>i</sup> We compared diesel vehicle registration data (12,000 pound and greater, unladen weight) as of October 1998 provided by the state of Alaska to national diesel vehicle data as described by the input data to the EPA MOBILE model for the 1999 calendar year.

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supplied and delivered is based strictly on economics, availability, and whether winter grade fuel is needed. Where some or all of the Jet-A kerosene is used as aviation fuel, it must be segregated from conventional diesel fuel to avoid contamination. Aviation fuel must meet stringent specifications, and contamination would disqualify the fuel as aviation fuel. The same barge and truck tankers and transfer equipment apparently can deliver both types of fuel without significant contamination of the Jet-A kerosene. However, dyed non-highway diesel fuel is a serious concern. According to the refiners and distributors in Alaska, if Alaska were required to dye its non-highway diesel fuel, residual dye in tanks or transfer equipment would be enough to contaminate and disqualify Jet-A kerosene for use as aviation fuel. Either the tanks and transfer equipment would have to be thoroughly cleaned prior to handling jet fuel, or separate tankage and transfer equipment would be needed.

Alaska's climate is colder than that of the other 49 states. The extremely low temperatures experienced in a large portion of Alaska during the winter imposes a more severe fuel specification requirement for diesel fuel in those parts of Alaska than in the rest of the country. This specification, known as a "cloud point" specification<sup>j</sup> significantly affects vehicle start-up and other engine operations. Alaska has the most severe cloud point specification for diesel fuel in the U.S. at -56°F. Because Alaska experiences extremely low temperatures in comparison to the other 49 states, and the cloud point specifications for diesel fuel in the lower 48 states are not as severe, most diesel fuel used in Alaska is produced by refiners located in Alaska. Jet-A kerosene meets the same cloud point specification as No. 1 diesel fuel (which is marketed primarily during the winter in Alaska, as opposed to No. 2 diesel fuel which is marketed primarily in the summer) and is commonly mixed with or used as a substitute for No. 1 diesel fuel. However, because Jet-A kerosene can have a sulfur content as high as 3000 ppm, the current motor vehicle diesel fuel sulfur requirement of 500 ppm, and the proposed sulfur requirement of 15 ppm, would generally prohibit using Jet-A kerosene from being used as a fuel for motor vehicles.

The Trustees commented that, while Alaska's climate may be colder on a state-by-state basis, Alaska's climatic conditions are not unique relative to other states when considered on a city-by-city basis. The Trustees noted that we have not granted cities in the lower-48 states exemptions from the low sulfur diesel regulations. The Trustees also commented that in light of Canada's recent implementation of 500 ppm sulfur diesel fuel regulations, we should examine the methods used by

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<sup>j</sup> The cloud point defines the temperature at which cloud or haze or wax crystals appears in the fuel. The purpose of the cloud point specification is to ensure a minimum temperature above which fuel lines and other engine parts are not plugged by solids that form in the fuel. This specification is designated by the American Society for Testing and Materials (ASTM) in its "Standard Specification for D975-96 Diesel Fuel Oils", and varies by area of the country and by month of the year based on historical temperature records. Alaska has the most stringent cloud point specification in the United States. For example in January, Alaska's cloud point specification is -56°F, -26°F, and -2°F for the northern (above 62° latitude), southern (below 62° latitude), and Aleutian Islands plus southeastern coast region, respectively. In contrast, the most stringent cloud point specification in January in the lower-48 states is -29°F for Minnesota. For the state of Washington, from which some imported distillate is imported into Alaska, the January cloud point specification is +19.4°F and 0°F for the western and eastern parts of the state, respectively.

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cities and towns located in northern Canada, including the Yukon and the Northwest Territories, to overcome cloud point difficulties. While these comments have merit to addressing the issue of technical feasibility of Alaska complying with the highway diesel fuel requirements, we are no longer certain that technical feasibility is an issue.

In complying with the proposed sulfur requirement, refiners have the option to invest in the process modifications necessary to desulfurize diesel fuel for use in motor vehicles, or not invest in the process modifications and either import low sulfur diesel fuel from outside of Alaska or only supply diesel fuel for non-highway purposes (e.g., heating, generation of electricity, non-road vehicles). Previously, most of Alaska's refiners indicated that local refineries would choose to exit the market for highway diesel fuel if an exemption from the 500 ppm sulfur requirement is not granted. This is because of limited refining capabilities, the small size of the market for highway diesel fuel in Alaska, and the costs that would be incurred to desulfurize diesel fuel. Among the reasons for the high cost include the construction costs in Alaska, which are 25 to 65 percent higher than costs in the lower 48 states, and the cost of modifying the fuel production process itself.

The 1998 proposal indicated that the Alaskan refineries cannot produce 500 ppm diesel fuel without significant capital expenditures for desulfurization equipment and operation. In response to that proposal, MAPCO commented the installation of the necessary equipment at MAPCO's North Pole refinery would cost over \$100 million for a diesel hydro-treater, a hydrogen plant, a sulfur recovery unit, additional tankage and associated piping, utilities, etc. But that cost estimate does not include needed new tankage at MAPI's Anchorage Terminal "where MAPI has found it almost impossible to build additional tankage to build adequate additional tankage because of difficulties in obtaining the required permits". Further, MAPCO indicates the refinery would have to dispose of waste sulfur material in a landfill, likely in an out-of-state disposal site at tremendous additional cost for disposal. Local borough landfills are nearing capacity and struggling with identifying long term options. Other borough landfill sites are not likely to accept waste generated outside their own borough. All non-taxable non-road diesel fuel would have to be dyed (the current temporary exemption also exempts the dye requirement). For MAPI alone, this would mean dyeing over 100 million gallons of diesel per year at a cost of over \$125,000 per year for blending infrastructure, cost of dye, management of dyeing operation, maintenance, laboratory, QA, accounting and loading personnel. Similarly, the Alaskan Oil and Gas Association (AOGA) commented the total cost to retrofit Alaskan refineries (for 500 ppm sulfur diesel fuel) has been estimated to be "in excess of \$150 million." Tesoro is currently producing 500 ppm diesel fuel at a cost of about four to six cents per gallon using low-sulfur crude product, but would likely need desulfurization equipment to reach the proposed sulfur limit of 15 ppm.

The Trustees commented that in March of 1998, Petro Star, Inc. signed a commercial license agreement with Energy Biosystems Corporation for a biocatalytic desulfurization unit, the costs of which are significantly less than the current hydro-treating method. Also, after we granted the "urban" exemption, Tesoro announced plans to spend \$50 million in 1997 to beef up its Nikiski refinery, expand its network of Alaska gas stations and renovate existing stores, and to spend an additional \$30 million over 1998-99 for further store expansion and renovations. The State of

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Alaska's Industrial Development and Export Authority later announced it would help finance \$8.1 million of the cost of Tesoro's refinery improvements. MAPCO also was in the midst of a \$11 million refinery expansion in 1997. The Trustees argue that EPA should, therefore, ignore complaints by local refineries that the cost of retrofitting are too much for them to bear in order to supply Alaskans with cleaner fuel.

It appears there are two related issues that need to be addressed. One is whether refiners can afford the retrofits to produce highway diesel fuel that meets the proposed sulfur requirement. Their comments seem to have focused on cost benefits: the anticipated high costs of 500 ppm diesel fuel and the lack of significant environmental benefits for Alaska. According to the Alaska Department of Environmental Conservation, Mapco's and Tesoro's expansions "were built because they are profitable investments. This is unlike the capital cost required for 500 ppm diesel. One refiner indicated that they do not see this as a profitable investment, but a burden to consumers, refiners, and fuel distributors in Alaska."<sup>k</sup>

The second related issue is cost. The costs of producing 500 ppm diesel fuel may be less than previous estimates using the standard hydrogenation process. We understand that emerging technologies, including the biocatalytic method, have potential to reduce the costs of desulfurization (see Chapter IV of this document for discussion of desulfurization technologies). Also, we have indications that Alaska's refiners may now be considering options for sulfur control.

The 1998 proposal discussed Alaska's potential ability to import diesel fuel from the lower-48 states. In that proposal, we explained that the fuel currently being imported into Southeast Alaska either does not meet the federal sulfur requirements for motor vehicles, or is not arctic grade, or both, thus the cost of requiring 500 ppm diesel fuel would likely increase. The Trustees subsequently commented that there are many northern cities and towns in the lower-48 states that need 500 ppm diesel fuel with a low cloud point, and that we failed to explain where those northern cities and towns obtain their low sulfur, low cloud point diesel fuel, or the inability of the lower-48 state refineries to provide Alaska with 500 ppm diesel fuel. Based on available information, we believe lower-48 state refineries are probably capable of producing and marketing 500 ppm arctic grade diesel fuel for Alaska, but there are likely cost implications.

The Trustees commented that based on information provided in the 1998 proposal, the price of imported fuel is not overly expensive or unreasonable. In response to this comment, we looked at the price of diesel fuel in the lower-48 states, and the cost to distribute fuel to Alaska from the lower-48 states. Two sources of distillate prices indicate the average price difference between high sulfur and 500 ppm diesel fuel is about 2.1 to 2.5 cents per gallon.<sup>1</sup> MAPCO submitted an invoice

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<sup>k</sup> IBID.

<sup>1</sup> According to the DOE "Monthly & Annual Petroleum Supply Data" for 1997, the average price of 500 ppm #2 diesel fuel in the United States in 1997 was 2.1 cents per gallon more than the average price of high-sulfur #2 diesel. Also, according to Hart's Diesel Fuel News for January through March of 2000, 500 ppm distillate

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for one vessel shipment of 42,779.20 barrels (1,796,726 gallons) of gasoline from Puget Sound to Anchorage at a cost of \$300,000, or 16.7 cents per gallon. We assume that the cost to ship diesel fuel is similar to the cost of shipping gasoline. Using these figures, the estimated direct cost of replacing locally produced high-sulfur motor vehicle diesel fuel in Anchorage with imported 500 ppm diesel fuel from the lower-48 states could be 18.8 to 19.2 cents per gallon.

This cost does not consider any additional cost that may be associated with producing special batches of 500 ppm diesel fuel having a low cloud point specification. EPA has no estimates of such cost, but at least two factors must be considered. First, it is likely that low-cloud point specification fuel costs more to produce because of its special formulation, and the fact that it is produced only to the extent it is specifically requested by purchasers. Second, the demand for low-cloud point specification fuel for Alaska would not likely coincide in time with the demand for low cloud point specification fuel in the lower-48 states. Alaska distributes and stocks its winter fuel during the summer and fall months, when summer fuel is being produced and delivered in the lower-48 states. For example, the Colonial Pipeline requests winter grade fuel beginning in September, so that it will be available for use in the Northeast states by about the end of October.<sup>m</sup> Thus, refiners in the lower-48 states would just be gearing up to produce winter fuel for the lower-48 states when they would be gearing down production of winter fuel for Alaska. Those refiners would have to produce special batches of fuel destined for Alaska in the Spring and Summer months, and refiners and distributors in the lower-48 states would have to store and transport this fuel while keeping it segregated from other diesel fuel destined for use in the lower-48 states and from any other high-sulfur diesel fuel destined for use in Alaska.

The Trustees also commented that we should provide evidence that transportation costs would increase. In the 1998 proposal, we concluded that transportation costs would be either zero or minimal for Southeast Alaska because most if not all its fuel is already imported to that area. However, the shipping costs would increase for other areas which currently obtain their fuel from in-state refineries, and that increase would likely be "more than minimal." The costs of transporting fuel produced in the lower-48 states for Alaska is the sum of the costs of transporting the fuel in the lower-48 states (e.g., from the refinery to Seattle) and the cost of transporting the fuel to Alaska from the lower-48 states (e.g., from Seattle to Anchorage). The transportation cost within the lower-48 states, for which we do not have a cost estimate, is incurred regardless of whether the fuel produced in the lower-48 states is destined for use in the lower-48 states or Alaska. Thus, the transportation cost within the lower-48 states should already be incorporated into the cost of fuel being sold in the lower-48 states. An example of transportation cost from the lower-48 states to Alaska was provided by MAPCO, which submitted an invoice for one vessel shipment of 42,779.20 barrels (1,796,726 gallons) of gasoline from Puget Sound to Anchorage at a cost of \$300,000, or 16.7 cents per gallon.

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averaged 2.5 cents per gallon more than low-sulfur distillate for New York, Houston and Chicago.

<sup>m</sup> Electronic mail to EPA staff by the American Petroleum Institute on October 12, 1998.

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We stated in the 1998 proposal that Canadian 500 ppm diesel fuel does not seem to be available for export to Alaska. The Trustees commented that this conclusion was based on 1995 information, that Canada recently passed regulations requiring all on-road vehicles to use 500 ppm diesel fuel, and Canadian refineries may now welcome the opportunity to supply Alaska with 500 ppm diesel. In response to this comment, EPA contacted Transport Canada, which indicated Western Canada has greater ability to produce 500 ppm products than other areas of Canada, and some Western Canadian refiners have indicated that they do not have enough capacity to supply 500 ppm diesel fuel with a -57° F cloud point to Alaska. The cloud point limit requires the fuel to be made from the same streams used to make Jet-A kerosene, and "there is simply not enough of this material available in Western Canada to supply Alaska, in addition to meeting domestic Jet A-1 and northern diesel demands." But even if some Canadian refiners could supply 500 ppm diesel fuel to Alaska, "[t]he costs for distribution would be significant."<sup>n</sup> In addition, Canada's highway diesel fuel would not meet the requirements of today's proposal, unless Canada subsequently would adapt these new requirements for Canada.

Cost is relevant not only for the likely higher cost of replacement of imported fuel (due to importation costs, decreased competition, etc.), but for total impact on the Alaskan economy. For example, the Anchorage International Airport commented that increased costs of highway diesel fuel could significantly impact Alaskans through increased capital and operating costs for airports, tenants, as well as other Alaskan industries and businesses relying on diesel fuel. These increased costs must be passed on to end-users. Further, many small businesses are relied on in Alaska due to the state's expansive size, undeveloped transportation system, and rural markets. These added capital and operating costs combined with logistical difficulties would place many small but needed businesses common at airports and throughout Alaska at a great disadvantage. The Alaska Railroad Corporation commented that although railroads would not be required to use 500 ppm diesel, it anticipates a reduction in the quantity of petroleum products it transports from the MAPCO refinery in Fairbanks for use throughout Alaska. Some of the diesel fuel business would be diverted to out-of-state refiners, reducing railroad revenues, thereby increasing the cost of transporting other goods and services, and thus causing customers to evaluate other less fuel-efficient alternatives.

Whether 500 ppm diesel fuel is produced in Alaska or imported from the lower-48 states or Canada, there remains the problem of segregating the two fuels for transport to communities that are accessible only by navigable waterways and subsequent storage of the fuels in those communities. Fuel is delivered to these communities only between the months of May and October due to ice formation which blocks waterways leading to these communities for much of the remainder of the year. The fuel supplied to these communities during the summer months must last through the winter and spring months until resupply can occur. Additionally, the existing fuel storage facilities limit the number of fuel types that can be stored for use in these communities. The cost of constructing separate storage facilities and providing separate tanks for transport of 500 ppm diesel fuel for motor vehicles could be significant. This is largely due to the high cost of construction in

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<sup>n</sup> Information submitted to EPA on July 20, 1998 by Transport Canada via electronic mail

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Alaska relative to the lower 48 states, and the constraints inherent in distributing fuel in Alaska.

One alternative to constructing separate storage facilities is to supply only 500 ppm diesel fuel to these communities. However, this would require use of the higher cost, 500 ppm diesel fuel for all diesel fuel needs. This would increase the already high cost of living in these communities, since a large percentage of distillate consumption in these communities is for non-highway uses, such as operating diesel powered electrical generators. The Trustees commented that we offered little evidence that 500 ppm diesel fuel would cost more, and in fact, 500 ppm diesel fuel may be less expensive. Our 1998 proposal offered little evidence of the cost of 500 ppm diesel fuel. Instead, we indicated that "the distributors import the more expensive Jet-A kerosene for all uses because limited storage prevents segregation among the intended uses." To avoid segregation, the distributors have to supply fuel that meets the most stringent requirements among the various uses of the fuel. Presently, the most stringent requirements are for jet fuel. As long as fuel is needed for aviation purposes and can not be segregated from the fuel used for other purposes, all fuel has to meet the more stringent and more costly jet fuel specifications. Similarly, if 500 ppm diesel fuel were required for highway use and segregation were not possible, all fuel would have to meet both the more costly jet fuel specifications and the more costly 500 ppm motor vehicle diesel fuel specification. The costs for refiners to desulfurize to the proposed low sulfur standard are discussed in Chapter V.

Also, Alaska would not be able to avoid segregating the fuel simply by supplying only 500 ppm diesel fuel for all uses. If the EPA sulfur content exemption were to expire or be terminated, the automatic Internal Revenue Service exemption for Alaska would also expire, and the Internal Revenue Service would require that the non-highway fuel (except jet fuel) be segregated and dyed. The Internal Revenue Service (IRS) tax code has a diesel fuel dye requirement that parallels that of the EPA, but areas of Alaska covered by an EPA diesel sulfur exemption are also exempt from the IRS dye requirement (26 CFR 48.4082-5T). Consequently, if the EPA exemption were to expire or be terminated and fuel producers and distributors decided to supply only 500 ppm diesel fuel for economic or other reasons, the producers and distributors would still have to dye and segregate the non-highway fuel (except jet fuel) for federal tax purposes or pay the highway fuel tax. The jet fuel intended for aviation would have to be segregated from jet fuel intended for general usage to avoid being contaminated with the dye.

In response to the 1998 proposal, we received significant comments from industry and businesses in Alaska on the issue of storage and segregation. We listed the most significant of these comments below. *[Note that while these issues were raised in response to the exemption decision for the current 500 ppm standard, they would generally be relevant to the proposed low sulfur standard as well.]*

The Anchorage International Airport commented that construction of separate storage and distribution facilities will be at "substantial capital and operating costs."

Kodiak Oil commented that there is not a lot of use of diesel fuel by vehicles. Diesel fuel is used for

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other purposes, including fishing boats, ocean transportation (tug boats), heating oil, off-road construction equipment, off-road logging and fish processing. Currently there is no need to segregate the fuel by use. The costs associated with 500 ppm diesel would be borne by a small segment of the market and would require a large expense in new tanks and pipelines for a small part of sales. Kodiak Oil further stated that fuel distributors can't send tank trucks to a fuel terminal in another town to load it up and drive it back. They must receive fuel by barge in large volumes and must have a large investment in tanks and equipment to store it.

Petro Marine Services commented that the vast majority of its product is used by vessels, and very little of it is sold to motor vehicles. If it were required to segregate 500 ppm diesel for use by motor vehicles, separate tanks would be required for distribution and storage, which would represent a huge cost for a very small volume of fuel.

Petro Star commented that segregated storage would be required to distribute 500 ppm diesel in many areas, and such storage would be unfeasible or prohibitively expensive.

ARCO commented the demand for motor vehicle fuel is small compared to other uses of its "Arctic Heating Fuel" (similar to No. 1 diesel fuel produced by ARCO Alaska Inc. for use in exploration and production in the North Slope) and it would be very expensive to construct separate storage tanks for a second type of diesel fuel.

The Alaska Oil and Gas Association commented that because 500 ppm diesel must be segregated from non-road diesel, separate distribution, storage and delivery systems must be installed. It estimates that there are approximately 80 tank farms located throughout Alaska, many of them in remote areas. Without the exemption all of these locations would be required to construct and maintain separate facilities.

Yutana Barge Lines, Inc. commented that over 95 percent of the diesel that Yutana Barge Lines, Inc. hauls is either for marine or power generation. It calculated the cost to be approximately 18 cents per gallon to properly segregate the dyed and undyed fuel, and build the additional facilities and equipment to ship and store the dyed and undyed fuel.

MAPCO commented that additional tankage and segregation of piping systems in the Alaska distribution system could easily cost \$50 million, assuming that permits can be obtained. There is a shortage of tankage for storage and distribution of products throughout the state. As a result, in Anchorage MAPCO ships and stores imported ethanol (for oxygenated gasoline during the control period for CO) in rail cars at a cost of over 27 cents per gallon. MAPCO has tried to build new tanks to expand its storage and distribution capabilities, but has been unable to obtain the associated air permits. It indicated similar permitting and storage challenges exist throughout the state. There are over 80 tank farms in Alaska that would require additional tankage. These tank farms are widely dispersed and delivery times are such that considerable storage volume would have to be dedicated to 500 ppm diesel. The cost of constructing one 10,000 barrel tank with all required spill containment and supporting infrastructure is at least \$600,000. MAPCO also commented that

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segregated tanker trucks would be required to haul the dyed fuels in order to avoid cross contamination with other non-dyed diesel and jet kerosene. The cost for each additional truck is approximately \$250,000. Contamination of other fuels by the dye (dying non-highway fuel, except jet fuel, would be required without the exemption) is a serious potential problem. Jet fuel is quite easily stained by the dye and in Alaska many of the same trucks that haul the heating fuel also haul the highway diesel and jet fuel.

The Trustees commented that we should clarify why distributors are presently capable of segregating summer and winter fuels, but if the exemption were denied, distributors would not be capable of segregation. In response, it is likely that distributors are presently capable of segregating the currently available fuels, but not additional fuels. For example, where only Jet-A kerosene is currently used for all purposes, no segregation may presently be needed. Where both Jet-A kerosene and conventional diesel fuel are currently available, adequate segregated storage may presently exist for the Jet-A kerosene (for jet use and all other uses in the winter) and conventional diesel fuel (including a mixture of conventional diesel and Jet-A kerosene) in the summer. In each case, additional tankage would likely be required to segregate the motor vehicle 500 ppm diesel fuel, and additional tankage may be required to segregate jet fuel intended for aviation purposes from the jet fuel intended for other non-highway uses, which would have to be dyed in accordance with the EPA and IRS requirements.

The Trustees commented that studies by members of the diesel engine manufacturing and petroleum refining industries prompted by the 1990 diesel rule (55 FR 34121, August 21, 1990) found that the potential cost benefit to truck owners and operators of using 500 ppm diesel fuel compared to conventional diesel fuel is between 8 and 30 cents per gallon, and this benefit would more than offset any cost increase incurred in requiring the use of 500 ppm diesel. Actually, in promulgating the 500 ppm requirement in 1990, we estimated cost savings to truck owners and operators from sulfur control to range from 0.8 to 30 cents per gallon, depending on the method used to evaluate the benefits and the vehicle class evaluated. While we have not gone back to reevaluate the benefits of the 500 ppm sulfur cap, we do believe the use of the proposed low-sulfur (15 ppm) fuel in upcoming engine technologies is very likely to offer benefits in addition to those resulting from the 500 ppm cap (see chapters III and V). More importantly, as discussed in chapter 3, we believe that the use of diesel fuel with sulfur levels greater than the proposed sulfur limit will not be viable with the use of the engine technologies necessary to meet the proposed 2007 vehicle emission standards.

### **b. Environmental and Health Factors**

Since Alaska has been operating under diesel sulfur exemptions since 1993, continuing the diesel sulfur exemption would not cause emissions to significantly increase, but would mean Alaska would forego the potential benefits to its air quality resulting from the use of 500 ppm diesel fuel. The only violations of national ambient air quality standards in Alaska have been for carbon monoxide (CO) and particulate matter (PM<sub>10</sub>). CO violations have been recorded in the State's two largest communities: Anchorage and Fairbanks. PM<sub>10</sub> violations have been recorded in two rural

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communities, Mendenhall Valley of Juneau and Eagle River in Anchorage. The most recent PM<sub>10</sub> inventories for these two communities, although more than a decade old, show that these violations are largely the result of fugitive dust from paved and unpaved roads, and that diesel motor vehicles are responsible for less than one percent of the overall PM<sub>10</sub> being emitted within the borders of each of these areas<sup>o</sup>. Moreover, Eagle River has not had a violation of the PM<sub>10</sub> standard since 1986. Mendenhall Valley has initiated efforts for road paving to be implemented to control road dust. The sulfur content of highway diesel fuel would not likely have a significant impact on ambient PM<sub>10</sub> or CO levels in any of these areas because of the minimal contribution by diesel motor vehicles to PM<sub>10</sub> in these areas and the insignificant effect of diesel fuel sulfur content on CO emissions.

The use of high-sulfur diesel fuel may cause plugging or increased particulate sulfate emissions in diesel vehicles equipped with trap systems or oxidation catalysts, and could impair the ability of oxidation catalysts to reduce HC and CO exhaust emissions. However, any increase in sulfate particulate emissions would likely have only a minor effect on ambient PM<sub>10</sub> levels in Alaska since current diesel motor vehicle contributions to PM<sub>10</sub> emissions are minimal. Since Alaska is in attainment with the ozone and SO<sub>2</sub> national ambient air quality standards, there is currently no great concern for reducing HC or SO<sub>2</sub> emissions.

The Trustees asserted in their comments to the 1998 proposal that given half of Alaska's highway fuel consumption is diesel, diesel particles can be expected to be significant contributors to wintertime air pollution. They also claim the state of Alaska bases an assertion that diesel vehicles are negligible contributors to the ambient PM<sub>10</sub> problems on inaccurate data. Alaska calculated that by using 500 ppm diesel fuel the maximum reduction in PM<sub>10</sub> emissions would be 70 tons per year. It based this figure on the assumption that the annual highway diesel fuel consumption is 50 million gallons. According to the Trustees, recent records show Alaskans consume closer to 200 million gallons of on-road diesel fuel each year. This would mean that if Alaska used 500 ppm diesel fuel, the State would reduce its PM<sub>10</sub> emissions by 280 tons per year instead of the 70 tons estimated by the State. This reduction, whether significant in proportion to other PM<sub>10</sub> sources, is in the best interests of the health and well-being of Alaskan residents. The Trustees also commented they are concerned about inventory numbers during wintertime air pollution events in Anchorage and Fairbanks. They claim Alaska has evidence that Anchorage and Fairbanks events are mostly vehicular pollution with measurable amounts of woodsmoke and that fine particle pollution is present during wintertime inversions that result in high pollution levels.

Any reduction of particulate emissions is likely to be beneficial to health at some level. However, we could not substantiate that half of Alaska's highway fuel consumption is diesel fuel. Compared to the total highway consumption of gasoline and diesel fuel combined, the diesel fuel highway consumption is approximately 24 percent, based on Alaska revenue data for the fiscal year

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<sup>o</sup> "PM<sub>10</sub> Emission Inventories for the Mendenhall Valley and Eagle River Areas," prepared for the U.S. Environmental Protection Agency, Region X, by Engineering-Science, February 1988.

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ending 1997 submitted by the Trustees in Attachment A to their comments to the 1998 proposal. That same revenue data indicate that highway vehicles in Alaska consume about 80 million gallons of diesel fuel annually. Using these statistics, the reduction in  $PM_{10}$  by using 500 ppm diesel fuel for highway vehicles would be about 112 tons per year.

The Trustees noted that in 1994, engine manufacturers began designing their engines with catalysts to meet the 1994 emission standards with the use of 500 ppm diesel fuel. It further concluded that when a diesel engine equipped with a catalyst burns high-sulfur diesel fuel, sulfate emissions increase. Alaska had argued that because of the small size of the new (1994 and later) vehicle fleet on Alaskan roads, the increase in sulfate emissions would be insignificant. At the time the Petition was submitted in 1995, Alaska's assertion may have been true, but as each year passes, more and more diesel engines equipped with catalysts join the Alaska fleet. The Trustees commented that EPA should examine the effect that increased numbers of diesel vehicles with catalysts have on emissions inventories.

Based on available information and analysis, increased sulfate emissions with the use of high-sulfur diesel fuel and oxidation catalyst technology is a possibility. However, with few exceptions, engine manufacturers are now complying with our current emission standards without the use of oxidation catalysts. Therefore, the concern is unlikely to grow.

The Trustees commented that we should consider the impact of the new national ambient air quality standard (NAAQS) for particulate matter ( $PM_{2.5}$ ) that we recently promulgated. However, as we stated in the 1998 proposal, it is untimely to consider the impact of the new NAAQS for  $PM_{2.5}$ . We may revisit this issue again in the future if and when actions on the NAAQS revisions are complete. Following a NAAQS revision, state Governors must submit recommendations for designations. These are designations of "nonattainment," "attainment," and "unclassifiable." Under section 6102(c)(1) and 6102(d) of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) concerning the designation process for a  $PM_{2.5}$  NAAQS, we will not make designations for  $PM_{2.5}$  until after at least three calendar years of air quality data have been gathered, which have been measured by Federal reference method monitors, or equivalent monitors. We anticipate that three years of quality assured data will be available from the first set of  $PM_{2.5}$  monitors by 2002, and from all of the monitors by 2003. Under section 6102(c)(1) of the TEA-21, states will be required to submit designations referred to in section 107(d)(1) of the Clean Air Act for each area concerning  $PM_{2.5}$  within one year after receipt of three years of quality assured air quality data from Federal reference method monitors or equivalent monitors. Under section 6102(d) of the TEA-21, we would then have to promulgate designations referred to in section 106(d)(1) of the Clean Air Act for a  $PM_{2.5}$  NAAQS by the earlier of one year after the date States are required to make their submittal or by December 31, 2005. Consequently, data indicating whether Alaska is complying with a new  $PM_{2.5}$  NAAQS would not be available until at least 2002 or 2003, and the compliance designation for Alaska would not be promulgated until at least 2004 or 2005. Nevertheless, based on very limited information available at this time, there is no substantive indication that Alaska would be in noncompliance with a  $PM_{2.5}$  NAAQS, or that requiring 500 ppm diesel fuel for motor vehicles in Alaska would significantly impact Alaska's prospects for attainment with a  $PM_{2.5}$  NAAQS.

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The Trustees commented that emissions monitoring results submitted in support of Alaska's petition do not provide a reliable basis for judging the potential adverse health effects of continuing the Alaska exemption in perpetuity. In Anchorage, for example, the Alaska Department of Environmental Conservation has two fixed monitoring sites for PM<sub>10</sub> and one fixed monitoring site for PM<sub>2.5</sub>. The Trustees noted that neither Alaska's petition nor our 1998 proposal indicate whether these sites are located in areas of high diesel use, and commented that the Alaska Department of Environmental Conservation must accurately monitor diesel emissions in representative locations if we intend to rely on such data in making its decision. In response to this comment, the Alaska Department of Environmental Conservation submitted a letter to us that includes technical detail regarding the monitoring sites.<sup>p</sup>

The Trustees commented that, while we, and the state of Alaska, may be correct in our assertion that sulfur content in motor vehicle diesel fuel will not significantly affect ambient PM<sub>10</sub> problems in Alaska, we failed to consider that Congress enacted the 500 ppm requirement for additional reasons, especially because of sulfur effects on human health. Congress passed Section 211(i) of the Clean Air Act because it was concerned about particulates which cause cancer, genetic mutation and other health related ailments. There is a discussion of the legal requirements for today's proposal in the Appendix.

The Trustees commented that Alaska provides a brief and wholly inadequate analysis of problems caused by high-sulfur content diesel fuel and then summarily concludes that Alaskan residents will not experience any health problems should we chose to grant this exemption. The Trustees assert that a complete analysis of health effects caused by exposure to diesel exhaust must be included in our final decision to grant or deny Alaska's petition. Further, we must recognize and discuss the fact that sulfur causes health problems in two primary ways from Alaskan residents. First, inhalation of sulfur or sulfur dioxide (SO<sub>2</sub>) causes health problems. Second, high sulfur content diesel fuels increase diesel exhaust which in turn causes an increase in emission of all major criteria air pollutants in exhaust, including carbon monoxide, hydrocarbons, and nitrogen oxides.

We are concerned about the emissions and health impact of our proposal as discussed at length in Chapter III. This discussion is prefaced by the presumption that implementing the proposed fuel requirements in Alaska, along with the proposed diesel motor vehicle engine and diesel motor vehicle emission standards, would be expected to eventually reduce emissions from diesel motor vehicles in Alaska from current levels (assuming diesel vehicle miles traveled in Alaska do not significantly increase). If the proposed fuel requirements are not implemented in Alaska, those emission reduction benefits would not be achieved, and some increased emissions might result from the use of high-sulfur fuel in upcoming engine and vehicle technologies.

Emissions of nitrogen oxides and sulfur dioxide do not seem to be an issue because no area

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<sup>p</sup> Letter of August 11, 1998 from the Alaska Department of Environmental Conservation. Copies of that letter are in the EPA Public Docket A-96-26 located in Washington D.C. and in Anchorage, Alaska.

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of Alaska is classified to be in nonattainment with the ozone or sulfur dioxide National Ambient Air Quality Standards (NAAQS). Two urban areas are in nonattainment with the CO NAAQS, but diesel motor vehicles are not likely a significant source of CO because of their low fuel consumption related to other sources in Alaska and their inherently low levels of CO emissions due to generally lean operation. Also, the sulfur content of the diesel fuel is not likely to significantly affect the CO emission levels, except possibly for technologies employing oxidation catalysts. Requiring the proposed sulfur limit for highway diesel fuel would probably only minimally mitigate the PM<sub>10</sub> problem in Alaska. Of the two urban areas in non-attainment with the PM<sub>10</sub> NAAQS, available apportionment data described our 1998 proposal indicate that diesel motor vehicles contribute only a very small portion (about one percent) to the ambient levels of PM<sub>10</sub> in those areas.

The Trustees commented that granting a fuel exemption for Alaska's mobile sources prevents the development of 500 ppm diesel supply sources in Alaska that can be economically tapped by stationary sources and off-highway engines. The Trustees indicated, that according to the Alaska Department of Environmental Conservation, almost all villages in Alaska depend on diesel generators to produce power for utility purposes. Most of these diesel generators are located in close proximity to residences and community centers, such as schools, where the exposure to diesel fumes is most problematic. These communities would benefit by the availability of 500 ppm diesel fuel.

We agree that there could be secondary air quality benefits to requiring 500 ppm diesel fuel for motor vehicles, but we are not sure that producers and distributors would provide an oversupply of 500 ppm diesel fuel for non-highway usage. The higher cost of producing 500 ppm fuel might discourage an oversupply. The extent of any excess 500 ppm fuel likely depends on the refiners' decisions whether to produce 500 ppm fuel for the highway market, as well as for the non-highway market. If one or two of the three major producers in Alaska decides to not produce excess 500 ppm diesel fuel, a significant amount of diesel fuel in Alaska would still have a high sulfur content. Also, regardless of the sulfur content, producers and distributors would have to segregate and dye the fuel not destined for motor vehicle use, or pay the Federal fuel tax in accordance with the Internal Revenue Service requirements. As previously noted, the state of Alaska indicates that a large portion of the estimated high cost associated with distribution of 500 ppm diesel fuel is due to the EPA and Internal Revenue Service dye requirements for the non-highway fuel. However, if Alaska were to be exempt from those dye requirements, much of the high costs of segregating the fuels could be avoided and excess 500 ppm fuel for the non-highway market would be more economical.

We do not have the information with which to estimate non-highway emission benefits. These benefits would depend on the proportion of the non-highway diesel fuel that would meet the motor vehicle 500 ppm diesel fuel requirement and the change in exhaust emissions by the various non-highway diesel combustion sources by using motor vehicle 500 ppm diesel fuel. Such diesel sources include, but are not limited to, utility diesel electrical power generators, small diesel electrical power generators (e.g., for construction and remote sites, backup generators for businesses, hospitals and homes, etc.), construction and farm vehicles (e.g., road graders, bull-

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dozers, farm tractors, etc.), construction and farm equipment (e.g., air compressors, harvesters, etc.), and heaters (e.g., industrial boilers, home furnaces, kerosene heaters, etc.).

Cross-border traffic is expected to raise an air quality issue for the lower-48 states and Canada. We are concerned about the impact on emissions in Canada and the lower-48 states of diesel vehicles and trucks from Alaska being driven to locations in Canada and the lower-48 states. We are also concerned about the impact on emissions in the lower-48 states, and of damage to the engines and emission control systems, of diesel vehicles and trucks from the lower-48 states driven to Alaska and refueled with high-sulfur fuel before returning to the lower-48 states. The extreme sulfur sensitivity of the engine and aftertreatment technology necessary to meet the proposed standards (see chapter 3) is one of the key obstacles in allowing Alaska to continue to sell high-sulfur fuel to highway applications.

### **c. Engine and emission control system factors**

The impacts of using high-sulfur (>500 ppm) diesel fuel on current engine and emission control system technologies, and those anticipated that will be used to meet the 2004 emission standards, are discussed in our 1998 proposal to grant Alaska a permanent exemption from the diesel sulfur standard (500 ppm), and are not repeated here. The impacts of using diesel fuel with higher than proposed 15 ppm sulfur on upcoming engine and emission control systems designed to meet the proposed 2007 emission standards are discussed in chapters III and IX of this document.

In response to our 1998 proposal to grant Alaska a permanent exemption from the diesel fuel sulfur standard, but prior to our announced action to propose more stringent emission standards for heavy-duty diesel engines and sulfur standard for highway diesel fuel of today's proposal, the Engine Manufacturers Association commented that, if we grant Alaska a permanent exemption for highway diesel fuel, the engine manufacturers should be exempted from the recall liability requirements and warranty liability requirements of Section 207 of the Clean Air Act for any engine affected by a fuel exemption in Alaska. The engine manufacturers' ability to meet current and future emission standards, and the proper operation and durability of highway engines and after treatment technology, is dependent on the availability of 500 ppm (or the proposed low-sulfur diesel fuel, depending on the applicable emission standards) diesel fuel.

In response to our preamble language in the August 1998 rule to extend Alaska's sulfur exemption for nine months, the Engine Manufacturers Association commented that this is not a local issue, confined solely within Alaska's borders. The 2004 engine technologies that will require 500 ppm diesel fuel will be used on all heavy-duty diesel engines, including those used in line-haul operations. Vehicles from the lower-48 states and Canada with technologies requiring 500 ppm diesel fuel surely will deliver goods in Alaska. Any exposure to Alaska high-sulfur diesel fuel may permanently reduce the effectiveness of the emission control technologies employed on those engines and substantially reduce their overall durability and performance. Not only will the owners of those vehicles suffer damage (for which the engine manufacturer should not be responsible), but as a result, the lower-48 states and Canada will also suffer adverse and excessive emission

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contributions.

As discussed in Chapter III, we expect that these concerns of the Engine Manufacturers Association would be even greater for the upcoming engine technologies designed to meet the proposed 2007 emission standards for diesel motor vehicles and diesel motor vehicle engines, if they would be operated using diesel fuel with sulfur levels higher than the proposed 15 ppm. We are proposing to deny Alaska's petition for permanent sulfur exemption for the areas served by the Federal Aid Highway System. However, we are proposing to allow Alaska's exemptions to continue until the proposed more stringent sulfur standard becomes effective in 2006. Thus, our proposal would fully address the concerns of the Engine Manufacturers Association in the long term, but only partially for the transition period. Consequently, the following comments pertain to the period when Alaska would still be covered by a diesel fuel sulfur exemption, and 500 ppm diesel fuel may not be available as in the rest of the nation.

During this period, engine manufacturers have expressed concern that emission control equipment will likely be damaged, and new engine technologies using cooled-EGR will likely have increased wear, if they are operated using high-sulfur (>500 ppm) fuel in Alaska. We are encouraging, but not requiring, Alaska to make 500 ppm diesel fuel available to the new technology vehicles and trucks that need it during this period. We have learned that Tesoro is currently producing and supplying 500 ppm diesel fuel in Alaska. Therefore, for example, for those areas supplied by Tesoro, Alaska would need only to segregate and label enough of Tesoro's product for the new technology vehicles and trucks. In areas not served by Tesoro (or other Alaska refiners producing 500 ppm fuel), Alaska would need to transport some of the Tesoro fuel, or import some 500 ppm fuel from the lower-48 states as well. As in previous actions to grant Alaska sulfur exemptions, the current proposal would not base any recall on emissions exceedances caused by the use of high-sulfur (>500 ppm) fuel in Alaska during this period, and that manufacturers may have a reasonable basis for denying emission related warranties where damage or failures are caused by the use of high-sulfur (>500 ppm) fuel in Alaska. These issues are addressed in the previous rules to grant Alaska extensions to its temporary exemption for Federal Aid Highway areas.

Subsequent to the 1995 petition for a permanent exemption from the diesel fuel sulfur requirements, the Engine Manufacturers Association requested enforcement discretion regarding the removal of catalytic converters because of an indicated plugging problem caused by the high-sulfur diesel fuel in Alaska. However, information subsequently collected by us from several heavy-duty engine manufacturers demonstrates that catalyst plugging is mainly a cold weather problem and not a high-sulfur fuel issue. We are also aware that the majority of the plugged catalysts have been eliminated. In a September 19, 1997 letter to us, the Engine Manufacturers Association indicated that the immediate problems that led to the Engine Manufacturers Association's earlier request have been resolved, although the manufacturers indicate they continue to have concerns.

In response to the 1998 proposal to grant Alaska a permanent exemption, the Engine Manufacturers Association commented that, under an exemption from the sulfur content (500 ppm) for highway diesel fuel, manufacturers should be allowed to sell engines without catalysts or

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exhaust gas recirculation (EGR) systems, and to continue to sell older technology heavy-duty engines (i.e., without catalysts or EGR systems). Also, users of vehicles in which 1994 and later model year heavy-duty engines are placed should be exempted from tampering liability and be allowed to remove plugged catalysts. The Engine Manufacturers Association is concerned that using a high-sulfur content fuel over a long period of time may have a tendency to cause plugging of catalysts, which could lead to more serious engine malfunction and warranty claims. The Engine Manufacturers Association asserts that vehicle owners are already experiencing engine failures directly resulting from catalyst plugging. Further, the plugging is substantially aggravated when the vehicle is operated in extremely cold temperatures. We are interested in any additional information about in-use catalyst plugging and engine failures being caused by the use of high-sulfur (>500 ppm) diesel fuel, along with any data and descriptions of remedies.

The Engine Manufacturers Association also commented that, as a result of the 2004 emission standards, heavy-duty engine manufacturers will likely introduce EGR systems on their engines and may also, if fully developed, use NO<sub>x</sub> catalysts. In the EGR system, exhaust gas is recirculated back into the cylinder to reduce the amount of fresh charge air or oxygen available for combustion during certain operating conditions. When the engine is operated on high-sulfur fuel, sulfur in the exhaust gas stream is condensed by the EGR cooler and forms sulfuric acid deposits in the cooler. These sulfuric acid deposits will significantly contribute to the deterioration of the EGR system and cause decreased engine durability. Similar to oxidation catalysts, the NO<sub>x</sub> catalyst will be adversely affected if operated on high-sulfur diesel fuel. Of special concern regarding NO<sub>x</sub> catalysts is the fact that a single exposure to high-sulfur diesel fuel will likely poison the catalyst, causing it to lose its emissions reduction effectiveness permanently.

We also are concerned about these problems, but do not believe it is necessary to propose an exemption that allows the removal of catalysts in the field, or that permits manufacturers to introduce into commerce catalyzed-engines without catalysts. As previously discussed, we have indicated we do not intend to use vehicles from Alaska to show noncompliance by those engines for the purpose of recalling an engine class, and that the engine manufacturers have a reasonable basis for denying warranty coverage where the problems are due to the use of high-sulfur (>500 ppm) diesel fuel. The Alaska Trucking Association, which is the other stakeholder most directly impacted by the use of high-sulfur fuel, commented that it is most concerned about the near-term cost of 500 ppm fuel. That association indicated that the Alaska market will provide 500 ppm fuel for those engines as needed, without a mandate from the state or federal government. It noted that Alaska's truck fleet is somewhat older than that of the lower-48 states, and the new technology engines (those designed to meet the 2004 emission standards) will likely not be "common" in Alaska's fleet until sometime after 2010. The Alaska Trucking Association recommended a five-year extension to the sulfur exemption and a subsequent "reasonable" transition period, after which 500 ppm diesel fuel would be required.

- d. Are there alternatives to granting or denying Alaska's Petition for permanent exemption?**

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The Alaska Center for the Environment suggested in an April 23, 1996 letter, and the Trustees supported, three fall back positions. While they strongly advocated that we deny Alaska's request for a permanent sulfur exemption, they preferred one or a combination of the three fallback positions rather than a permanent exemption. They believed that the fall back alternatives would achieve some air quality benefits at reduced cost compared to full compliance with the fuel sulfur requirement. The first alternative would permanently exempt most of Alaska, but not Southeast Alaska. Southeast Alaska does not need the low cloud point diesel fuel in the winter, and it was assumed at that time (but no longer true) that Southeast Alaska imports most of its diesel fuel from the lower-48 states. Thus, 500 ppm diesel fuel from the lower-48 states could easily be substituted for diesel fuel currently being imported before shipping it to Southeast Alaska. The second alternative would permanently exempt Alaska in the summer months, when conventional diesel fuel is generally used, but not in the winter months when Jet-A kerosene is generally used. Thus, the problem of supplying 500 ppm fuel in the winter, when low-cloud point fuel is needed, could be avoided. The third alternative would require lower sulfur (but generally greater than 500 ppm) Jet-A kerosene year round. Thus, some air quality benefits might be achieved by using fuel that is already available in Alaska.

In general, we believe some assumptions upon which each of these alternatives were based are erroneous or no longer applicable because of recent information or proposed changes to the emission standards and fuel requirements of today's notice. We now believe these alternatives would not likely achieve significant cost reductions, or significant air quality benefits, or protect the upcoming engine technologies from reduced performance and damage. No other stakeholder indicated they were in favor of these alternatives, and refiners and the Alaska Department of Environmental Conservation submitted comments indicating they are opposed to these alternatives because of cost or lack of air quality benefits. Since no other stakeholder supported these alternatives, and since the situation has changed with the new standards being proposed, and since we are not proposing to grant Alaska's request for a permanent exemption for the areas covered by the Federal Aid Highway System, we believe that these alternatives need not be addressed further.

The Trustees also noted that when we granted Alaska's rural areas a permanent exemption from the 500 ppm diesel fuel requirements, we reserved the right to withdraw the exemption in the future if circumstances change such that the exemption is no longer appropriate. The Trustees commented that in light of Canada's recent promulgation of 500 ppm diesel fuel requirements, Petro Star's commitment to produce 500 ppm diesel fuel, recent health studies that concretely link SO<sub>2</sub> and diesel exhaust with respiratory problems and risks of cancer, and worldwide acceptance of the 500 ppm sulfur content limit, we should not only deny Alaska's current petition for the areas served by the Federal Aid Highway System, we should also reconsider Alaska's exemption for the rural areas.

### **e. What Are We Proposing for Alaska?**

The preamble to the NPRM fully discusses our proposal for Alaska. In summary, as mentioned above, Alaska has submitted a petition for a permanent exemption from the 500 ppm

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standard for areas not served by the Federal Aid Highway System. Our goal is to take action on this petition in a way that minimizes costs through Alaska's transition to the low sulfur program. The cost of compliance could be reduced if Alaska refiners were given the flexibility to meet the low sulfur standard in one step, rather than two steps (i.e., once for the current 500 ppm sulfur standard in 2004 when the temporary exemption expires, and again for the proposed 15 ppm standard in 2006). Therefore, we propose to extend the temporary exemption for the areas of Alaska served by the Federal Aid Highway System from January 1, 2004 (the current expiration date) to the proposed effective date for the proposed 15 ppm sulfur standard (i.e., April 1, 2006 at the refinery level; May 1, 2006 at the terminal level; and June 1, 2006 at all downstream locations).

As discussed fully in the NPRM, we are proposing to allow Alaska to develop a transition plan for implementing the proposed 15 ppm sulfur program. Because of the unique circumstances in Alaska, we are proposing an alternative option for implementing the low sulfur fuel program in Alaska. We are proposing to provide the State an opportunity to develop an alternative low sulfur transition plan for Alaska. This plan would need to ensure that sufficient supplies of low sulfur diesel fuel are available in Alaska to meet the demand of any new 2007 and later model year diesel vehicles. Given that Alaska's demand for highway diesel fuel is very low and only a small number of new diesel vehicles are introduced each year, it may be possible to develop an alternative implementation plan for Alaska in the early years of the program that provides low sulfur diesel only in sufficient quantities to meet the demand from the small number of new diesel vehicles. This would give Alaska refiners more flexibility during the transition period because they would not have to desulfurize the entire highway diesel volume. Our goal in offering this additional flexibility would be to transition Alaska into the low sulfur fuel program in a manner that minimizes costs, while still ensuring that the new vehicles receive the low sulfur fuel they need. We expect that the transition plan would begin to be implemented at the same time as the national program, but the State would have an opportunity to determine what volumes of low sulfur fuel would need to be supplied, and in what timeframes, in different areas of the State.

At a minimum, such a transition plan would need to: 1) ensure an adequate supply (either through production or imports), 2) ensure sufficient retail availability of low sulfur fuel for new vehicles in Alaska, 3) address the growth of supply and availability over time as more new vehicles enter the fleet, 4) include measures to prevent misfueling, and 5) ensure enforceability. We would anticipate that, to develop a workable transition plan, the State would likely work in close cooperation with refiners and other key stakeholders, including retailers, distributors, truckers, engine manufacturers, environmental groups, and other interested groups. In the NPRM, we discuss this option in more detail, including the timeframe for the State to submit the plan and for EPA to approve it, and seek comment on the overall approach.

If the State anticipates that the primary demand for low sulfur fuel will be along the highway system (e.g., to address truck traffic from the lower 48 states) in the early years of the program, then the initial stages of the transition plan could be focused in these areas. We believe it would be appropriate for the State to consider an extended transition schedule for implementing the low sulfur program in rural Alaska, as part of the state's overall plan, based on when they anticipate the

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introduction of a significant number of 2007 and later model year vehicles in the remote areas.

During this transition period, it is possible that both 15 ppm (for proposed 2007 and later model year vehicles) and higher sulfur (for older vehicles) highway fuels might be available in Alaska. To avoid the two-step sulfur program described above, we are taking comment in the NPRM on whether we should consider additional extensions to the temporary exemption of the 500 ppm standard beyond 2006 (e.g., for that portion of the highway pool that is available for the older technology vehicles during Alaska's transition period). We would expect that any additional temporary extensions, if appropriate, would be made in the context of the separate rulemaking taking action on Alaska's transition plan (as described in the NPRM).

As in previous actions to grant Alaska sulfur exemptions, we would not base any vehicle or engine recall on emissions exceedences caused by the use of high-sulfur (>500 ppm) fuel in Alaska during the period of the temporary sulfur exemption. In addition, manufacturers may have a reasonable basis for denying emission related warranties where damage or failures are caused by the use of high-sulfur (>500 ppm) fuel in Alaska.

Finally, the costs of complying could be reduced significantly if Alaska were not required to dye the non-highway fuel. Dye contamination of other fuels, particularly jet fuel, is a serious potential problem. This is a serious issue in Alaska since the same transport and storage tanks used for jet fuel are generally also used for other diesel products, including off-highway diesel products which are required to be dyed under the current national program. This issue is discussed further above. Therefore, we also propose to grant Alaska's request for a permanent exemption from the dye requirement of 40 CFR 80.29 and 40 CFR 80.446 for the entire State.

### **C. American Samoa, Guam, and Commonwealth of Northern Mariana Islands (CNMI)**

#### **1. Why Are We Considering an Exemption for American Samoa, Guam, and CNMI?**

Prior to the effective date of the current highway diesel sulfur standard of 500 ppm, the territories of American Samoa, Guam and CNMI petitioned EPA under section 325 of the Clean Air Act for an exemption from the sulfur requirement under section 211(i) and associated regulations at 40 CFR 80.29. The petitions were based on geographical, meteorological, air quality, and economic factors unique to those territories. We subsequently granted the petitions.<sup>9</sup> We are now revisiting the issue of diesel sulfur exemptions for these territories, because this

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<sup>9</sup> See 57 FR 32010, July 20, 1992 for American Samoa; 57 FR 32010, July 20, 1992 for Guam; and 59 FR 26129, May 19, 1994 for CNMI

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proposed rule impacts these territories, either directly by requiring stringent sulfur requirements or indirectly by the future impact of using high-sulfur diesel fuel in upcoming technologies for diesel vehicles and engines.

### **2. What are the Relevant Factors?**

#### **a. American Samoa**

American Samoa is a group of five volcanic islands and two coral atolls located in Polynesia, approximately 2,300 miles southwest of Hawaii and 1,600 miles northeast of New Zealand. It has a total land area of approximately 76 square miles, about two-thirds of which is mountainous with steep slopes that make it virtually inaccessible. The population was about 52,400 in 1993. Over 96 percent of the population live on the largest island, Tutuila, which is approximately 53 square miles. The air quality is generally pristine, due to the combined prevailing winds, climate, remoteness, and low population. American Samoa is classified EPA "Priority III" for all pollutants. Continuing the existing diesel sulfur exemption or expanding it to the proposed diesel sulfur standard would not cause an increase in emissions, but would forego a small emissions benefit if American Samoa used low-sulfur diesel fuel for its highway vehicles. There are no cross border issues.

Total diesel fuel imports and consumption is about 38,600,000 gallons per year. The 60 diesel fueled vehicles licensed for highway use (in 1991) use approximately 0.12 percent, 46,000 gallons per year. The fishing fleet uses approximately 70 percent, or 27,000,000 gallons per year. Power generation uses approximately 18 percent, or 7,000,000 gallons per year. Tuna Canneries use approximately 10 percent, or 4,000,000 gallons per year in boilers for steam generation. Other uses (stand-by generators and small engines) consume a small quantity. American Samoa has two providers of diesel fuel. Mobil Australia provides about 70 percent and Tesoro Hawaii provides about 30 percent. All petroleum is shipped to American Samoa by medium range tankers.

The economy of American Samoa is ill suited to handling the additional expense of low-sulfur diesel fuel and upgrades to its storage and distribution system. It lacks internal petroleum supplies and refining capabilities. Diesel fuel must be imported over long distances and in small cargo parcels, making the cost about 10 cents per gallon higher than in the mainland United States (exclusive of the effects of taxes). It was estimated in 1991 that shipping a segregated quantity of low-sulfur diesel fuel would cost an additional eight to ten cents per gallon. The proposed 15 ppm sulfur standard would add additional cost to the low-sulfur fuel. Compliance with low-sulfur requirements for highway fuel would require construction of separate storage and handling facilities. American Samoa, which owns the petroleum storage facilities, would have to construct a new storage tank and fuel lines at an estimated 1991 cost of \$550,000.

If American Samoa alternatively decided to use low-sulfur fuel for all purposes to avoid segregation, compliance with low-sulfur requirements would, in effect, bar importation of diesel

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fuel by the only suppliers in the area outside of Tesoro. The effect of a monopoly from prior years' experience was to see an increase in the price of fuels by four to five cents per gallon. While Australia, Philippines and certain other Asian countries have or will soon require low-sulfur diesel fuel, they require a 500 ppm sulfur limit, not the proposed 15 ppm sulfur limit.

The fishing fleet buys its fuel in Samoa, but has the alternative to fuel in Fiji or from tankers at sea. If the cost of fuel in American Samoa increased, the fishing fleet would probably significantly reduce its fueling in American Samoa resulting in a "disastrous decline in the local economy and lost revenues to the government." In 1997, the price of fuel in Samoa rose to over ten cents a gallon higher than the price in Fiji, and Samoa lost about one-half of its sales to the fleet. Currently, the price of diesel fuel is about six to seven cents per gallon higher than in Fiji. Any additional fuel switching by the fleet due to a low-sulfur requirement would damage the economy without providing any significant improvement in air quality.

Any increased fuel costs of producing steam by the canneries would be another competitive disadvantage for them to remain in American Samoa. Cheap labor and fuel in the Philippines and Thailand have attracted canneries to those countries that compete directly with the canneries in American Samoa. Over the past eight years, Samoa has granted larger and larger tax exemptions to retain the canneries in Samoa.

### **b. Guam**

Guam is the southern-most island in the Marianas Archipelago, located in Polynesia, approximately 3,700 miles west-southwest of Honolulu and 1,550 miles south of Tokyo. The island is about 28 miles long and between 4 and 8.5 miles wide, with a total land area of about 209 square miles. In the early 1990's, the population was 133,152.

Guam is in attainment with the primary NAAQS with the exception of sulfur dioxide in two areas. One area is a radius of 3.5 km around the Piti Power Plant. The other area is a radius of 3.5 km around Tanguisson. Both areas are designated nonattainment for sulfur dioxide as a result of monitored and modeled exceedences in the 1970's prior to implementing changes to power generation facilities. Guam believes the area around Piti is now in attainment. The Tanguisson area includes only two small villages and a U.S. Air Force Annex, none of which attract significant vehicle traffic.

In the early 1990's, there were 735 registered diesel-fueled motor vehicles, approximately one percent of the total vehicle population on Guam. On an annual basis, the diesel-fueled vehicles on Guam were estimated in 1993 to emit less than 0.1 percent of the maximum potential sulfur dioxide emissions from other sources, given the 6000 ppm (maximum) level of sulfur in diesel fuel at that time. Therefore, Guam's continued use of 6000 ppm (maximum) diesel fuel is not expected to have any significant impact on the ambient air quality status of Guam, including the status of the two areas designated as nonattainment for sulfur dioxide. Continuing the existing diesel sulfur exemption or expanding it to the proposed diesel sulfur standard would not cause an increase in

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emissions, but would forego a small emissions benefit if Guam used low-sulfur diesel fuel for its highway vehicles. There are no cross border issues.

The economy of Guam is ill suited to handling the additional expense of low-sulfur diesel fuel and upgrades to its storage and distribution system. It lacks internal petroleum supplies and refining capabilities and relies on long distance imports. Essentially all of the island's petroleum products were refined in Singapore in the early 1990's, but there were four sources: Singapore, Indonesia, Australia and the Philippines. While Australia, Philippines and certain other Asian countries have or will soon require low-sulfur diesel fuel, they require a 500 ppm sulfur limit, not the proposed 15 ppm sulfur limit. In 1992, the No. 2 diesel fuel imports had sulfur content ranging between 3,900 to 5,000 ppm and cetane ranging from 48 to 55.

If stationary sources continue to use high-sulfur diesel fuel, importing low-sulfur diesel fuel would require the costly construction of separate storage facilities. Even if Guam were to import low-sulfur diesel fuel for all its diesel needs from the United States mainland, new storage facilities would be necessary to store larger quantities of fuel, since shipments would be less frequent and possibly less reliable, due to the increased round-trip distances. It was estimated that Guam's fuel suppliers could conceivably be subjected to \$14,500,000 and \$22,300,000 annually to comply with the low-sulfur requirement, and the cost per gallon of diesel fuel could increase by 30-46 cents per gallon. This high cost of compliance is due to additional transportation costs associated with importing fuel from the mainland, construction of new storage facilities needed to segregate low-sulfur and high sulfur fuel, and to store larger quantities of fuel, and the higher purchase price of the low-sulfur [500 ppm] fuel. The proposed 15 ppm sulfur standard would add additional cost to the low-sulfur fuel.

### **c. Commonwealth of Northern Mariana Islands (CNMI)**

CNMI consists of 14 islands of volcanic origin that extend in a general north-south direction for 388 nautical miles, with a land area of 176.5 square miles. It lies in the western part of the Pacific Ocean about 1150 miles south of Tokyo, 108 miles north of Guam, and 5280 miles from the United States mainland. Development and the population of Saipan, the most populated island, are predominately on the western side. The population centers exist on Saipan (38,896), Tinian (2,118), and Rota (2,295). The northern islands of the commonwealth have a population of about 36 people.

The development being concentrated on the west side, meteorology (westward trade winds) and lack of heavy industry have a beneficial impact on CNMI's air quality. As of 1994, CNMI was in attainment with all primary NAAQS. The islands have approximately 200 miles of roads, of which approximately 50 percent are paved, and about 500 diesel vehicles, of which about 60 are owned by the CNMI government. Continuing the existing diesel sulfur exemption or expanding it to the proposed sulfur standard would not cause an increase in emissions, but would forego a small emissions benefit if CNMI used low-sulfur diesel fuel for its highway vehicles. There are no cross border issues.

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Saipan has two bulk storage facilities for diesel fuel, and Rota and Tinian each have one. The main use of diesel fuel is for electrical power generation. CNMI relies exclusively on diesel fuel to provide electrical power. An insignificant amount of the diesel fuel is used for motor vehicles. CNMI lacks internal petroleum supplies and refining capabilities and relies on long distance imports. At the time of the request for exemption, CNMI relied on the importation of fuels exclusively from refineries in Singapore. While Australia, Philippines and certain other Asian countries have or will soon require low-sulfur diesel fuel, they require a 500 ppm sulfur limit, not the proposed 15 ppm sulfur limit.

The economy of CNMI is ill suited to handling the additional expense of low-sulfur diesel fuel and upgrades to its storage and distribution system. The cost of diesel fuel on Saipan is approximately 20 cents per gallon higher than that on the United States mainland [1994]. The cost of diesel fuel on Rota and Tinian are higher than on Saipan. In order to meet the sulfur requirement, it was estimated that low sulfur (500 ppm) diesel fuel would have to be imported from the United States at a cost increase of 10 to 20 cents per gallon. The proposed 15 ppm sulfur standard would add additional cost. A fuel supplier on CNMI estimated that in order to comply with the low-sulfur diesel fuel standard, four new storage tanks would need to be built for the three [populated] islands at a cost of \$2,000,000. Because of the added costs of shipping materials to CNMI for construction projects, construction costs on CNMI are generally 20 to 40 percent higher than those of the United States mainland.

### **3. What Are the Options for the Territories?**

We could include or exclude the territories in the geographical areas for which the proposed diesel fuel sulfur standard would apply. As in the early 1990's with the 500 ppm sulfur standard, we believe that compliance with the proposed 15 ppm sulfur standard would result in small environmental benefit, but major economic burden. We are also concerned about the impact to vehicle owners and operators of running the new and upcoming engine and emission control technologies using high-sulfur fuel. We believe that for the sulfur exemption to be viable to vehicle owners and operators, they would need access to either low-sulfur fuel or pre-2007 technology vehicles that could be run on high-sulfur fuel without significant engine damage or performance degradation. Consequently, the territories would either need to be exempted from both the proposed fuel and vehicle emission standards, or neither. Exempting them from only the fuel requirement would virtually preclude the sale of new vehicles in the territories due to their sulfur sensitivity.

