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Part III

Environmental Protection Agency

40 CFR Part 82

Protection of Stratospheric Ozone; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[OAR-FRL-3409-7]

Protection of Stratospheric Ozone

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: This final rule limits the production and consumption of certain chlorofluorocarbons (CFCs) and brominated compounds (halons) to reduce the risks of stratospheric ozone depletion. It requires a near-term freeze at 1986 levels of production and consumption (defined as production plus imports minus exports) of CFC–11, –12, –113, –114, and –115 based on their relative ozone depletion weights, followed by a phased reduction to 80 percent and 50 percent of 1986 levels beginning in mid-1993 and mid-1998, respectively. It also limits production and consumption of Halon 1211, 1301, and 2402 to 1986 levels beginning as early as 1992. Under specified circumstances, limited increases in production (but not consumption) above these levels would be permitted.

Promulgation of this rule is authorized by section 157(b) of the Clean Air Act and constitutes the United States' implementation of the "Montreal Protocol on Substances that Deplete the Ozone Layer" (Montreal Protocol), which the United States ratified on April 21, 1988. The final rule's control measures will take effect when the Protocol enters into force, which could occur as early as January 1, 1989.

The rule implements the Protocol's requirements to control production and consumption of the CFCs and halons specified above by allocating production and consumption allowances to firms that produced and imported these chemicals in 1986, based on their 1986 levels of these activities. By directly restricting the supply of the regulated chemicals, the United States will meet its obligations under the Montreal Protocol by means of a straightforward, economically efficient, and easily administered regulatory program.

In a separate notice appearing elsewhere in today's **Federal Register**, EPA is seeking public comment on an advance notice of proposed rulemaking (ANPRM) which discusses supplementing this final rule with a regulatory fee and/or engineering controls or bans on specific uses of CFCs and halons or replacing allocated quotas with an auction system.

Ideally, market based systems are preferable. An auction, in particular, would insure compliance with the Protocol, and would shift some windfalls from the producers to the United States Treasury. EPA is not adopting an auction of production and consumption allowances at this time due to remaining legal and economic concerns. After reviewing the public comment, the Agency will decide whether to propose a rule supplementing the allocated quota system or shifting to an auction approach, and depending on its decision, would issue a notice of proposed rulemaking containing a detailed description of any proposed modification.

The ANPRM also discusses scientific information now available in summary form that could not be considered in this rulemaking but which suggests that the risks of ozone depletion may be greater than previously anticipated.

EFFECTIVE DATE: This final rule will take effect upon entry into force of the Montreal Protocol. The United States and other Parties to the Protocol will likely have 90 days prior notice of the date on which the Protocol will enter into force. When EPA learns of that date, it will publish a document in the **Federal Register** announcing the effective date of this rule and the dates of each of the rule's control periods. The reporting requirements in § 82.13(f)(1) of the rule takes effect September 12, 1988.

ADDRESS: Comments and other information relevant to this rulemaking (Docket No. A–87–20) may be viewed at the Central Docket Section, South Conference Room 4, Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460. The docket may be inspected between 8:00 a.m. and 3:30 p.m. on weekdays. As provided in 40 CFR Part 2, a reasonable fee may be charged for photocopying.

FOR FURTHER INFORMATION CONTACT: Stephen Seidel, Senior Analyst, Office of Program Development, Office of Air and Radiation (ANR–445), EPA, 401 M Street, SW., Washington, DC 20460. Telephone (202) 382–2787.

SUPPLEMENTARY INFORMATION:

I. Background

Stratospheric ozone shields the earth's surface from dangerous ultraviolet (UV–B) radiation. In response to growing scientific evidence, a national and international consensus has developed that unabated use of CFCs and halons will result in depletion of stratospheric ozone. To the extent depletion occurs, penetration of UV–B radiation will increase, resulting in potential health and environmental harm including increased incidence of certain skin cancers and cataracts, suppression of the immune response system, damage to crops and aquatic organisms, increased formation of ground-level ozone, and increased weathering of outdoor plastics.

EPA evaluated the risks of ozone depletion and published its findings in "Assessing the Risks of Trace Gases That Can Modify the Stratosphere" (EPA, 1987), which the Agency's Science Advisory Board (SAB) reviewed and approved.

Based on the Agency's risk assessment work, the Administrator concluded that an international approach was necessary to effectively safeguard the ozone layer. As EPA pointed out in its December 14, 1987 proposal (52 FR 47489), theory and available scientific evidence make clear that the problem of stratospheric ozone depletion is global in nature. Over their long atmospheric lifetimes, CFCs and halons become widely dispersed, and the release of these chemicals in one country adversely affects the stratosphere above, and therefore the health and welfare of, other countries. The United States currently contributes about 30 percent of worldwide CFC emissions, and its percentage contribution will probably decrease as developing countries increase their consumption of CFCs and halons, which are used primarily in refrigeration, foam-blowing, electronics production, and fire-fighting. As a result, EPA sought to further negotiation of a protocol requiring all nations to curb their use of these chemicals.

After a series of international workshops on the cause and effects of ozone depletion, negotiations for an international control protocol resumed in December 1986. Last September the United States and 23 other nations signed the Montreal Protocol and since then 13 more have signed. The United States, Mexico, Norway, Sweden, Canada, and New Zealand have ratified the Protocol, and several other nations (e.g., Japan, Western European nations) are close to ratifying the agreement, as well.

A. The Montreal Protocol

Briefly, the Montreal Protocol requires nations who join to restrict their production and consumption of CFC–11, –12, –113, –114, –115 and Halons 1211, 1301, and 2402 in bulk form (referred to as "controlled substances"). It does not place limits on each of the controlled substances, but instead groups the CFCs together (Group I) and the halons together (Group II) and places separate

limits on the total ozone depletion potential of each group of controlled substances that can be produced and consumed. As a result, within each group the mix of controlled substances a nation produces and consumes may change, so long as the total ozone depletion potential of the mix does not exceed the specified limits. The Protocol uses the phrase "calculated level" to refer to this weighting of controlled substances based on their relative ozone depletion potential.

The Protocol calls for a phased reduction in the production and consumption of Group I controlled substances and a freeze in the production and consumption of Group II controlled substances. Specifically, Group I substances are frozen at 1986 levels beginning on July 1, 1989, assuming the Protocol enters into force on January 1, 1989. (The Protocol will enter into force on that date if 11 nations or regional economic integration organizations have ratified the Protocol. Otherwise, the Protocol will take effect 90 days after these conditions have been met.) Group I substances are then reduced to 80 percent and 50 percent of 1986 levels by July 1, 1993, and July 1, 1998, respectively. Group II controlled substances are frozen at 1986 levels beginning on January 1, 1992, assuming the Protocol enters into force on January 1, 1989.

The Protocol also allows for limited increases in production beyond the reductions described above under prescribed circumstances. In addition, it also bans imports of controlled substances from nations which neither join nor comply with the Protocol one year after the Protocol enters into force. (The text of the Protocol is described in detail and printed in its entirety in the December 14, 1987 notice of proposed rulemaking (NPRM).)

B. December 14, 1987 Proposal

In the December 14, 1987 NPRM, the Agency proposed regulations that would ensure United States' compliance with the Montreal Protocol. EPA stated that based on its assessment of the available evidence, the Protocol's requirements are an appropriate response to the potential ozone depletion problem at this time. The Agency estimated that compliance with the Protocol by most developed and developing nations would reduce ozone depletion by the year 2075 to 1.3 percent, and stated that given the many variables and uncertainties involved in predicting ozone depletion far into the future, the Protocol would achieve a reasonable degree of risk reduction. Because of the need for an international solution to the ozone depletion problem, EPA added that it would be unwise to risk undermining the agreement by deviating from its requirements.

EPA proposed to implement fully the Protocol's control requirements and import ban. It proposed to adopt the Protocol's definition of "controlled substances" and its application of limits on CFCs as a group and halons as a group on a ozone depletion potential basis ("calculated level"). It also provided for increases in production of controlled substances over the otherwise applicable limits consistent with the Protocol's allowances for such increases. In addition, the Agency proposed that the regulations take effect when the Protocol enters into force.

The December 14 NPRM set forth a number of control strategies for domestically implementing the terms of the Protocol. EPA stated that its preferred control strategy was an "allocated quota" system. Under this approach, EPA would grant production and consumption "rights" or privileges equal to the quantity of production and consumption allowed under the Protocol. These rights would be apportioned to producers and importers of controlled substances based on their 1986 levels of production and imports, and would be frozen and reduced according to the schedule specified in the Protocol. In effect, this proposal would grandfather in past producers and importers at their 1986 relative market shares. EPA also proposed that rights be transferable, so that firms could buy and sell production and consumption rights and thus respond to changing market conditions.

According to economic theory, an allocated quota system should achieve EPA's regulatory goal at the lowest possible cost to society. By restricting the supply of CFCs and halons, this system should cause the price of these chemicals to be bid up over time by firms seeking to purchase them. The resulting price increases should, in turn, encourage firms to reduce their use of these chemicals and to increase recycling and recovery, and should also create a market incentive for the introduction of chemical substitutes. A declining supply of CFCs and halons would continue to be available, though at a higher price, to the highest value users of these chemicals.

While EPA proposed the allocated quota system, it also identified and sought comment on the potential implications of the "windfall profits" that would accrue primarily to the five domestic CFC producers as a result of the system driving up the price of these chemicals. The Agency also noted for public comment the potential need to augment this system with direct regulation of key user groups to ensure that low-cost reductions were undertaken as soon as they become cost-effective (termed the hybrid option in the December 14 NPRM).

EPA presented and sought comment on several other regulatory approaches. As an alternative to allocating rights to past producers and importers, the NPRM discussed the possibility of auctioning rights to the highest bidder. The price paid at auction for the rights would reflect the expected higher market price for the controlled substances and any such increase would be paid to the United States Treasury instead of the producers. However, EPA raised concerns about the large uncertainties bidders would likely face during the early stages of an auction and the potential impact of participation by large users or speculators.

A third option presented by EPA involved the use of a regulatory fee. Under this option, CFC and halon production would be assessed a fee set at a level sufficient to raise prices that would in turn reduce demand to the requisite level. Like auctions, this approach would result in price increases from controlled substances (i.e., the transfers) going to the United States Treasury. However, because of the uncertainties in determining the level of a fee necessary to achieve a desired reduction, the NPRM pointed out that use of a fee by itself would make it difficult to ensure United States' compliance with the Montreal Protocol.

In contrast to the above options which all rely on economic incentives, EPA also discussed the possibility of employing the Agency's traditional regulatory approach—industry-specific control requirements. Under this approach, EPA would target and require controls on specific uses of CFCs and halons. However, as with regulatory fees, use of this option by itself would not ensure that the United States would meet the Protocol's control requirements (e.g., growth in unregulated uses could offset reductions from required controls).

On January 7 and 8, 1988, EPA held a public hearing in Washington, DC, to receive oral testimony on the NPRM. Approximately 25 witnesses representing producer and user industries, the scientific community, and public interest groups presented testimony at the hearing. A transcript of the hearing is contained in the public docket.

The public comment period on the December proposal closed on February 8, 1988. EPA received almost 500 comments including submissions by the major CFC and halon producers, most of the trade associations and large companies in industries which use these chemicals, interested citizens, other federal agencies, and public interest groups. Because of the volume of these comments, EPA has prepared and placed in the docket a separate document, "Background Information Document: Stratospheric Ozone Protection Rulemaking," which describes and responds to each of the significant issues raised in the public comments. This document is incorporated by reference in this notice. In addition, throughout this preamble, key issues raised in the public comments are identified and EPA's response provided, along with any changes in the final rule which may have resulted.

C. December 14, 1987 Final Rule

In addition to its NPRM, EPA also published in the **Federal Register** on December 14, 1987 a final rule (40 CFR 82.20; 52 FR 47486) requiring firms to document and report to EPA the amount of controlled substances they had produced, imported and/or exported in 1986. EPA needed this data to provide the United Nations Environment Program (UNEP) with a preliminary estimate of the United States' 1986 consumption and production of controlled substances and to develop company-specific apportionments of production and consumption rights.

D. May 24, 1988 Supplementary Proposal

On May 24, 1988, EPA issued a supplemental proposal which set forth company-specific apportionments of production and consumption rights (53 FR 18800). It also addressed issues raised by responses to the December 14 proposed and final rules relating to the apportionment of rights and implementation of the proposed rule. These issues and EPA's final resolution of them in light of the May supplemental proposal are described in later sections of this preamble.

II. Statutory Authority and Applicable Legal Test

A. Statutory Authority

EPA is promulgating this final rule under section 157(b) of the Clean Air Act, 42 U.S.C. 7457(b). That section authorizes the Administrator to issue "regulations for the control of any substance, practice, process, or activity [or any combination thereof] which in his judgment may reasonably be anticipated to affect the stratosphere, especially ozone in the stratosphere, if such effect in the stratosphere may reasonably be anticipated to endanger public health or welfare. Such regulations shall take into account the feasibility and the costs of achieving such control."

As the Agency pointed out in its December 14 NPRM, two aspects of this regulatory authority are notable. First, the Administrator is not required to prove that a "substance, practice, process or activity" does in fact deplete stratospheric ozone before he may regulate it. Congress recognized the potentially serious health and environmental consequences of ozone depletion if it were occurring, and authorized EPA to act in the face of scientific uncertainty. Second, the Administrator is given broad latitude to choose what and how to regulate. He is not limited to controlling ozone-depleting substances themselves; he may also regulate "any practice, process, activity" that threatens the ozone layer. Nor is he limited to a particular control strategy. He may employ the regulatory options he finds appropriate to control threats to stratospheric ozone that in turn threaten public health and welfare.

B. Applicable Legal Test

Commenters on the Agency's proposal agreed that section 157(b) authorizes EPA to promulgate regulations to protect stratospheric ozone as needed to protect public health and welfare. However, several environmental groups disagreed with EPA's judgment that implementation of the Montreal Protocol will satisfy that section. They argued that EPA is obligated to require further, faster reductions in CFCs and halons based on evidence that the Agency expressly found insufficient as a basis for taking regulatory action at this time. They also asserted that EPA is obligated to take unilateral action as needed to protect stratospheric ozone, and cannot make its regulations contingent on an international agreement taking effect.

At the heart of these commenters' argument is an interpretation of section 157(b) that obligates EPA to protect against all "potential" dangers involving stratospheric ozone. They find this obligation in the section's provision for controls of virtually anything "which in [the Administrator's] judgment *may reasonably be anticipated to affect* the stratosphere, * * * if such effect * * * *may reasonably be anticipated to endanger* public health or welfare" (emphasis added). The "reasonably anticipated" language, they contend, requires EPA to act when there is potential danger, not just when danger is certain. Moreover, when a global resource like stratospheric ozone is at stake, they assert that the Act requires EPA to regulate to protect the resource even if there is more uncertainty than is considered tolerable regarding more limited dangers.

EPA agrees that section 157(b) takes a precautionary approach to protecting stratospheric ozone. Both its language and legislative history make clear that EPA is authorized to regulate before harm occurs and, optimally, to prevent harm. However, EPA does not agree that section 157(b) requires the Agency to prevent all potential harm. "Reasonably anticipated" harm connotes a likely harm or a harm whose likelihood and magnitude together are large enough to make preventive measures reasonable. Put another way, section 157(b) authorizes EPA to assess the risks of stratospheric ozone depletion and to regulate as the assessment warrants.

The legislative history of section 157(b) confirms that Congress intended the Agency to assess risks and regulate on that basis. The "reasonably anticipated" language was crafted against the backdrop of recent DC Circuit opinions in *Ethyl Corporation v. EPA* on the Agency's authority under the 1970 Clean Air Act to reduce the lead in gasoline. A three judge panel had held that EPA must prove that lead in gasoline by itself caused significant harm, notwithstanding the likely impossibility of making that case before the harm actually occurred. The panel's decision was later reversed by the court *en banc* (541 F.2d 1 (1976)), which found that the Act authorized EPA to act before harm occurred based on its assessment of risk.

Congress, in revising the Act, sought to codify the *en banc* panel's decision. The House Committee which drafted section 157(b) stated in its report that it had used "a standardized basis for future rulemaking to protect the public health: the Administrator may regulate a pollutant, emissions of 'which in his judgment cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare.' " It explained that the purpose of this standardized basis was, among other things, to "authorize the Administrator to weigh risks and make reasonable projections of future trends," and "to reflect awareness of uncertainties and limitations in the data which will be available to the Administrator in the foreseeable future * * *"

The committee also included the words "in [the Administrator's] judgment" in the foregoing phrase "to emphasize the necessarily judgmental element in the task of predicting future health risks of present action and to confer upon the Administrator the requisite authority to exercise such judgment." Specifically in reference to section 157(b), the committee quoted with approval another committee's statement that "the phrase 'may reasonably be anticipated' is intended to give the Administrator discretion in proposing and promulgating regulations."

Congress, however, did not authorize EPA to assess risks based on a "crystal ball" inquiry. The House Committee report indicates that Congress expected EPA's risk assessments to be based on evidence that had been adequately adduced (e.g., measured against any critical comments) and rationally applied. Again in reference to section 157(b), the Committee adopted another committee's explanation that the Administrator should rely on reputable scientific data that, while not immune from challenge, must be reasonably reliable.

EPA therefore reads section 157(b) as authorizing regulation to reduce or eliminate risks that the Agency considers will "endanger" health based on available, reliable evidence. Whether or not a risk warrants a regulatory response depends on the likelihood of the harm occurring and the magnitude of the harm that would occur; for example, the risk of an improbable, but potentially far-reaching harm may still warrant reduction or elimination. Obviously, the characterization of a risk entails the exercise of judgment, and the statute makes clear that the Administrator is authorized to exercise such judgment.

EPA also believes that in deciding whether and how to regulate under section 157(b) it may consider other countries' effect on stratospheric ozone and the effect of United States action on other countries' willingness to take regulatory action. There is no dispute that the cause and effects of ozone depletion are global in nature. Ozone-depleting emissions from all nations mix in the atmosphere and threaten the stratosphere above every nation. Thus, in order to assess the risk of ozone depletion and the need for regulatory action, EPA must consider other nations' actions affecting the stratosphere. A logical next step in this analysis is what effect United States action could have on other nations' actions now and in the future.

Consideration of the international ramifications of United States action is also appropriate in analyzing the cost and feasibility of controls, as required by section 157(b). The legislative history of that section indicates that Congress expected the Agency to use the cost and feasibility analysis to determine the most appropriate means of protecting the stratosphere. Certainly other nations' ozone-depleting emissions or control of emissions affect the cost of United States' controls, and the need for other nations to limit their emissions may make appropriate United States action that encourages, or does not discourage, other nations to agree to such limits.

A recent DC Circuit case confirms that EPA may consider potential international ramifications in making a regulatory decision, where, as here, those ramifications are relevant to achieving the statutory purpose. In *National Coalition Against the Misuse of Pesticides* v. *Thomas*, 815 F. 2d 1579 (DC Cir. 1987), the court upheld the Agency's decision to extend the period of time imported mangoes could be treated with a particular pesticide because a contrary decision could have jeopardized mango-producing nations' willingness to find and use a safer alternative. The relevant statutory purpose was to ensure the safety of the United States food supply, and the court found that the Agency reasonably concluded that loss of other nations' cooperation in that endeavor posed a greater risk to the food supply than short-term use of the pesticide.

III. Risk Assessment

As noted above, EPA prepared an assessment of the risks of stratospheric ozone depletion to provide a basis both for United States' participation in negotiation of an international control protocol and for a regulatory decision on the need for future domestic control of ozone-depleting substances (EPA, 1987). The risk assessment was reviewed in draft form by an SAB subcommittee made up of independent experts in the disciplines relevant to predicting ozone depletion and its effects. At the same time, the draft assessment was made available for public comment. Based on comments from the subcommittee, its individual members, and the public, EPA revised the risk assessment and submitted the revised version to the SAB subcommittee for further review. In its closure letter of January 29, 1988, the head of the Subcommittee stated that the final assessment "adequately responded to the Subcommittee's advice on all major scientific issues".

EPA used the risk assessment as the basis for its regulatory impact analysis (RIA) and proposed rule. These documents examine in detail: Past and future trends in trace gases that affect ozone levels; measurements of atmospheric levels of ozone; estimates of future changes in ozone levels derived from atmospheric models; and health and environmental effects that would be associated with depletion of the ozone layer.

A. Past and Future Changes in Atmospheric Composition

As the Agency explained in its December 14 NPRM, measurements taken over the past several decades of the chemical composition of the earth's atmosphere have demonstrated that human activities are altering its make-up. In particular, the atmospheric concentrations of CFCs and halons, which destroy stratospheric ozone, have been increasing. For example, the atmospheric concentrations of CFC–11 and –12 have been increasing at an annual rate of 5 percent during the past decade (WMO, 1986). Other gases which act to slow or offset the destruction of ozone have also been increasing. For example, carbon dioxide levels have increased by 25 percent since the beginning of the industrial revolution (WMO, 1986), and methane concentrations have increased at an annual rate of .017 parts per million during the past decade (EPA, 1987).

Future changes in atmospheric concentrations of these gases will determine the net impact on the ozone layer. As part of its risk assessment, EPA developed scenarios for future trends in the growth of these gases. These scenarios were also used in the RIA prepared in support of this rule.

The scenario used in the RIA to characterize what would happen absent controls ("the baseline") assumed the following growth rates:

TABLE 1.—PROJECTED GLOBAL GROWTH RATES FOR OZONE-MODIFYING COMPOUNDS [1]

	1986–1992	1992–2000	2000–2050	2050–2075
CFC–11	4.34	2.71	2.50	0.00
CFC–12	5.32	3.06	2.50	0.00
CFC–113	7.03	4.09	2.50	0.00
CFC 114	4.95	2.79	2.50	0.00
CFC–115	3.20	2.73	2.50	0.00
Halon 1211	9.77	4.80	2.93	0.00
Halon 1301	3.46	2.20	3.16	0.00
HCFC–22	4.37	2.74	2.50	0.00
Methyl Chloroform	4.70	2.78	2.50	0.00
Carbon Tetrachloride	4.90	2.91	2.50	0.00
Carbon dioxide			0.5%/yr	
Nitrous oxide			0.2%/yr	
Methane	[2]	[2]	[2]	[2]

[1] Average annual rates computed using data cited in Exhibit 4–5 of the RIA. Rates vary for developed and developing nations and by region.
[2] 0.017 parts per million/year.

See chapter 4 of the RIA for a more detailed breakdown of growth rates.

These growth rates are similar to those contained in the December 14 NPRM, but reflect higher CFC growth for 1987 based on actual data (CFC–11 and –12 grew by 13 percent instead of the less than 3 percent EPA had assumed) and a slightly higher growth rate for CFC–11 and –12 through 1992 in the baseline case to more accurately reflect the recent period of sustained high growth in these chemicals—U.S. production of CFC–11 and CFC–12 has grown by 24 percent since 1985.

Several chemical producers and organizations criticized EPA's baseline trace gas scenario. One stated that the Agency's choice of 0.017 parts per million annual growth rate for methane and 0.2 annual percent growth rate for nitrous oxide concentrations differed from the standard assumptions generally used by atmospheric modelers and that they had not been reviewed by the SAB subcommittee. Others criticized EPA's projection of sustained growth for methyl chloroform and HCFC–22 as being unrealistic. Several public interest groups objected that EPA did not assume future controls on carbon dioxide and methane which slow the rate of ozone depletion but also contribute to global warming. They argued that the potentially catastrophic effects of global warming made EPA's assumption of continued uncontrolled growth of greenhouse gases unreasonable.

EPA believes that its baseline trace gas scenario represents appropriate assumptions based on the best available scientific information. In the case of methane, the Agency's choice of a growth rate for changes in atmospheric concentrations is based on a survey of the research groups involved in methane measurements. Moreover, a methane growth rate almost used identical to that by EPA was recently described as "the best current description of growth in CH_4 concentrations" in an article on methane published after the completion of the risk assessment. (Blake, 1988). EPA's choice of a growth rate for nitrous oxide is also fully consistent with the available scientific literature. Contrary to the assertion of one commenter, these baseline trace gas growth rate assumptions were included in the second draft of EPA's risk assessment summary that the SAB subcommittee reviewed and approved, and in any event fall well within the range of assumptions approved by the subcommittee both in the assessment's draft and final forms. Finally, recognizing the uncertainties inherent in making long term projections, EPA included in the RIA sensitivity analyses which examine the impact on predicted ozone depletion of alternative trace gas scenarios. These analyses indicate that none of the RIA's conclusions would be significantly modified by changing these trace gases assumptions along the lines suggested by the commenters.

EPA also believes that the growth rates assumed in its scenarios for HCFC–22 and methyl chloroform are reasonable. These chemicals continue to be widely used in the United States and their use abroad has been expanding and is likely to continue to increase over time. To the extent these chemicals may be substituted for CFCs in the future, the EPA baseline scenarios may actually underestimate future growth in these chemicals.

EPA does not believe it appropriate to assume at this time in its baseline case that controls will be imposed on greenhouse gases. Commenters who argue that EPA must assume controls misconstrue the reason behind the Agency's assumption of continued growth of greenhouse gases. The purpose of the rulemaking is to promulgate controls needed to protect stratospheric ozone. In assessing what controls are needed, the Agency has taken the world as it is; since no action has yet been instituted to limit greenhouse gases, the Agency assumes no controls on these gases in its baseline case. Moreover, until action is instituted, EPA has no reliable basis for predicting the timing or stringency of future controls.

However, because of the Agency's concern about the potential impact of continued growth in greenhouse gas emissions, EPA did examine as part of its sensitivity analysis in the RIA the impact of limiting growth in carbon dioxide and methane. The analysis shows that in the absence of controls on any of the relevant trace gases, the EPA baseline scenario would result in a global equilibrium temperature increase of 6.0 degrees centigrade by 2075. The scenario reflecting the reductions in CFCs and halons required by the Montreal Protocol would reduce the projected global warming equilibrium temperature to 4.3 degrees centigrade by 2075. Because methane and carbon dioxide act to increase ozone, if controls are placed on them to limit global warming to an equilibrium warming of 2.0 degrees centigrade by 2075, the resulting effect would be to increase ozone depletion by the date from under 2 percent (in the case of implementing the Montreal Protocol) to around 6 percent. While a consideration of potential global warming is outside the scope of this rulemaking, EPA recognizes that because the same trace gases govern both climate change and ozone depletion, these issues are closely connected. Should future steps be taken to address global warming, the Agency will consider the need to revise its CFC and halon control requirements to ensure that the stratospheric ozone layer is maintained.

Seven chemical producers and users stated that EPA's baseline and other

scenarios incorrectly assumed that CFC and halon use would grow unabated in the future despite evidence of ozone depletion (i.e., firms would voluntarily reduce CFC and halon use). EPA's assumption concerning baseline growth of CFCs and halons was the product of several years of analysis and review including many different studies undertaken both here and abroad. (For a summary of these studies, see chapter 4 of the RIA). The goal of these studies was to project demand for these chemicals in the absence of regulation. Given the long time period covered by these projections (typically many decades to over a century, the atmospheric lifetimes of CFCs and halons), considerable uncertainty in the estimates is unavoidable. Nonetheless, the studies demonstrate that in the absence of regulation substantial sustained growth in demand for CFCs and halons would be likely.

The notion that firms would shift away from CFCs and halons in the face of evidence of ozone depletion is flawed for two reasons. First, it does not comport with recent history. Despite the fact that over the past two years public concern and scientific evidence about the threat of ozone depletion has grown, use of these chemicals has surged by an annual average of 11.5 percent rather than slackened. Second, it misunderstands the role of the baseline in a regulatory analysis. The baseline serves as the basis for estimating costs of shifting away from harmful chemicals. If EPA decided not to regulate CFCs and halons and the ozone layer thinned, some firms indeed might reduce their use voluntarily or in response to public pressure. However, because section 157(b) requires EPA to consider total costs of protecting the ozone layer, EPA appropriately considered all costs to society, including the cost incurred by firms in shifting away from CFCs and halons either in response to regulation or as a voluntary action.

B. Past and Future Changes in Ozone Levels

Measurements of changes in atmospheric concentrations of ozone-modifying gases provide only indirect evidence that human activities may be altering the ozone layer. Two other methods for analyzing the risk of ozone depletion are direct measurement of ozone to detect any trends and use of atmospheric models to project future ozone trends based on assumed changes in atmospheric levels of ozone-modifying gases.

1. Direct Measurements of Ozone Levels

In the preamble to the December 14 proposal, EPA described the extent and significance of available satellite and ground-based measurements of ozone. The Agency cited the 1986 World Meteorological Organization (WMO) assessment which concluded that measurements available at the time revealed no statistically significant change in total column ozone, and noted that the WMO conclusion was consistent with then current atmospheric theories and models.

EPA also noted, however, recently released preliminary evidence that suggested some depletion of stratospheric ozone had already occurred. It described the recently discovered seasonal "hole" in the ozone layer above Antarctica and the recent data that strongly suggested anomalous chlorine chemistry plays a role in the hole's formation. EPA concluded, however, that too many questions remained as to the cause and implications of the hole for the Agency to take it into account in its projections of global ozone depletion and, by extension, its regulatory decision-making.

The Agency also noted a recent article containing data that called into question the conclusion that *global* ozone levels had not decreased. Preliminary assessments of the ground-based and satellite measurements suggested that depletion of up to five percent had occurred over the past one or two decades. However, the data suggesting that ozone had depleted globally had not yet been published in the scientific literature and therefore had not yet been thoroughly reviewed. EPA explained that interpretation of such data was complex because of the need to address issues of calibration and instrument drift, among others. In addition to validating and quantifying the trend itself, EPA also cited the need to distinguish ozone losses related to man-made chlorine from those related to natural causes (e.g., solar cycle, volcanic activity). The Agency noted that a thorough review of both that data and research on the Antarctic ozone hole had been recently initiated by a group of the world's leading atmospheric researchers under the auspices of UNEP, WMO, NASA and NOAA (the Ozone Trends Panel), and decided that until the data had been adequately reviewed and analyzed by the scientific community, it should not be used in its risk assessment or regulatory decision-making.

Environmental groups commenting on EPA's proposal strongly disagreed with the Agency's decision not to factor into its risk assessment and regulatory decision-making the Antarctic hole and global ozone trends data. While apparently acknowledging that at the time of the proposal there was inadequate evidence linking CFCs with the Antarctic hole, they argued that a scientific consensus had since emerged that CFCs are a cause of the hole. They also asserted that the Ozone Trend Panel's review of the ozone trends data was "expected" to conclude that ozone depletion of several percent had already occurred. Many industry commenters, on the other hand, agreed with the Agency's judgment that the Antarctic and global ozone trends data were either too preliminary or inconclusive to provide a basis for regulatory action. But some of these commenters complained that the Agency focused too much on the data, given its judgment that the data were insufficient to support regulatory action.

EPA stands by its conclusion that the Agency should not rely on the preliminary evidence of either the Antarctic hole phenomenon or apparent global ozone depletion in this rulemaking. As discussed earlier, Congress gave EPA broad discretion to weigh the available evidence, but it indicated that the Agency should base regulatory decisions on evidence that "is adequately adduced" and "reasonably reliable." Relatedly, Congress did not intend EPA to protect against any risk of ozone depletion; it instead authorized EPA to regulate in the case of risks it finds "will endanger" public health and welfare.

EPA judged that the preliminary Antarctic ozone hole data was insufficient to conclude that public health and welfare would be "endangered" by the hole's existence. The preliminary data left unanswered important questions like whether the mechanisms causing the hole are unique to Antarctica, whether losses in Antarctica alone influence global ozone levels, and whether the hole will have other direct and indirect effects on the rest of the world. At the time of the December proposal, the preliminary global ozone trends data, in turn, were not adequately adduced or reasonably reliable for purposes of assessing risks or making regulatory decisions. The data was not peer-reviewed for accuracy and significance and the Agency could not rely on "expectations" of what that review would show. In the case of ozone measurements, peer review is particularly important because of the difficult issues of interpretation they pose. EPA thus found it appropriate to await completion of the Ozone

Trends Panel review of the data before basing its risk assessment and regulatory decisions upon it.

Industry concerns that EPA overemphasized the preliminary data are also misplaced. As noted above, EPA carefully described the limitations of the data concerning these phenomenon and expressly rejected relying on the data in this rulemaking. Moreover, the atmospheric models used in its risk assessment and RIA do not account either for the Antarctic ozone hole or for observed losses in ozone during the decade.

2. Ozone Trends Panel Report

In March of this year, the Ozone Trends Panel released the executive summary of its report; release of the body of the report is expected in August. The panel concluded that stratospheric ozone has already been depleted on a global basis more than researchers had previously thought, though not as much as the preliminary satellite data had suggested. The panel also stated that "the observed changes [in global ozone] may be due wholely, or in part, to the increased atmospheric abundance of trace gases, primarily [CFCs]," and that the Antarctic ozone hole is clearly linked to CFCs. An obvious implication of its conclusions is that EPA's risk assessment probably underestimates the risk of ozone depletion.

Notwithstanding the likely significance of the Ozone Trends Panel report, EPA is not in a position to consider it in this rulemaking. As noted above, the full report, including the data and analyses supporting the summary's conclusions, are not yet available for either the Agency or the public to review. Before relying on the summary's conclusions, EPA has the responsibility to review the underlying report; the Agency cannot delegate its duty to make an informed judgment on the adequacy and implications of the new information.

Even if EPA could rely on the report's summary alone, the Clean Air Act would require that the public be given an opportunity to comment on the summary if the Agency intended to base its regulatory decision on it. However, the August 1 court-ordered deadline governing this rulemaking did not leave sufficient time for the Agency to provide the public with a meaningful chance to comment on the summary's significance for the proposed rule. The scientific community will require at least several months to perform the analyses and model revisions needed to assess the significance of the new information. Complicated analysis will be required to determine what aspects of current atmospheric models must be altered to more accurately reflect recent changes in ozone levels both in the Antarctic and globally. EPA will then have to review these model changes and undertake its own assessment of risks. This effort would have left too little time to publish and obtain comment on any revised risk assessment and regulatory response and still meet the August deadline for a final rule.

Moreover, even if no court-ordered deadline pertained to this rulemaking, EPA could not have delayed the rulemaking to the extent analyzing and providing public comment on the summary would have required. The Protocol's freeze may take effect as early as July of next year; if EPA is to provide industry with leadtime to comply with the freeze, it cannot long delay promulgation of the final rule.

The Agency is nonetheless concerned about the implications of the conclusions drawn by the Ozone Trends Panel. Administrator Thomas, in an April 7, 1988 letter, has called on the Executive Director of UNEP to expedite the Protocol's review process to allow parties to determine at the earliest possible date the need for additional restrictions. The United States, along with other countries, is now actively engaged in planning for the review on an expedited schedule following entry into force of the Protocol. Under the revised schedule, the assessments called for in the Protocol are tentatively scheduled to be completed by mid-1989, which would allow the Parties to meet to begin considering the need for additional steps by fall of next year.

EPA is also in the process of updating its risk assessment and will evaluate the Ozone Trends Panel report and all other new scientific information in the updated assessment. Assuming the panel's full report is released in August, EPA expects to complete its update by early 1989. EPA discusses further the summary findings of the Ozone Trends Panel in the ANPRM also published today in the **Federal Register**, and states that it intends to seek public comment on the full report when it becomes available. Based on its revised Risk Assessment, the Agency will determine what further actions, if any, are necessary.

3. Use of Atmospheric Models in Predicting Future Ozone Depletion

Direct measurements indicate past changes in ozone levels, but atmospheric models are the only available tool for predicting future trends in ozone. These models, in more or less detail, attempt to replicate the forces that determine ozone levels. Two basic types of atmospheric models have been developed. One-dimensional (1-D) models predict ozone levels on a globally averaged basis, while two-dimensional (2-D) models also predict ozone levels by latitude and season.

For its risk assessment and RIA, EPA used a simplified version of a 1-D model to analyze different scenarios of ozone-modifying gas growth and control. In the preamble to its December 14 proposal, the Agency explained that while 2-D models provide more information relevant to calculating the impacts of depletion, they are expensive and time-consuming to use and far from uniform in their results. The Agency recognized the relative limitations of 1-D models, but concluded that they were the best available tools for the purposes of risk assessment (e.g., analyzing the impact on depletion of many different control scenarios).

Several commenters raised issues concerning EPA's use of a simplified 1-D model as its primary risk assessment tool. One chemical producer urged that the full 1-D model, as opposed to the simplification, be used for regulatory decision-making, and added that the model the Agency used was outdated. Several environmental groups argued that EPA should have used the more sophisticated 2-D models.

The Agency chose to use the parameterized version of the 1-D model because it provided a relatively low-cost means of analyzing different trace gas scenarios without losing much of the original model's precision. Under the auspices of UNEP, results of the parameterized model EPA used were compared with results from the major 1-D models of the world. The study concluded that "[w]ithin the existing limitation of models to accurately simulate the real stratosphere, all models including the fully parameterized model, predicted, within acceptable limits, similar ozone depletions for given control scenarios."

As noted by one of the commenters, the parameterization EPA used was revised following preparation of the original risk assessment. Minor changes in several coefficients were made. However, the revised and original methods gave essentially the same results, so EPA continued to use for its RIA the original version of the model which had been reviewed and approved by the SAB.

The Agency chose not to use 2-D models because, not only are they substantially more expensive and time-consuming to use, but there is much less agreement between 2-D model results than now exists for 1-D models. While all 2-D models show that ozone

depletion varies with latitude, they differ widely in the size of the latitudinal gradient they project and even in what hemisphere they predict a gradient. These differences reflect the fact that 2–D models are attempting to replicate atmospheric transport mechanisms that are extremely complex and not yet well understood. While 2–D models are potentially powerful in their predictive capacities, they still require substantial development. What can be gleaned from them now is the basic finding that ozone depletion will be greater at higher latitudes and may be greater on a global average than 1–D models predict. In comparing these two types of models, the 1987 WMO assessment concluded that, "[t]here is no indication at present that results from two-dimensional models should invalidate in a gross sense assessment studies with one-dimensional models."

A more fundamental fact in considering the choice of models is that no model now exists that accurately mirrors the complex processes which affect stratospheric ozone; the results of all models are approximate, at best. In summarizing the conclusions of its risk assessment, EPA stated, "while the [atmospheric chemistry] models replicate many of the characteristics of the atmosphere accurately, they are inconsistent with measured values of other constituents, thus lowering our confidence in their ability to predict future ozone changes accurately." In short, while models provide the best available tool for evaluating future ozone trends, they provide rough approximations at best. Regardless of the type of model used, the inherent limits of our current ability to precisely predict future atmospheric changes must not be overlooked.

4. Future Trends in Ozone Levels Assuming No Controls

Using the parameterized 1–D model, EPA examined the potential impact of its trace gases scenarios on ozone depletion. Table 2 shows the results of its analysis. For the baseline scenario, depletion is projected to begin around the turn of the century and increase sharply through the next century.

TABLE 2.—Estimated Ozone Depletion for Baseline Scenario

Year	Percent depletion
2000	1.0
2025	4.6
2050	15.7
2075	[1] 50.0

[1] Because of limits in the range of accuracy of the model, ozone depletion was arbitrarily constrained at 50 percent. However, the Agency performed a sensitivity analysis that includes no artificial limit on depletion; it projected depletion in 2075 of 52 percent.

C. Health and Environmental Impacts

Under current atmospheric conditions, the ozone layer blocks most of the damaging ultraviolet radiation (UV–B) from penetrating to the earth's surface. As part of its risk assessment, EPA examined a wide range of potential health and environmental impacts from increased exposure to UV–B radiation as a result of ozone depletion.

Research to date has identified the following areas of potential harm to human health: increased incidence of melanoma and non-melanoma skin cancers and cataracts, and suppression of the immune system. Because the exact nature of the dose-response relationship between increased exposure to UV–B radiation and the incidence of skin cancers and cataracts is uncertain, a range of values were used in the analysis. These estimates are presented in section V, below. Insufficient information exists to quantify potential effects related to immune suppression.

Limited experiments have also linked increased UV–B exposure to damage to plants and aquatic organisms, accelerated weathering of certain manmade materials, and increased formation of ground-level ozone (smog). While studies completed to date suggest that substantial damage in each of these areas is likely, the limited nature of the studies make it difficult to generalize and quantify the potential effects. For its RIA, EPA drew from the existing studies to provide limited estimates of potential damage, but the Agency recognizes that substantially more research in each of these areas is needed. The results of the analysis contained in the RIA are presented below in section V.

Because the gases that affect ozone also contribute to global warming, the Agency's risk assessment also examines the likely health and environmental impact of the greenhouse effect if emissions of these gases continue to grow. Global warming is likely to lead to changes in temperature and precipitation, increased sea level, and changes in storm patterns and frequency. These changes could affect agriculture, forests, development patterns, water quality and a wide range of other health and environmental factors. Given the limited information available to quantify these potential impacts, EPA only included in its RIA a case study of the impact of sea level rise. This is explained in Chapter 8 of the RIA and below in section V.

D. Conclusion

Based on its risk assessment and RIA, the Agency has concluded that continued growth in CFCs and halons will result in substantial ozone-depletion having serious health and environmental consequences. While many uncertainties exist, the current evidence presents a strong case for action to substantially reduce emissions of these most potent ozone depleting chemicals. A comparison of the costs and potential benefits of differing levels of control are discussed below.

IV. Final Rule

A. Scope, Stringency and Timing of Reductions

As noted above, EPA proposed to implement the Montreal Protocol, provided that the Protocol enters into force and the United States ratifies it, which the United States has since done. The Agency explained that United States implementation of the Protocol was an appropriate response to the threat of ozone depletion for two reasons. One, EPA's assessment of available scientific evidence indicated that adherence by the United States along with broad international participation in the Protocol's control requirements would nearly eliminate the projected risk of ozone depletion. Two, EPA judged that the obvious need for broad international adherence to the Protocol counseled against the United States' deviating from the Protocol, because any significant deviation could lessen other countries' motivation to participate. To the extent the Protocol's existing control requirements were later found more or less stringent than necessary to protect stratospheric ozone, EPA noted that key provisions in the agreement afford the Parties the opportunity to review and revise those requirements.

The public comments on the Agency's proposed rule were virtually unanimous in supporting implementation of the Montreal Protocol. Industry and public interest groups alike recognized the need for a global response to this global problem, and embraced the Protocol as a landmark international agreement to address an environmental threat to a critical and irreplaceable resource. These groups and others differed, however, on whether the Protocol's control measures were sufficient to fully protect stratospheric ozone.

In general, CFC producers and users contended that the scientific evidence

on which EPA rested its proposal did not justify the CFC reductions required by the Protocol except as a precautionary measure. They disagreed with EPA's assumptions concerning the future growth rates of several gases affecting ozone (as discussed above) and the likely degree of international compliance with the Protocol, and contended that more realistic assumptions would yield projections of total column ozone remaining stable or actually increasing. They suggested that since the science on which EPA purported to rest its proposal did not justify the required reductions, the Agency must have taken the Antarctic and ozone trends data into account in deciding to seek those reductions.

Industry commenters also generally agreed with EPA's concern that deviating from the Protocol risked undermining it. They recognized that implementation of less stringent controls than the Protocol required would be unacceptable, and shared EPA's concern that implementation of more stringent controls would yield little, if any, additional stratospheric protection, while possibly reducing other countries' incentive to join the Protocol. They added that unilateral action to reduce further ozone-depleting emissions would put United States' industry at a competitive disadvantage in world markets.

In contrast, environmental and other public interest groups claimed that the Montreal Protocol and thus EPA's proposed rule did not go far enough fast enough in requiring reductions in ozone-depleting substances. Several noted EPA's own projections that (1) stratospheric ozone would still be depleted by nearly two percent by the year 2075 under the Protocol's control regime; (2) every one percent decrease in ozone would result in a one to two percent increase in melanoma skin cancer incidence, among other adverse effects; and (3) United States unilateral action to reduce CFC use by an additional 30 percent would further reduce those adverse effects. In light of these projections, they questioned the logic of EPA's proposal to implement the Montreal Protocol's required reductions and no more.

Their chief complaint, however, was that EPA failed to propose the virtual phaseout of CFCs and halons that they claim is needed based on the preliminary Antarctic ozone hole and global ozone trends data. In its comments on the May 24 NPRM proposing company-specific allocations of production and consumption rights, one environmental group noted that the Ozone Trends Panel summary concluded in March that ozone-depletion had already occurred and that CFCs and halons appeared at least partly responsible. The commenter also pointed to data released in May supporting the existence of a smaller Arctic version of the Antarctic ozone hole, and argued that both developments made clear that a phaseout was required to protect stratospheric ozone.

Several commenters also faulted the Agency for essentially relying on continued uncontrolled growth of other greenhouse gases to buffer the ozone-depleting effects of CFCs and halons. They disagreed, moreover, with EPA's judgment that unilateral United States reductions beyond those required by the Protocol ran a significant risk of undermining the efficacy of that agreement. They argued that EPA could and should use its authority under section 157(b) of the Act to leverage further reductions from other countries by immediately imposing restrictions on the import of products containing or made with CFCs from countries that fail to agree to make the same reductions.

Finally, a number of commenters disagreed with EPA's proposal to make the regulations effective upon the Protocol's entry into force. Again, they stated that the severity of the ozone depletion problem warrants faster action than the Protocol requires and that unilateral United States action would not seriously undermine the incentive of other countries to join the Protocol.

B. Basis for Control Requirements

After carefully considering the comments received, EPA has concluded that implementation of the Montreal Protocol is the best course the Agency can take at this time to securing adequate protection of stratospheric ozone.

EPA's decision to implement the Protocol has two bases. One, EPA believes that the scientific information and analyses available to the Agency and public in this rulemaking support a finding that the Protocol's control requirements are needed and reasonably adequate to protect stratospheric ozone. For the reasons discussed earlier, EPA considers the preliminary nature of the data on the Antarctic ozone hole and global ozone trends provides an insufficient basis for regulatory action. The Agency recognizes that the summary of the Ozone Trends Panel Report released several months ago assessed that data and raised questions about the adequacy of the Protocol's controls. However, as explained above, adequate evaluation of that report and other recently available information could not be completed before the close of this rulemaking. EPA also believes for reasons mentioned earlier that it reasonably considered the need to control ozone-depleting substances independently of the need to control other greenhouse gases.

Two, EPA believes that the Montreal Protocol's international response represents the most effective means of protecting the ozone layer. Unilateral action by the United States would not significantly add to efforts to protect the ozone layer and could even be counterproductive by undermining other nations' incentive to participate in the Protocol. The Agency believes that the best way to deal with the challenges posed by new information is through the Protocol's review and revision process, and at the Administrator's request, UNEP has agreed to expedite that process so that the Parties may consider at the earliest possible date whether additional international reductions are warranted. EPA's analysis indicates that if further reductions are required, they may be undertaken after the expedited review process is completed and still be effective in achieving stratospheric protection.

1. Scope of Coverage

The final rule governs future production and consumption of CFC–11, –12, –113, –115 and Halon 1211, 1301 and 2402. These chemicals are covered by the Protocol and, as explained in the preamble to the proposed rule, currently pose the greatest threat to stratospheric ozone.

The Agency received one comment that took issue with the scope of chemicals proposed for regulation. The commenter, a halon producer, pointed out that EPA's projections show that freezing the growth of halons will not reduce ozone losses until well into the next century, and that a case could thus be made for not regulating halons at this time. The Agency points out, however, that halons' long atmospheric lifetimes require that action to control their use be taken now to prevent the ozone depletion EPA projects for the future. Halon 1301, for instance, has an estimated lifetime of 110 years; thus, emissions of this chemical today will contribute to ozone depletion far into the next century. In addition, if left unregulated, halons could grow in use. To prevent halons from becoming a greater threat to the ozone layer, EPA must limit their supply in the near term.

2. Stringency and Timing of Controls

The final rule also adopts the stringency and timing of the Protocol's control measures. Taken together with the scope of chemicals covered by the rule, EPA believes based on the information in the record that its rule is an appropriate response to the risk of stratospheric ozone depletion.

Table 3 shows model projections of ozone depletion for different levels of reductions. As explained earlier, EPA has revised its ozone depletion projections to reflect higher CFC growth for 1987 and slightly higher CFC growth rates through 1992. The revised projections indicate that broad international implementation of the Protocol's control measures (case 3) is likely to reduce future ozone depletion from over 50 percent to less than 2 percent in the year 2075, with further reductions in depletion occurring after that date as ozone increases from additional methane and carbon dioxide more than offset losses from CFCs and halons (see chapter 6 of the RIA). The projections also illustrate that unilateral implementation of the Protocol's control measures by the United States, with no other nations reducing their use of CFCs and halons (case 4), would halve projected depletion by 2075, but that substantial depletion would still occur.

Even assuming that the United States unilaterally decreased CFC use by 85 percent by 1998 (case 5), this action would only reduce projections of ozone depletion by 0.3 percent in 2075 compared to the Protocol case (case 3). If the United States unilaterally accelerated its reductions and decreased by 85 percent by 1992 (case 6), projections of ozone depletion in 2075 would only be reduced by another 0.2 percent. These cases also assume that United States unilateral action beyond the Protocol would not reduce participation by the other nations in that agreement. In contrast, should the international community decide in the future that reductions beyond the Protocol are proper, a multilateral reduction of 85 percent by 1998 would result in substantially greater protection than that achieved by unilateral action (case 7).

TABLE 3.—SUMMARY OF OZONE DEPLETION ESTIMATED FOR THE 8 CONTROL CASES *

[Ozone depletion reported in percent]

Case	2000	2025	2050	2075
1. No Controls (baseline) *	1.0	4.6	15.7	50.0
2. CFC Freeze Only—International	.8	2.5	4.7	6.9
3. CFC 50%/Halon Freeze—International (Protocol Case)	.8	1.5	1.9	1.9
4. CFC 50%/Halon Freeze—United States only	.9	3.5	10.3	27.4
5. CFC 50%/Halon Freeze—International; CFCs—85% (1998)—U.S. only	.8	1.3	1.7	1.6
6. CFC 50%/Halon Freeze—International; CFCs 85% (1992)— U.S. only	.8	1.2	1.5	1.4
7. CFC 85%/Halon Freeze—International (1998)	.8	.9	.8	.3

* Cases 2, 3, 5, 6 and 7 assume 94 percent participation for other developed countries, and 65 percent participation for developing countries, based on countries participating in Protocol negotiations.
* Global ozone depletion is arbitrarily constrained at 50 percent in this analysis.

EPA disagrees with some industry comments that the Agency's own projections in the risk assessment show that a *freeze* in controlled substances would result in an *increase* in total column ozone and thus that current scientific information does not justify the Protocol's reduction requirements. EPA notes that this particular scenario in the risk assessment assumed a total freeze in HCFC 22, methyl chloroform and carbon tetrachloride, as well as the chemicals covered by the Protocol, along with all nations in the world participating; the projections made here and in the accompanying RIA showing that the Protocol's controls would still result in a small degree of ozone depletion do *not* assume a freeze in chemicals outside the coverage of the Protocol. This difference in assumptions accounts for the difference in projections.

EPA also disagrees with comments suggesting that additional reductions beyond the Protocol are necessary for the Agency to meet its obligations under the Clean Air Act. As Table 3 illustrates, based on the information which could be considered in the course of this rulemaking, EPA's analysis shows that the model's projected ozone depletion would be reduced to a level of less than two percent. EPA believes that, given the scientific and technical limitations of its analysis and the need to obtain international agreement to achieve effective controls, additional unilateral reductions are not warranted at this time.

a. Limitations in Atmospheric Models. While atmospheric chemistry models are the best available tools for estimating future changes in ozone depletion, they are far from exact. As discussed above and in both the WMO and EPA assessments, these models accurately reproduce some aspects of the current atmosphere but fall far short of replicating other aspects. As a result of these acknowledged deficiencies, rigidly tying the stringency of controls to the projections of these models is not warranted or appropriate. Moreover, Table 3 illustrates that based on current models, little difference in depletion occurs until the turn of the century. During this period additional measures could be taken through the Protocol process if needed. For example, more stringent reductions on CFCs or the addition of such chemicals as methyl chloroform (which has a shorter atmospheric lifetime) to the Protocol could achieve further reductions in potential ozone depletion.

b. Limitations in Long-Term Projections. Results from the atmospheric models are further limited by uncertainties concerning growth in trace gases which affect ozone. While EPA believes that its trace gas growth assumptions accurately reflect current understanding of likely future trends, the Agency recognizes the inherent limits in making projections that cover more than a century. Some of these projections (e.g., CFC growth rates) are based on factors such as long term economic growth and technological development which cannot be predicted with precision. Others (e.g., methane, carbon dioxide and nitrous oxide growth) are based on recent history, which may not prove an accurate indicator of future trends. Still others are based on behavioral assumptions (e.g. participation in the Protocol) which cannot be readily tested.

Given these limits, the reduction in ozone depletion that a specified control limit will provide cannot be foretold with precision. Recognizing this, the Protocol negotiators agreed to a 50 percent reduction in CFCs in part because a reduction of this magnitude would provide an incentive for development of chemical substitutes which in turn would facilitate even greater reductions if such proved necessary. The analysis in the RIA assumes that CFC use is reduced by 50 percent in 1998 as called for in the Protocol. Yet several large producers and users of ozone-depleting substances have recently announced their

intentions to phase down below this level or even phase out of these chemicals. If this occurs, the RIA's analysis could actually overstate the amount of long-term ozone depletion which could result.

As part of its sensitivity analysis contained in the RIA, the Agency considered many of the issues raised by commenters. The analysis examined alternative assumptions in the following areas: higher and lower growth in methane, carbon dioxide and nitrous oxide; different rates of participation by developed and developing nations in the Montreal Protocol; and different baseline growth rates of CFCs. The results of this sensitivity analysis illustrate that projected ozone depletion could increase or decrease (or that ozone could even slightly accrete) under certain scenarios for any of a number of reasons. Given that recognized uncertainties in the analysis are on the same order of magnitude as the projected residual depletion, EPA believes that it would not be reasonable necessarily to require controls to eliminate the residual depletion. Other factors, such as the opportunity to revise the Protocol as new information warrants and the need for broad Protocol participation, are also important in deciding how much control to require now.

c. International Considerations. As shown in Table 3, concerted international action represents the only effective means to safeguard the ozone layer. EPA firmly believes that the ratification and implementation of the Montreal Protocol provides the most effective means of achieving that objective. As explained below, the history leading to the Protocol provides ample evidence that unilateral action by the United States would not necessarily ensure adequate protection for the ozone layer.

In 1978 the United States restricted the use of CFCs in aerosols. While several nations adopted similar restrictions (e.g., Sweden, Canada, Norway) and others partially cut back this use (European nations, Japan), there was no widespread movement to follow the United States' lead. Concerns existed then that other nations had failed to act because the United States and a few other nations were making the reductions thought necessary to protect the ozone layer. Similar concerns exist today that unilateral action could result in "free riding" by some other nations.

More recently, negotiations leading to the Montreal Protocol can be traced back to the early 1980s. The initial round of negotiations were concluded in 1985 when the involved nations agreed on the Vienna Convention for the Protection of the Ozone Layer but failed to agree on specific actions to limit ozone-depleting chemicals. This failure resulted, in part, from the fact that some nations had already taken different interim approaches to limiting CFCs and from the lack of a common understanding of the underlying science and risks. During the year following the first round of negotiations and leading up to the second, a major international assessment of atmospheric issues was conducted (WMO assessment) and international workshops on health and environmental effects and on economic and technological issues were convened. These assessments provided the common base of information which led in September 1987 to agreement on the Montreal Protocol.

Thus, in past efforts to obtain international controls, the United States has been most effective not by taking unilateral action but instead by actively participating in international assessments and by aggressively pursuing a strong global agreement.

Recognizing the utility of the international assessment process and the significant scientific, technical, economic and environmental uncertainties that remain, the Protocol explicitly provides for periodic "assessment and review of control measures." EPA believes that this process, as agreed to by nations becoming Party to the Protocol, represents the most effective vehicle for obtaining further reductions, if such prove necessary. But the essential first step is satisfying the conditions for entry into force. EPA's Administrator sent a letter to his counterparts in May of this year urging their ratification of the Protocol. Based on recent information, it appears that the January 1, 1989 target date for entry into force will be met.

Once entry into force has occurred, the next step will be to conduct the assessments called for in the Protocol on an expedited schedule and allow the Parties to decide if additional actions are warranted. As discussed above, EPA has initiated several actions to facilitate that process, and UNEP's schedule for assessment and review has been moved forward in time.

Given that the Protocol process appears likely to be effective in addressing the need for additional controls in a timely manner, EPA believes that unilateral action by the United States would not significantly contribute to protecting the ozone layer and might even make it more difficult to utilize the Protocol process to achieve the necessary international consensus for action. Unilateral United States action could appear to reduce the urgency of reviewing the Protocol's control measures, and unilateral actions accompanied by trade sanctions, such as some commenters suggest, could lead to counteractions well beyond the scope of protecting stratospheric ozone, making future agreement more difficult.

EPA also rejects several commenters' suggestion that EPA's regulation should take effect immediately and not be linked to entry into force of the Protocol. EPA believes that the environmental benefits from delaying implementation for a few months would be small compared to potentially large economic costs to United States industry of acting in advance of other Parties to the Protocol. Entry into force now appears likely by January 1, 1989. With success so near, EPA does not want to take unilateral action that could reduce the impetus for other nations to join the Protocol in a timely manner.

C. Selection of Regulatory System

EPA considered many different strategies for implementing the requirements of the Montreal Protocol including traditional engineering controls and economic based programs. The Agency explained that the latter type of program would utilize free market incentives to achieve cost-effective controls, and suggested three specific options: Auctions, allocated quotas, and regulatory fees. The advantages and disadvantages of each of these options (and possible combinations) were discussed in the December 14 NPRM. While EPA stated that an allocated quota program was its preferred option, it sought and received comment on each of the options. EPA received more comments on its selection of a regulatory strategy than on any other aspect of its December 14 NPRM.

1. Allocated Quota Option

Under this system, producers and importers of CFCs and halons in 1986 would receive production and consumption "rights" or allowances.[1]

[1] In the December 14 NPRM, EPA used the term "rights" to refer to what it proposed to grant producers and importers of CFCs and halons to authorize future production and consumption of these chemicals. The Agency noted, however, that "rights" was used as a matter of convenience, and that what EPA proposed to grant was actually in the nature of a privilege. One commenter suggested that EPA avoid the use of such a shorthand term and therefore the need to explain it. EPA agrees and has in the final rule and this preamble used the term "allowances" instead.

The majority of commenters addressing this point, including chemical manufacturers and most major CFC and halon user groups, supported EPA's preference for the allocated quota system for many of the same reasons discussed in the December NPRM: It would ensure that the control requirements of the Protocol are achieved; would provide for low cost, market-based reductions; and would be administratively straightforward.

While generally supporting the allocated quota approach, a large number of respondents from the foam-blowing industry argued that they would be inadvertently discriminated against under such a system because chemical producers would shift production away from CFC–11 (the primary chemical they use) to other, more profitable CFCs. They also claimed that since CFCs are a large percentage of their final product costs, but only a small percentage of the product costs of other CFC-using industries (e.g., computers, refrigerators, and car air conditioners), future CFC price increases will have a greater effect on their industry. As a result of these concerns, they argued that EPA should provide a set-aside for their industry based on their 1986 use.

EPA considered this request, but at this time believes that the disadvantages of creating such a set-aside substantially outweigh any possible advantages. EPA has no information about whether chemical producers will shift production away from CFC–11 to other CFCs. Several producers have publicly stated that, consistent with anti-trust requirements, they intend to utilize their quotas to minimize disruption in user markets by allocating allowable supplies to past customers. While EPA doubts that producers will make allocations that reduce their ability to earn profits, to the extent producers allocate CFC–11 to foam blowers, their concerns will be obviated. In the longer term, which chemicals will be produced is difficult to discern. It will depend largely on the relative timing of chemical substitutes. For example, to the extent chemical substitutes for CFC–12 and CFC–113 become available before substitutes for CFC–11, within the limits established by the Protocol, even more CFC–11 than is produced today could be produced in the future.

Providing a set-aside for one industry segment would also be economically inefficient. If EPA adopted the system proposed by the foam-blowers, the Agency would be subsidizing that industry at the expense of all other CFC users. Other industries would have access to a reduced supply of CFCs (the allowable level minus the set-aside) and would therefore pay higher market prices. Since foam-blowers would not have to compete against firms from other user industries, they would likely pay lower CFC prices and consequently have less incentive to reduce their use of these chemicals. Moreover, many segments of the foam-blowing industry (e.g., foam packaging and flexible molded foam) have inexpensive alternatives available today and therefore would not need a set-aside.

Finally, the foam-blowers' concerns relate primarily to their alleged inability to pay higher prices for CFCs. The magnitude of future price increases will depend on the speed and rate of reductions taken by all industries particulary in the next few years. (See Section V, below.) As discussed at length in the accompanying ANPRM, EPA intends to closely monitor progress in achieving reductions across all CFC user industries, and may propose to require reductions where they are available but are not being aggressively pursued by a particular user industry. According to the RIA (Chapter 9 and Appendix M), if such reductions are achieved in a timely manner, price increases would be substantially moderated and the concerns raised by the foam-blowing industry would never materialize. This analysis is presented in detail in Section V, below which describes the analysis contained in the RIA accompanying this rule.

Several auto companies, two government agencies, and several environmental groups were concerned that an allocated quota system would provide substantial market power and sizable windfalls to a small number of producers. These commenters feared that producers would have an economic incentive to delay the introduction of chemical substitutes which would thus raise the cost of reducing use of ozone depleting chemicals. They also feared that producers might restrict supply beyond the limits in the regulation, further increasing CFC prices. In addition, one of the commenters was concerned that allocated quotas alone would, in effect, create a system under which polluters would profit from their pollution.

EPA shares these commenter's concerns that windfall profits could induce producers to delay the introduction of chemical substitutes. It also recognizes the irony that regulation by means of an allocated quota system could make money for the regulated industry. Despite these drawbacks, however, EPA is confident that an allocated quota system would still bring about the required reductions in controlled substances, although at a higher cost if substitutes are delayed. Since the quotas would directly limit production and import of controlled substances, they would ensure that the Protocol's limits are met. But should producers delay the introduction of substitutes, the cost to society of meeting those limits would be higher than it would otherwise be; prices of controlled substances and prices of products using controlled substances would be driven higher or remain high for a longer period of time.

Six chemical producers and an industry trade association argued that EPA had incorrectly characterized the nature and magnitude of profits that would result from allocated quotas (e.g., by not taking into account higher production costs and taxes) and that higher prices for controlled substances are necessary to fund the development of new chemical substitutes. EPA believes that it has correctly portrayed the nature of the likely windfalls (i.e., transfers) which would result from the allocated system. EPA agrees that the costs of production of each unit of controlled substances might increase as the quantity of production is cut and that increased prices for controlled substances will also result in increased taxes paid to the U.S. Treasury. But these points do not materially alter the analysis of windfalls presented in the RIA. The unit costs of feedstock materials, which constitute the majority of production costs, are not likely to significantly increase. While the payment of taxes may decrease the actual profits to producers, the amount of this payment to the Treasury will depend on many factors (e.g., corporate income tax rates) outside the scope of this analysis. Moreover, losses due to the shutdown of existing production facilities are also uncertain. Instead of being closed, existing production facilities may be modified, in some cases to produce chemical substitutes (e.g., HCFC–22) or used to produce feedstocks for new chemicals. The ANPRM also published today in the **Federal Register** contains a more detailed discussion of the issue of windfalls and their long-term environmental and economic implications.

2. Regulatory Fees

Regulatory fees were also offered as an option in the December 14 NPRM. In that notice, EPA raised the issue that fees, by themselves, would not ensure that the required control levels were met and therefore that the United States'

obligation under the Montreal Protocol were fulfilled. EPA would not be able to accurately predict how many firms would elect to pay the fee and continue using CFCs and halons and how many would instead elect to reduce their consumption of these chemicals. EPA also questioned and requested comment on its legal authority under the Clean Air Act and Toxic Substances Control Act to impose a regulatory fee.

Many commenters agreed that a fee alone would not be an effective regulatory program since EPA would not be able to set the fee at the correct amount to achieve the required levels of control. Ten commenters supported the use of a fee to reduce the windfall to producers and thus, the incentive the windfall might have created to delay the introduction of substitutes. But others, primarily from the foam-blowing industry, objected to the use of a fee on the grounds that it would unnecessarily increase their costs of doing business.

Implicit in their argument is an assumption that any fee would be added to the price of CFCs and halons above and beyond increases created by market scarcity. Economic theory as described in two analyses sponsored by EPA, however, suggests that fees would not increase the price of controlled substances in such a manner. (Decanio, 1988 and Sobotka, 1988.) As long as the fee is set below the increase in price resulting from the limit on supply of CFCs, user industries would pay the same amount under either a fee system or an allocated quota system. Price increases would be limited by the forces of supply and demand regardless of whether they result from a fee or regulatory mandated scarcity. With fees, however, the windfalls go to the United States Treasury, while under a quota system, the transfers would go to the producers.

Under a system combining fees and allocated quotas, the cost to users would also be the same as either of these systems alone, and the transfers would accrue to the United States Treasury. As a result, adding a regulatory fee to an allocated quota system would not raise the price of CFCs and halons to users but would remove any potential advantage for a producer to delay or reduce the supply of chemical substitutes.

Commenters disagreed about whether EPA has legal authority to impose regulatory fees. Several public interest groups contended that section 157(b) of the Clean Air Act is sufficiently broad to permit EPA to use fees as a regulatory method. On the other hand, some chemical producers and a trade association asserted that EPA could levy fees, if at all, only to recoup the administrative cost of the program; fees sufficiently high to raise prices of controlled substances enough to reduce demand were beyond EPA's authority. These commenters also argued that to comply with the Clean Air Act's notice-and-comment rulemaking requirements, EPA would have to propose a more specific regulatory fee program before it could promulgate such a program. The Agency believes that the issues surrounding institution of a fees program deserve further attention, and in any event agrees that the December 14 NPRM did not provide adequate notice of what fee EPA would impose. The Agency has therefore decided to conduct further rulemaking on fees, as explained in the ANPR also published today.

3. Auctioned Rights

Instead of granting production and consumption allowances to past producers and importers, EPA sought comment on the use of an auction as the means of distributing allowances. Under this system, production and consumption allowances would be sold at auction to the highest bidder. Anyone seeking to produce or import CFCs or halons could purchase allowances directly at auction. To the extent chemical producers or distributors obtained allowances at auction, user industries could rely on their existing channels of supply to provide these chemicals. Alternatively, user firms could also obtain allowances directly through an auction or purchase them through a secondary market.

The December 14 NPRM discussed several key advantages (e.g., economic efficiency, transfers to the U.S. Treasury) and potential disadvantages (e.g., short-term speculation and hoarding) of this approach.

Chemical producers and a wide spectrum of CFC and halon user industries voiced opposition to an auction system. These commenters raised many of the concerns identified in the NPRM. They suggested that auctions would lead to speculation and hoarding, thus unnecessarily driving up the price of CFCs and halons. Others commented that regulation by auction fell outside EPA's legal authority. They also stated that this approach would be unfair to small businesses who would be unable to compete in an auction and would make planning difficult for producers.

In contrast, two automobile companies and three government agencies supported the use of auctions as an efficient and equitable regulatory system. Further, one government agency argued that speculation would increase rather than decrease market stability. One agency and several public interest groups also contended that EPA has the legal authority to use an auction to achieve its regulatory goal.

EPA believes that many of the concerns raised by industry would be short term. As a market price developed for CFCs and halons over time, any problems associated with hoarding and speculation would likely be diminished. However, because the next several years are critical in the transition to reduced reliance on CFCs and halons, EPA is concerned that these problems, if they did occur in the short-term, could significantly hamper a smooth transition away from ozone-depleting substances. EPA also recognizes that, like fees, auctions are a novel regulatory approach and consequently raise issues about the Agency's authority to employ them. EPA is concerned that a successful challenge to this regulatory approach would disrupt United States' compliance with the Montreal Protocol.

In the ANRM also published in today's **Federal Register**, EPA seeks additional public comment on the desirability of shifting to an auction system and a possible design feature to address the concerns raised by commenters.

4. Engineering Controls and Product Bans

EPA also requested public comment on the use of industry-specific engineering controls—the Agency's traditional approach to pollution control—to implement the Protocol. Thirty-two commenters stated that they opposed the use of EPA-mandated engineering controls or bans. These commenters provided many reasons against the use of this approach including: Reduced economic efficiency; increased administrative costs; inequitable treatment of industries (some would be regulated while others would not); failure to provide an across-the-board incentive for the development of chemical substitutes; and lack of assurance that the control requirement's goal would be achieved (e.g., increases in unregulated uses could offset required reductions).

In contrast, several environmental groups and many foam blowers supported the adoption of EPA-mandated engineering controls for industries with low-cost control options. These commenters argued that requiring such reductions would ensure that low-cost measures would be taken in a timely manner which, in turn, would minimize CFC and halon price increases

for all users. Several foam-blowers specifically supported engineering controls as a means of ensuring that other industries undertake cost-effective reductions available to them instead of deciding to continue to use CFCs and pay the higher prices. Other members of the foam industry suggested that EPA establish a "trigger event" (such as an increase in CFC price beyond an established guideline) after which the Agency would mandate controls.

In short, economic incentives as employed in an allocated quota system may not be enough to ensure the most cost-efficient control of CFCs and halons possible. At the same time, EPA is still mindful of the drawbacks of using industry-specific engineering controls and product bans. It also acknowledges that the December 14 NPRM did not propose any particular control or ban with enough specificity to permit the Agency to promulgate it in this rulemaking.

EPA intends to continually monitor progress made by each user industry to reduce its use of CFCs and halons. If the Agency determines that cost-effective controls exist but are not being adopted in a timely manner, it may require such actions. The ANPRM accompanying this final action discusses the specific circumstances which could lead to EPA-mandated control requirements.

5. Other Systems

Comments were also submitted on other regulatory options which were briefly mentioned in the December 14 NPRM. For example, several representatives of the auto industry supported a user (instead of producer) allocation system. Under this system, EPA would allocate allowances to the approximately 5,000–10,000 customers who purchase CFCs directly from chemical producers. The commenters did not suggest how this mammoth allocation might be accomplished, only that EPA could assess an administrative fee to pay for the costs.

EPA does not believe that a user allocation system would be feasible. Perhaps the simplest approach to making user allocations would be for EPA to obtain 1986 sales list from CFC producers and publish them for comment as the basis for its allocation. However, based on its recent experience in developing allocations for less than 30 producers and importers, the time and resources required to process and verify claims would be much more than the Agency has available and could not be completed before the Protocol's likely effective date (January 1, 1989). Also, user allocations based on sales records would require release of information that would be claimed confidential.

EPA considered allocating production rights to producers and auctioning consumption rights to users. However, because producers would still maintain control over production in this system, their market power would not be substantially diminished. Users could seek to buy controlled substances that are imports instead of domestic production, but since foreign producers must also live within the Protocol's limits (or have their imports banned by the Parties), the availability of imports of controlled substances would be restricted, leaving the market power of the domestic producers largely intact. In any event, EPA does not want to create a system that encourages greater reliance on CFC and halon imports.

6. Selection of the Allocated Quota System

EPA has concluded that the allocated quota system is the appropriate method for implementing the Montreal Protocol for several reasons. One, by directly regulating the supply of CFCs and halons, the allocated quota system is a straightforward method of ensuring that the requirements of the Montreal Protocol are met. Two, it is clearly lawful, in contrast to the auction and regulatory fee systems which raise legal issues. Three, as a market-based approach, the allocated quota system is economically efficient. Four, it is relatively simple to administer, since the producers and importers subject to the allocated quotas are small in number. While EPA recognizes that an allocated quota system has the potential for windfall profits and the concentration of market power in relatively few companies, it does not believe those disadvantages would prevent the system from bringing about the reductions in ozone-depleting substances required by the Protocol.

The Agency did not select regulatory fees as its implementing strategy because fees alone would not ensure compliance with the Montreal Protocol. It is quite possible that more firms would decide to pay the fee and continue using the CFCs and halons than should if the United States is to comply with the Protocol. Moreover, EPA's authority to administer a regulatory fee program is uncertain.

Like fees, engineering controls or bans could not ensure compliance with the Protocol, since uses of CFCs and halons that are left unregulated could continue to grow, thereby offsetting reductions in the regulated uses. Engineering controls or bans are also difficult to administer considering that thousands of firms use CFCs and halons.

The auction approach, like other market-based programs, is economically efficient. However, commenters expressed concern that auctions, at least initially, would create large uncertainties about price and availability and could lead to speculation and short term hoarding of permits during the auction process. Further, legal questions exist about EPA's statutory authority to implement an auction system. However, because auctions are a market-based system which, if, adopted, would ensure compliance with the Montreal Protocol and shift some of the windfalls from the producers to the United States Treasury, EPA is seeking additional public comment in the ANPR on the desirability of shifting to this approach.

EPA has selected the allocated quota system rather than other strategies, given the allocated quota system's capability of implementing the Montreal Protocol in an economically efficient, low cost manner and the legal and other concerns associated with other systems. However, EPA recognizes that the use of an allocated quota system standing alone could result in substantial windfalls to a small number of CFC and halon producers which could create an economic incentive for these firms to delay the introduction of chemical substitutes.

Because of this concern, EPA is continuing to examine several alternatives to the use of an allocated quota system alone. In the advance notice of proposed rulemaking (ANPRM) which is also published in today's **Federal Register**. EPA describes and seeks comment on supplementing allocated quotas with a regulatory fee to reduce windfall profits and/or with engineering controls or bans on specific uses of CFCs and halons to ensure that low cost reductions are made in a timely manner. The ANPRM also describes and seeks comment on placing a time limit on the use of allocated quotas and shifting to an allocation system based on auctions.

D. Design of Allocated Quota System

In response to comments on both its December 14 and May 24 NPRMs, EPA has revised several aspects of its allocated quotas system. The following paragraphs explain the operative sections of the rule and highlight any changes from the proposed rule and the rationale for such changes.

1. Effective Date (§ 82.2)

The December 14 NPRM stated that the rule would take effect when the Montreal Protocol entered into force. As noted above, the Protocol will enter into force on January 1, 1989, provided that at least 11 instruments of ratification, acceptance, approval of the Protocol or accession thereto have been deposited by Nations or regional economic integration organizations representing at least two-thirds of estimated global consumption of the controlled substances. If this condition has not been fulfilled by January 1, 1989, the Protocol will enter into force on the 90th day following the date on which the conditions have been fulfilled. (The Protocol also requires that the Vienna Convention first enter into force; the conditions for that agreement to take effect have recently been fulfilled, so that it will enter into force before January 1, 1989.)

Several commenters stated that the rule should not in any way be contingent on the Protocol. Moreover, because firms might increase production and stockpile controlled substances prior to January 1, 1989, the regulations should go into effect immediately upon promulgation.

EPA does not believe that firms will stockpile significant quantities of controlled substances before the rule goes into effect because storage facilities are limited and profit margins in the near term are not likely to make expanding storage economically attractive at this time. In any event, EPA believes that by holding off domestic implementation of the Protocol until it enters into force, the United States will be in a better position to encourage other key nations to ratify the agreement.

There is no question that broad international observance of the Protocol's control requirements is necessary to safeguard the ozone layer. Any reductions the United States could accomplish on its own by implementing the Protocol's requirements before the Protocol enters into force would be small compared to the protection offered by a ratified Protocol. (Although the United States now accounts for about 30 percent of global consumption of controlled substances, if only this nation and a few others limit future consumption, other nations would remain free to *increase* their consumption, making the United States contribution to control increasingly less significant). At the same time, United States' implementation might suggest to more reluctant nations that they need not undertake the required controls right away. EPA thus considers it prudent to stay domestic implementation of the Protocol until it enters into force.

EPA remains optimistic that the conditions for entry into force will be satisfied by the January 1, 1989 target date. Governments throughout Europe, and in Australia, Japan and the Soviet Union are well along in their own process of ratification. Recently, the Administrator of EPA sent a letter to his counterparts in other nations urging their speedy ratification of the Convention and Protocol. EPA intends to continue to closely monitor progress toward ratification. If the Agency at some future date determines that a delay is likely, it will reassess what, if any, action should be taken.

In a change from the December proposal, EPA has made paragraph § 82.13(f)(1) of its rule effective as of September 12, 1988. This requirement relates to the method by which EPA will measure production of CFCs and halons, and requires producers to inform the Agency of their current measurement techniques. EPA needs this information even before the Protocol's target effective date in order to have enough time to prepare compliance monitoring guidelines before the likely date of the first control period, July 1, 1989. If EPA did not obtain this information until after the Protocol entered into force, it could not ensure compliance with the freeze requirement.

2. Definitions (§ 82.3)

EPA received comments on many of its definitions both from respondents to its data collection rule (§ 82.20) and from commenters on its December 14 NPRM. The Agency sought to clarify several of its definitions (e.g., controlled substance, production, importer and exporter) in its May 24 supplementary proposal. This section discusses the key definitions and summarizes comments received on the two NPRMs and the resulting changes in the final rule.

a. Control Periods. In its December 14 NPRM, EPA defined control periods as those periods during which the prohibitions under § 82.4 (limits on production and imports) would apply. It reserved the actual dates of the control periods for future determination, because the timing of the first control period depends on the date of the Protocol's entry into force. EPA must therefore wait until that date is known before it can publish in the **Federal Register** the exact dates for every control period.

EPA sought comment on a further complication in determining control periods. The Protocol specifies 12-month control periods for all three steps in the Group I (i.e., CFCs) reduction schedule (i.e., freeze, 20 and 50 percent reductions). While the Protocol provides that the second step will begin on July 1, 1993, it makes timing of the first step contingent on when the Protocol enters into force. If the Protocol enters into force on January 1, 1989, then the freeze will go into effect on July 1, 1989, and each control period thereafter would last for 12 months without any overlap between step 1 (freeze) and step 2 (20 percent reduction). However, if the Protocol enters into force on any date other than January 1, 1989, then there would be overlapping control periods unless the last control period of the freeze is shortened to less than 12-months.

In its December 14 NPRM, EPA stated that it intended to handle this potential overlap, if it arose, by shortening the last control period in the freeze stage so that no overlap occurred and prorating annual allocations for that truncated control period.

EPA received one comment on this issue from a chemical producer which stated that any control period less than a year could prove disruptive because of the seasonal demand for CFCs. The commenter explained that CFC production increases dramatically during summer months because of higher demand for CFC–12 and–11 as a coolant. A shortened control period with a prorated allocation would prove economically disruptive if it coincided with this period of peak demand. It suggested that EPA should define overlapping control periods with the last freeze control period running into the first control period of the 20 percent reduction stage.

EPA proposed to define the control periods so that no overlap would occur in part because it believed that the drafters of the Protocol did not intend control periods to overlaps. Evidence of this intent is the fact that no overlap will occur if the Protocol enters into force on the target date and that the latter two control periods are defined as consecutive. However, EPA recognizes that the Protocol does define all control periods as lasting 12 months, and that a control period of less than a year could disrupt companies' production plans. The Agency has thus decided to define control periods as overlapping between the freeze and 20 percent reduction stages if the Protocol enters into force on a date other than January 1. Should the Protocol parties decide on a different approach to control periods, however, EPA will change its definition accordingly.

b. Controlled substances. Consistent with the Montreal Protocol, EPA initially proposed defining this term as "any substance listed in Appendix A to this Part, whether existing alone or in a mixture, but excluding any such substance or mixture that is in a manufactured product other than a container used for the transportation or storage of the substance listed."

A number of firms that responded to EPA's data collection rule (§ 82.20) found this definition confusing, and as a result, EPA included in its May 24 supplemental proposal further clarification. This clarification attempted to better distinguish "bulk" CFCs or halons from CFCs or halons contained in products; the Protocol drafters and EPA intended that only bulk CFCs and halons be subject to the freeze and reduction requirements. For example, while CFCs contained in a refrigerator are clearly not covered by the definition of controlled substances, it is less clear whether CFCs contained in small cans used to refill a car air conditioner would be considered in bulk form and thus a controlled substance or contained in a product and thus not a controlled substance.

Technical experts called together by UNEP to discuss implementation of the Protocol (Nairobi, January 1988) recommended that the Protocol's definition be clarified as follows: "Any amount of a [listed] substance or a mixture of [listed] substances which is not part of a use system containing the substance is a controlled substance and not a product containing a controlled substance [for the purpose of the Protocol]. If a [listed] substance or mixture must first be transferred from a bulk container to another container, vessel or piece of equipment in order to realize its intended use, the first container is in fact utilized only for storage and/or transport and the [listed] substance is considered [in] bulk [form or a controlled substance] and not a product". Under this modified definition, for example, CFCs in small cans used to refill refrigerators and car air conditioners would clearly be in bulk form and therefore be counted as controlled substances. EPA concluded that this clarification captured the bulk-versus-product distinction the Protocol drafters had sought to make, and proposed in its May 24 supplemental notice to add the clarification to the rule's definition. Comments on that notice supported the proposed clarification, and it has been incorporated into the final rule.

EPA also addressed the need for "rules of thumb" in determining whether an ozone-depleting substance was in bulk form and thus a controlled substance. In reviewing the data submitted for purposes of calculating company-specific allocations, the Agency found that importers and exporters of CFC–113 in small containers did not always know the use to which the containers were ultimately put. EPA developed a "one gallon rule" to decide whether the reported CFC–113 was a controlled substance or not if the use of the container could not be determined; if the container of CFC–113 was under one gallon in size, the Agency assumed it was used for direct cleaning and thus not a controlled substance. EPA stated that for purposes of implementing the proposed rule, it would use the one gallon rule where the use of a container of CFC–113 was not known, and suggested that it might develop other rules of thumb as circumstances warranted.

Commenters supported EPA's rule of thumb for CFC–113 and suggested that it be extended to metric containers equivalent to one gallon in size and to other chemicals. EPA agrees that its one gallon rule should apply to containers that are approximately 4 liters in size. It also agrees that the rule should be applied to small containers of controlled substances other than CFC–113, but also only when the use to which those containers will be put cannot be determined.

As several commenters recommended, EPA intends to establish a process by which industry could seek further clarification of the definition as new ambiguities arise and by which the Agency would develop any other rules of thumb.

c. Export/Import. The December 14 NPRM and final rule (§ 82.20) defined export as "the transport of controlled substances from within the United States or its territories to persons or countries outside the United States." Several respondents raised issues concerning specific applications of that definition. Several questioned whether shipments of controlled substances to United States military bases abroad should be counted as exports. Others questioned whether controlled substances used on-board ships were to be considered exports.

As part of its May 24 NPRM, EPA proposed that in both cases the controlled substances *not* be considered exports. In the case of shipments to United States military bases abroad, the United States is clearly the beneficiary of the controlled substances and should count them toward its consumption limit. In both cases, it is unlikely that any other nation would claim them as imports. As a result, failure to include them as part of United States consumption would likely result in undermining the effectiveness of the Montreal Protocol by allowing some subset of controlled substances to remain unclaimed and unreported by any nation as consumption. Comments on this provision generally supported the clarification proposed on May 24.

For the reasons mentioned above, EPA has revised the definition of exports to specifically exclude shipments to United States military bases and to ships for on-board use.

In its May 24 supplemental proposal, EPA also discussed the potential export and import of recycled or used controlled substances. EPA explained that the Nairobi technical experts group had suggested that production be defined in the Protocol to exclude recycled substances but that export and import be defined to include them. The Agency noted that its definition of production already excluded recycled controlled substances, and described how its consumption allowances would allow import of used controlled substances and export of recycled substances.

Several commenters agreed that recycled and used controlled substances should be included in the definition of export and import. They noted, however, that not all used substances could be recycled, so that consumption allowances expended to import used substances would not be completely replaced by consumption allowances granted upon proof of export of the recycled used substances. They accordingly recommended that consumption allowances be required only for that portion of used substances that could be recycled. Another commenter instead argued that agreements between nations to recycle would be facilitated if the Agency's rule did not cover used or recycled controlled substances at all.

Since preparing the May 24 supplemental proposal, EPA has realized that defining export in its rule to include recycled *and* virgin controlled substances would risk United States noncompliance with the Protocol. Since the Agency's rule defines production to exclude recycled controlled substances, firms could recycle those substances without expending production and consumption allowances. However, if export is defined to include recycled substances, on exporting the recycled substances firms would receive authorization to convert potential production allowances and consumption

allowances in the amount of the recycled substances exported. Thus, as a result of exporting recycled substances for which no production and consumption allowances were expended, firms would realize a net increase in production allowances (up to the 10 or 15 percent limit on potential production allowances) and consumption allowances. They could then use these additional allowances to produce or import and *sell domestically* controlled substances in excess of the amount the initial allocations authorized.

If this occurred, the United States would exceed its limits under the Protocol. EPA's rule allocates consumption allowances equal to United States 1986 consumption and allows firms to obtain additional consumption allowances only upon proof of export, so that total available consumption allowances never exceed the United States consumption limit under the Protocol. If firms could recycle controlled substances without expending production and consumption allowances, but obtain production and consumption allowances upon exporting the recycled substances, total consumption allowances would exceed the United States limit. EPA cannot permit this and still comply with the Protocol, so it has revised the definition of export to make clear that only virgin production is covered by that term. In addition, it has revised the provisions governing the availability of consumption and production allowances to specify that only exports of virgin production will entitle a person to additional allowances. Firms can continue to export recycled or used controlled substances, but will not receive additional consumption or authorization to convert potential production allowances.

At the same time, EPA believes that imports must be defined to include both virgin and recycled or used chemicals. The potential would otherwise exist for virgin controlled substances to be mislabelled as recycled or used chemicals so that they could be imported without consumption allowances. To ensure that the United States does not exceed its consumption limit by inadvertently importing virgin production that has been labelled recycled, the definition of import in EPA's rule must be and has been revised to include both types of production. The Agency realizes that by defining import and export differently in this way, the rule no longer allows producers to recoup consumption allowances expended to import used controlled substances for recycling with allowances granted upon export of the recycled substances. Depending on how this issue is addressed by the Protocol Parties, EPA will consider revising its rule so as to provide consumption allowances for export of recycled substances without risking United States noncompliance with the Protocol.

d. Exporter. The December 14 NPRM did not contain a definition of exporter, but simply referred to an exporter as the person who exported the controlled substance (proposed § 82.13(g)). The December 14 final action defined exporter also in terms of the movement of controlled substances from within the United States to outside the country (§ 82.20(a)(3)).

The lack of a specific definition created considerable confusion over who should be considered the exporter. Clearly defining the exporter is important for determining both who must comply with the final rule's reporting requirements [§ 82.13) and who will obtain upon proof of export consumption allowances and authorization to convert potential production allowances to production allowances [§§ 82.10 and 82.11).

In its May 24 supplemental NPRM, the Agency proposed to define exporter as the person or company that enters into a contract to sell controlled substances to a person or company located outside the United States for use outside the United States. EPA believed the persons meeting this definition would likely have knowledge of the Agency's reporting requirements and incentive to seek the additional allowances available upon proof of exports. While commenters generally supported this approach, one chemical company pointed out that this definition fails to cover transactions between subsidiaries of multinational corporations that do not entail contracts of sale. Taking this comment into consideration, the Agency has modified its definition of exporter to "the person who contracts to sell controlled substances for export or transfers controlled substances to his affiliate in another country."

e. Importer. EPA did not directly define importer in either the December 14 NPRM or the final rule published on December 14. Instead, in the final rule EPA referred to importers as "persons who transported the chemicals listed in § 82.20(b) from outside the United States or its territories to persons within the United States or its territories." The December 14 NPRM also referred to an importer as "any person who imports controlled substances" (§ 82.13(f)).

Public response to both of these notices suggested that it was not clear who EPA considered to be the importer. The definition of importer is important because it determines who receives the initial allocation of consumption rights (§ 82.6), who is required to submit reports to EPA (§ 82.13(f), and who must hold consumption rights to authorize the importation of controlled substances (§ 82.4).

In its May 24 supplementary proposal, EPA proposed to define importer for the purpose of allocating consumption rights as "the first United States owner who is a supplier to or a member of the domestic industry that uses the controlled chemicals." EPA stated that this definition would generally result in consumption rights being allocated to the "importer of record" on United States Customs documents (the party responsible for obtaining a shipment's legal entry in the United States). However, in the few cases where the importer of record was a transfer or shipping agent and not the first United States' owner, the definition would mean that the first United States purchaser of the imports who was a member of the producer or user industry would receive the consumption rights allocation. EPA considered this definition appropriate not only because it would result in consumption rights being allocated in every case to members of the CFC and halon producer or user industries, but because it also provided a reasonable and rational basis for resolving which of two parties claiming 1986 imports should receive the applicable consumption allowances.

During the public comment period for the May 24 proposal, EPA identified another competing claim that was different from those it had considered in developing the proposed definition of importer. This claim involved, on the one hand, the shipments' importer of record which is a member of the domestic user industry and, on the other, the shipments' first United States owner (based on submitted invoices) which is a foreign producer's subsidiary. In the case of the competing claims discussed in the May 24 NPRM, application of the proposed definition always resulted in the claim being awarded to the importer of record, unless the importer of record was not a supplier to or member of the domestic user industry. However, in the case of the recently identified competing claim, the proposed definition would identify the foreign producer's subsidiary even though it was *not* the importer of record.

EPA had explained in the May 24 NPRM that it preferred its proposed

definition in part because it would result in the importer of record being awarded the claim except where a mere shipping agent was the importer of record. The Agency thought this result appropriate because the importer of record was legally responsible for obtaining the shipment's entry into the United States, and because in most cases shipments claimed by importers of record were *not* also claimed by anyone else.

On further reflection, EPA has concluded that its proposed definition reasonably resolves competing claims even though in the case described above, its application will result in a claim being awarded to a supplier to the domestic user industry that is *not* an importer of record. Given the many different ways import transactions can be configured, defining importer as the person who paid the foreign producer for the shipment (i.e., "the first United States owner") is both simple and logical. The first United States owner can in every case be considered to have "caused" the import since it paid the foreign producer for the shipment. To define the importer as the United States firm that placed the order with the foreign producer, as some commenters suggest, would extend the chain of causality which could arguably be extended further. For example, the customers of that United States firm could also argue that they "caused" the import by creating the demand. EPA has also come to appreciate that what firm is the importer of record may often be a matter of proximity to ports and thus an accident of convenience, or of a business relationship independent of the sale of the control substances.

Where two firms claimed to be the "first United States owner," EPA resolved the dispute in favor of the firm that paid the foreign producer for the imported chemicals, as indicated by submitted invoices. One commenter argued that payment to the foreign producer was not dispositive of ownership, and that the nature of the relationship between the producer and its United States subsidiary is also relevant. It specifically recommended that if the two firms are principal and agent or consignor and consignee, EPA should not consider the subsidiary an owner even if it paid its parent company for the shipment.

While the commenter's suggested application of the "first United States owner" definition might be plausible, EPA notes that it has discretion in applying terms of its own creation. The Agency chose the "first United States owner" definition in part because of its administrative simplicity. It likewise applied that definition in a straightforward manner—who paid the foreign producer—to preserve the advantage of simplicity. The commenter's suggested application would have required EPA to determine the legal relationship between firms and the significance of that relationship for the concept of "ownership," and undertaking which the Agency has neither the time nor resources to complete. EPA believes its application of its definition is reasonable under the circumstances.

In defining importer for allocation purposes and applying that definition, EPA is faced with assigning valuable allowances based on actions taken in the past with no awareness of their future significance. Any choice the Agency makes will thus seem inequitable to the firms whose claims are rejected in EPA's resolution of competing claims. EPA considered dividing claims between competing firms, but rejected this approach because there was no assurance that this approach would satisfy the firms involved. Moreover, the many firms that could have, but did not, submit competing claims would likely assert that, in light of an Agency decision to divide up competing claims, they should have the opportunity to submit those claims now.

The Agency also rejected one commenter's request that it conduct evidentiary hearings to determine who "most" caused an import to occur. First, EPA already has the information such hearings would be likely to provide. Second, what weight to give what factors (e.g., who placed the order with whom, who supplied what aspects of the transportation) would entail only more linedrawing that could be second-guessed any number of ways. Third, conducting such hearings would be administratively burdensome and, by delaying completion of the rule, could jeopardize the United States' ability to comply with the Protocol.

The Agency regrets that it could not honor all firms' import claims. However, the competing claims left EPA with no practical choice but to define importer in a manner that would identify only one firm. It believes its proposed definition is reasonable for the reasons given above, and has thus adopted that definition for purposes of allocating consumption allowances based on 1986 imports.

In the May 24 NPRM, EPA also indicated that it was considering defining importer differently for purposes of enforcing the rule's prohibition against importing controlled substances without consumption allowances. EPA expressed concern that as an ongoing matter, it may be administratively burdensome to determine who is the first United States owner and who is a supplier. It stated that requiring a shipment's importer of record to hold the consumption allowances authorizing the shipment would be easier to implement, and that purchasers of those shipments would be likely to ensure that the importer of record held the necessary consumption allowances.

Several commenters indicated that they would prefer that the first United States owner definition used for allocating consumption allowances also be used to determine who should hold consumption allowances authorizing an import shipment. However, one of these commenters suggested that the importer of record, where different from the first United States owner, also be required to report the shipment.

Notwithstanding these comments, EPA still favors defining importer as the importer of record for purposes of enforcing the rule's requirements. That definition avoids the potential for EPA becoming entangled in disputes between companies as to who is the first United States owner and who is a supplier to the user industry. It also avoids the need to require both the first United States owner *and* the importer of record to report the shipment. With advance knowledge of this definition, firms can decide wether they should be the importers of record for future shipments or should make arrangements with other companies to ensure that shipments are covered by the necessary consumption allowances.

EPA notes that the final rule defines importer only as the importer of record. Since the rule specifies firms' consumption allocations, there is no need for the definition of importer underlying those allocations (i.e., the first United States owner) to appear in the rule. The importer of record definition is included in the rule because it determines who is subject to the rule's prohibition against importing controlled substances without consumption allowances.

f. Production. The December 14 NPRM defined this term as "the manufacture of a controlled substance from any raw material or feedstock chemical; however, production does not include the manufacture of controlled substances that are used and entirely consumed in the production of other chemicals."

The public comments on the December 14 NPRM raised several

issues related to this definition. In addition, at the Nairobi meeting of technical experts, other nations suggested modifying the definition of production in the Montreal Protocol ("the amount of controlled substances produced minus the amount destroyed by technologies to be approved by the parties") so that reprocessed or recycled controlled substances would not be counted as part of a Party's production. The technical experts group agreed to suggest modifying the definition in the Protocol to state that production equals total production, including reprocessed and virgin chemicals, minus purchases of controlled substances for purposes of recycling. This definition would permit recycled controlled substances from one nation to be mixed with virgin production from another nation without the latter nation having to count the recycled portion as part of its production.

EPA explained in its May 24 supplemental NPRM that its definition of production, which is limited to manufacture from raw materials or feedstock chemicals, already excludes the portion of any output that results from reprocessed controlled substances. As a result, EPA proposed not to alter this aspect of its definition of production and commenters agreed that no alteration was necessary. The Agency has thus adopted the definition of production proposed in its December 14 NPRM.

Another issue related to the definition of production concerns the definition's exclusion of "controlled substances that are used and entirely consumed in the production of other chemicals." In its May 24 supplemental NPRM, EPA discussed the need to clarify limits on the use of this exclusion. Specifically, the Agency proposed that, because of potential administrative burdens and problems of verification, this exclusion would be limited to transformation of controlled substances that are produced and transformed by the same company. Thus, one company could not buy a controlled substance from another company and receive credit against its production by transforming that controlled substance. Nor could a company in the United States receive credit for transformation of a controlled substance produced in another country. EPA proposed to modify its definition of production to specifically include this limitation.

Four chemical companies commented that such restrictions would unduly limit the use of controlled substances as chemical feedstocks. They suggested that the producing and transforming firms could report and document any such transformations, and that the feedstock producers should receive credits. One commenter also argued that the proposed limitation would prevent companies that are not producers from entering into a business that uses controlled substances as feedstock.

The Agency notes that the proposed limitation would not prevent companies that do not produce feedstocks from purchasing feedstocks from producers. Also, it is not clear to EPA that small companies would be disadvantaged in competing against fully integrated companies, since their ability to purchase feedstocks will depend on future prices of controlled substances and the availability of product and chemical substitutes.

In any event, EPA believes that granting production credits for feedstock transformation involving two companies raises several difficult issues that require further study. One issue is which company should receive the production credit—the company which produced the feedstock or the company which transformed it. Similarly, the group of technical advisors to the Protocol could not agree on which country should be granted production credits in the case of feedstocks traded between countries.

There are also documentation issues. If the company transforming the feedstock is not the company receiving the credits, the transforming company would seem to have little incentive in maintaining accurate records. More generally, quantifying and verifying the amount of feedstock transformed and tracking the transfer and use of transformation credits would add layers of complexity to the Agency's compliance monitoring task.

These issues are even more difficult to resolve where transformations involve controlled substances produced in another country. Because of these concerns, EPA has decided to initially limit credit to production and transformation of feedstocks by the same company and will evaluate the possibility of expanding this provision in the future.

A third issue related to the definition of production involves EPA's decision in the December NPRM (see footnote 6 on page 47501) not to initially provide production credit for the destruction of controlled substances as the Montreal Protocol permits. (Under the Protocol, CFCs and halons destroyed by technologies to be approved by the Parties would not be counted as production). EPA stated that since no destruction technologies had yet been approved by the Parties it was deferring implementation of this provision, but that "EPA intends to work closely with industry in the future to review existing and new destruction technologies and, if appropriate, submit these technologies to the Parties for their approval."

Six chemical producers and users urged EPA to define production to reflect this destruction credit provision in its final rule as a means of encouraging the rapid development and implementation of destruction technologies. EPA agrees that efforts should be made to further development of destruction technologies. However, regardless of what it now includes in the rule, EPA will have to modify the rule to specify any destruction technologies once they are approved by the Parties, as well as reporting and recordkeeping requirements adequate to monitor their implementation. Thus, the Agency believes that modifying its definition of production when the Parties approve technology will be more efficient. In waiting to do so, the Agency will also benefit from the experience gained under the rule until that time.

Firms with potential destruction technologies are encouraged to expeditiously develop these technologies and to work with EPA to gain their approval by the Parties. EPA fully intends to modify its rule to allow for the grant of production credits as soon as destruction technologies are approved.

3. Prohibitions (§ 82.4)

The prohibitions section of the rule stipulates that no person may produce controlled substances at any time during any control period in excess of the amount of unexpended production allowances held by that person at that time, and that no person may produce or import controlled substances at any time during any control period in excess of the amount of unexpended consumption allowances held by that person at that time. It further specifies that both valid unexpended production and consumption allowances are required for production, while only valid unexpended consumption allowances are necessary for the importation of controlled substances.

The proposed rule specified that a person must "own" or "hold" production and consumption allowances to produce or import controlled substances. The final rule instead requires that allowances "held by that person under the authority of this Part" be sufficient to cover that person's production or import. EPA made this change to clarify its intention to only credit persons with production and consumption allowances

that the Agency's records show they possess or that the person has properly obtained by the means specified in the regulations. The Agency also sought to avoid having to determine who has legal ownership of allowances or becoming entangled in ownership disputes.

As explained in the December 14 NPRM, the use of both consumption and production allowances are required to ensure compliance with the consumption and production limits of the Montreal Protocol. One commenter suggested that EPA limit only production and not consumption, but if EPA does not limit imports as well as production, the United States could exceed the Protocol's limits on consumption, which is defined as production plus imports minus exports. EPA also sought through the use of consumption and production allowances to provide industry with the maximum flexibility available under the terms of the Protocol.

EPA received several comments on its proposed penalty which defined a violation in terms of "every kilogram" of production or importation in excess of unexpended production or consumption allowances. As explained in the December 14 NPRM, under section 113(b) of the Clean Air Act, penalties of up to $25,000 per day per violation can be assessed.

Several chemical producers generally believed that a penalty of $25,000 for each kilogram was excessive and impractical. They stated that given the nature of the process used to produce these chemicals, they cannot control or even measure production output to the level of a kilogram. One commenter stated that production output is measured based on storage in large holding tanks and therefore can only be measured with an accuracy of 1–2 percent. They argued that they should not be accountable for exceedances which they believed they could not accurately measure. In addition, these commenters suggested that EPA modify its rule to allow production overruns in one year to be compensated by a reduction in allocated allowances in the following year. A public interest group, on the other hand, supported EPA's proposed definition of a violation, stating that it would prevent significant "leakages" of controlled substances in excess of production and consumption limits.

In the time since its December NPRM, EPA has conducted several site visits to review the level of accuracy that producers can achieve in their production control and measurement, and the recordkeeping procedures they currently employ.

The Agency recognizes that controlling the exact quantity of production is difficult and that measuring large quantities of controlled substances is subject to a small degree of error. However, the Montreal Protocol requires that Parties live within specified limits, and EPA has apportioned allowances that total to those limits. Were the Agency to define violations in units of 1,000 kilograms, for example, it would effectively license firms to exceed their limits by 999 kilograms. Were firms to take advantage of this flexibility, the United States would find itself in violation of the Protocol. Thus, EPA has adopted the provision that every kilogram of production or import in excess of valid unexpended production or consumption allowances is a separate violation of the rule.

Even though EPA has defined violation in terms of one kilogram, the Agency does not intend to necessarily seek the maximum statutory penalty for each violation. EPA intends to develop and administer a penalty policy that will effectively deter noncompliance, while at the same time recognizing that production of controlled substances cannot always be precisely controlled or measured. (The Agency notes that importers typically purchase controlled substances in kilogram units, so that they should be able to more precisely account for their shipments.)

In developing that policy, EPA will review potential price increases of controlled substances and estimate the penalty necessary to deter exceedences. The Agency will also consider the practical degrees of control in current production processes, the accuracy of measurements and industry recordkeeping in general, and the ability of EPA to monitor compliance. In assessing actual penalties, EPA will take into account these factors as well as the magnitude of the exceedence and the types of internal controls used by the firm.

EPA has also decided not to alter its prohibition provisions to allow producers and importers to exceed their allowances in one control period in exchange for a reduction in their allowances the next. The Montreal Protocol defines control periods in terms of 12 months and requires that controls be achieved during the 12-month period. Thus, the Protocol does not provide for the flexibility the producers seek, and EPA may not provide it without risking United States' noncompliance with the Protocol.

Section 82.4(d) implements the provision in the Montreal Protocol prohibiting Parties from importing controlled substances from nations not Party to or not complying with the Protocol beginning one year after the Protocol enters into force. No comments on this provision were submitted, but EPA requested and received comments on other possible trade provisions. Specifically, EPA requested comment on the desirability of moving forward in time implementation of the Protocol's provisions restricting the importation of products containing or produced with controlled substances from non-Parties. Eight commenters (chemical producers, user industries and public interest groups) urged EPA to take such action. However, most commenters generally urged EPA not to take action beyond that required by the Montreal Protocol, arguing that such action would be economically disruptive without improving environmental protection.

EPA does not believe that implementing trade prohibitions in tandem with the Protocol will adversely affect United States industry's ability to compete with companies from countries not Party to the Protocol in the early years following the agreement's entry into force. CFC and halon prices are not likely to increase significantly in the early years of the Protocol if firms act in a timely manner to employ cost-effective reductions. Moreover, most of EPA's major trading partners (e.g., Japan, Canada, Mexico, Western European nations) are likely to become Parties to the Protocol. However, EPA will continue to monitor this situation and may determine in the future that early implementation of trade restrictions against non-Parties is warranted.

4. Apportionment of Baseline Production Allowances (§ 82.5)

This section of the rule sets forth companies' baseline production allowances and the basis for calculating them. To determine these allowances, EPA in its December 14 final rule required producers of controlled substances to submit data documenting their production levels in 1986, the baseline year specified by the Protocol. After reviewing these data submissions for completeness and accuracy, EPA published a supplemental proposal on May 24 containing proposed company-specific allocations and clarifying the definition of relevant terms.

EPA proposed to calculate each producer's baseline allowances in three steps. First, consistent with the rule's definition of production, the producer's 1986 production level of each controlled chemical was reduced by the amount of that chemical the producer used in 1986 to make other controlled substances.

Second, the producer's adjusted production of each controlled chemical from raw materials or feedstocks was multiplied by that chemicals' ozone depletion weight as set forth in Appendix A of the December 14 proposal to arrive at a "calculated level" of production. Finally, the resulting calculated levels were added together for Group I chemicals and for Group II chemicals. Firms that produced chemicals in both Group I and Group II were thus apportioned separate production allowances for Group I and Group II chemicals.

EPA received comments from one chemical producer on its December 14 NPRM opposing its proposed basis for calculating baseline production allowances. This producer suggested that, in the case of halons, EPA should use a 1987 base year to more accurately reflect current free market conditions. It also suggested that allocations for halons should be based only on "non-government" business to avoid providing a competitive advantage to past vendors who sold to the federal government, the single largest consumer of these chemicals.

The Agency does not agree with either comment. The Protocol specifies 1986 as the baseline year. EPA could only use a different year as a baseline and ensure compliance with the Protocol if it prorated 1987-based allowances so that they do not total to more than 1986 United States' production. To do this would entail EPA collecting and reviewing data for both 1986 and 1987, and otherwise complicate a process the Agency already found cumbersome. Moreover, use of 1986 as the baseline year is more equitable because firms may have changed their market behavior in 1987 in response to on-going Protocol negotiations. EPA also sees no compelling reason to distinguish past sales to the government (or any other large users) from any other past sales. As EPA defined and proposed it, the allocated quota system simply grandfathers past market shares. Since the rule permits allowances to be transferred, however, market shares may still change in the future.

In comments on the May 24 NPRM, firms generally agreed with their proposed production allowances. EPA reviewed the comments and is including final allocations in the final rule.

5. Apportionment of Baseline Consumption Allowances (§ 82.6)

To implement the Protocol's limits on consumption (defined as production plus imports minus exports), the calculation of baseline consumption allowances requires reducing the sum of production and imports by exports. Complications arise in attributing exports to producers and importers. In all other respects, consumption allowances are calculated in the same manner as production allowances.

In the December NPRM, EPA proposed to simply allocate exports to producers in proportion to their 1986 market share of production, since producers were responsible for most exports presumably in proportion to their share of the production market. In response to public comments questioning the equity of this approach, EPA proposed in its May supplemental NPRM to calculate each firm's consumption allowances by subtracting the amount of controlled substances that firm *directly* exported in 1986. Accordingly, importers as well as producers would have their consumption allowances reduced to reflect their direct exports. Since not all exports could be traced to a producer or importer, EPA also proposed to attribute the remaining exports to producers in proportion to their 1986 market share of production. In addition, EPA stated that because the final rule would contain the company-specific apportionments, it would omit from the final rule the explanation of how they were calculated.

Several firms urged EPA to take additional steps to trace exports back to their original producer. EPA concludes that it would be impractical and in many cases infeasible to undertake such an exercise. To verify claims of consumption allowances, the Agency examined large volumes of supporting documentation and in some cases corrections were made to the claims. EPA believes that a similar verification process requiring supporting documentation would be required to assign the unattributed exports to producers and importers. Further, EPA would have to obtain the exporter's proof of purchase from a producer or importer to assign these unattributed rights appropriately. Although providing the necessary documentation might be relatively easy for some firms, for others it would be difficult and in some cases even impossible. Where exporters bought CFCs from multiple sources, adequate documentation to determine the sources of particular exports simply does not exist. Given how little time remains before the Protocol is due to enter into force and the infeasibility of tracing all exports, EPA has decided against attempting to further attribute currently unattributable exports.

Two commenters complained that use of the proposed correction factor would unfairly penalize producers that had produced little or no controlled substances for direct or indirect export. They suggested that EPA allocate the unattributed exports in proportion to a firm's direct exports rather than production. EPA disagrees with this approach. The Agency does not believe that there is any correspondence between a manufacturer's share in the direct export market and that manufacturer's share of the non-producer exports since exporters could have purchased from any of the producers in the marketplace. The Agency also cannot be certain that exporters did not purchase any controlled substances from the producers who claim not to have contributed even indirectly to the export market. To verify such claims, EPA would have to trace potentially long chains of sales and resales, which the Agency has neither the time nor resources to do. As a result, EPA believes that the apportionment of unallocated exports based on production share is a more equitable approach.

Another commenter noted that it exported a chemical it did not produce and thus argued that it should not have the export of that chemical subtracted from its consumption allowance. It likened its exports to those of exporters who are neither producers nor importers and whose shipments have consequently been placed in the unattributed exports pool for allocation to producers by means of the correction factor.

EPA agrees with this commenter. In calculating consumption allowances, the Agency sought to attribute exported chemicals to those firms that were responsible for the production or import of the chemicals. In the case of this commenter and two other firms that EPA identified based on information submitted in response to the December 14 final rule, the Agency subtracted from their proposed consumption allowances exported chemicals of a type they neither produced nor imported. EPA has thus placed those exports in the unattributed export pool and modified producers' consumption allowances accordingly.

As discussed above, the Agency has decided to require consumption allowances for import of used controlled substances for recycling. EPA thus considers it appropriate to allocate firms' consumption allowances in the amount of any 1986 import of used controlled substances, so that they may continue to engage in recycling without having to purchase consumption allowances that could otherwise be used

to produce or import virgin production. EPA identified one firm that imported used controlled substances in 1986 and has increased that firm's consumption allowance accordingly

6. Grant and Phased Reduction of Baseline Production and Consumption Allowances for Group I Controlled Substances (§ 82.7)

This section of the rule implements the Protocol's phased reduction of CFCs (Group I controlled substances). It grants companies decreasing percentages of their baseline production and consumption allowances in step with the Protocol's three-stage reduction schedule. Following entry into force of the Protocol, companies are granted 100 percent of their baseline allowances for the control periods during which the Protocol requires a freeze in production and consumption of Group I controlled substances. (As stated earlier, once EPA knows the date of entry into force, it will publish a **Federal Register** notice giving the dates of the control periods for the freeze and subsequent stages.) As of July 1, 1993, companies are granted 80 percent of their baseline allowances for each control period and as of July 1, 1998, 50 percent of their baseline allowances.

As described earlier, should the Protocol not enter into force on January 1, 1989, the first control period would not begin on July 1, 1989. In that event, EPA intends to implement the Protocol's 12-month control periods by having overlapping periods during the transition from the freeze stage to the 20 percent reduction stage. EPA has accordingly modified the rule to grant 100 percent of 1986 baseline levels for each of the control periods which "begins" before July 1, 1993, instead of "ends" before July 1, 1993. The only effect of this change will be to allow the last 12 month control period of the freeze to continue beyond July 1, 1993, if necessary. Of course, firms will also have to meet the 20 percent reduction requirement for the 12-month period beginning on July 1, 1993.

One chemical producer raised an additional issue concerning the timing of control periods. While recognizing that EPA's regulation cannot accomplish this goal, it suggested that the Protocol be modified to shift control periods to calendar years. EPA notes, however, that agreement on the timing of the staged reductions was reached only after considerable negotiations and only just before the Protocol was signed. As a result, EPA strongly believes that, notwithstanding the minor inconvenience that may result from the use of 12-month periods which are not coincident with the calendar year, reopening this issue at this time is inappropriate. However, the issue of stringency and timing of controls will be reviewed by the Parties under Article 6 of the Protocol at which time this issue can be further addressed.

7. Grant and Freeze of Baseline Production and Consumption Allowances for Group II Controlled Substances (§ 82.8)

This section implements the Protocol's freeze of the production and consumption of halons (Group II controlled substances). It grants companies 100 percent of their baseline production and consumption allowances for the control periods specified in § 82.3(f)(2). Section 82.3(f)(2) is reserved for future determination by EPA, because the Protocol provides for the halon freeze to begin on the first day of the thirty-seventh month following the Protocol's entry into force. Assuming the conditions required for entry into force are satisfied by January 1, 1989, the restrictions on halons would take effect on January 1, 1992. If entry into force is delayed, the freeze on halons would also be delayed. EPA will publish the dates of control periods for Group II controlled substances soon after the date of entry into force has been determined.

8. Availability of Production Allowances in Addition to Baseline Production Allowances (§ 82.9)

This section implements provisions in the Montreal Protocol which allow for limited production (but not consumption) increases above limits described above. At each stage, the Protocol allows production levels during a control period to exceed the limit by no more than ten percent (or 15 percent when CFCs must be reduced by 50 percent) of the 1986 level. Such increases are permitted "only so as to satisfy the basic domestic needs of the Parties operating under Article 5 [special situation of developing countries] and for the purposes of industrial rationalization between parties." Industrial rationalization is defined by the Protocol as "the transfer of all or a portion of the calculated level of production of one Party to another, for the purposes of achieving economic efficiencies or responding to shortfalls in supply as result of plant closures." The Protocol also allows a Party to exceed its production limit to the extent it reaches a binding agreement with a Party which produced less than 25 kilotonnes of controlled substances in 1986, if the "25-kilotonne Party" will reduce its production allowance by the same amount.

To enable producers to increase their production to the extent permitted by the Protocol, § 82.9 grants to each firm receiving baseline production allowances under §§ 82.5 and 82.6 "potential production allowances" equalling 10 or 15 percent of their baseline allowances depending on the control period and group of controlled substances. Holders of potential production allowances may then obtain EPA authorization to convert them to production allowances under § 82.11 by proving they exported to Parties a calculated level of controlled substances equal to the amount of potential production allowances they want to convert, or under § 82.12 by obtaining such authorization from another firm that obtained the authorization under § 82.11. In addition, § 82.9 permits anyone to produce controlled substances to the extent they receive a transfer of a 25-kilotonne Party's production allowance and they demonstrate to EPA that the transfer is *bona fide*.

One chemical producer suggested EPA should grant potential production allowances based on producers' past export activity. This producer argued that to be equitable, an allocated quota system should rely on past activities as the basis for granting all allowances including any potential production allowances. EPA believes that *past* export activities are properly dealt with in the context of calculating baseline consumption allowances and should not be used as a basis for allocating potential production allowances. To do so would unnecessarily link future export activity to past activity. Since any controlled substance produced could be exported, total production is a more appropriate basis for allocating potential production allowances. As a result, the rule provides that potential production allowances are allocated on the basis of total production allowances and not on the basis of past exports.

Another chemical producer suggested that the 10 percent limit on potential increases in halon production was too low because only a few relatively large production plants exist throughout the world and any industrial rationalization would necessarily have to involve increases greater than 10 percent. The commenter recognized, however, that any changes in the allowable increases would require modification of the Protocol. EPA is concerned that allowing halon production increases of more than 10–15 percent for the purposes of industrial rationalization would further concentrate production in a few

countries and create problems of potential monopoly power.

A public interest group stated that EPA should take action to ensure that any added production exported "to supply the basic domestic needs" of developing countries who qualify under Article 5 of the Protocol is used only for such needs and not reexported either as bulk chemicals or in products produced with or containing these chemicals. EPA believes that ensuring that Article 5 countries use imported CFCs and halons for their "basic domestic needs" is a Protocol enforcement issue within the purview of the Parties and not EPA. Since the Protocol does not define "basic domestic needs," EPA would risk placing inappropriate constraints on developing countries when the purpose of Article 5 is to encourage such countries to join the Protocol. EPA is also not equipped legally or financially to police how controlled substances are used in other countries. Compliance monitoring and enforcement issues are due to be taken up by the Parties at their first meeting within one year of the Protocol's entry into force and at that time implementation of the "basic domestics needs" provision can be addressed.

EPA also received several comments on its implementation of the industrial rationalization provision. A chemical company commented that EPA's was faithful to the intent of the Protocol negotiators that Parties be allowed to increase production somewhat in order to export controlled substances to other Parties. In contrast, a public interest group commented that production increased "for purposes of industrial rationalization" should be allowed only where the Party receiving the increase decreases its production by the same amount and where one of the two specified purposes—achieving economic efficiency or responding to shortfalls in supply as a result of plant closures—is being served.

The industrial rationalization provision of the Protocol is somewhat ambiguous, since at least two of its key terms could be interpreted in different ways. Industrial rationalization is defined in part as "a transfer of a calculated level of production between Parties." "Calculated level of production" could refer to the right to produce controlled substances or the produced controlled substances themselves. Similarly, "transfer" could refer to exchange of rights or simply trade in produced substances.

EPA has interpreted the industrial rationalization provision in light of the United States negotiators' understanding of the purpose of that provision. According to the lead United States negotiators, the industrial rationalization provision was included to permit some future flexibility in world markets for controlled substances. In 1986, the Protocol's baseline year, only a few nations were major exporters of controlled substances; a production cap based on 1986 levels with no allowances for limited growth would thus effectively lock in 1986 export-import relationships until substitute chemicals were available. By allowing some increase in Parties' production levels, the Protocol negotiators hoped to facilitate future competition in the world market.

EPA has thus interpreted the terms of the industrial rationalization provision mentioned above to mean trade in controlled substances between Parties. The Agency notes, moreover, that because the Protocol does *not* allow for any exceedence of Parties' consumption limits, trade in controlled substances effectively results in a transfer of production rights after 1992. Under the Protocol, Parties may not import controlled substances from non-parties beginning one year after the Protocol enters into force, and exports to non-Parties may not be subtracted in calculating a Party's consumption level as of January 1, 1993. Thus, the Protocol in effect creates a Party wide "bubble" of controlled substance production. If one Party increases its production by the 10 or 15 percent allowed, it must export that to a Party or decrease its imports from Parties to stay within its consumption limit. The Party that imports the increased production or loses the export of its own production will, in turn, have to decrease its own production (or export it to another Party) in order to stay within its consumption limit. Thus, a transfer of production rights can be said to have occurred.

EPA finds further support for its interpretation in the contrasting Protocol provision for transfers involving 25-kilotonne Parties (Article 2, paragraph 5). That provision expressly provides that the total combined calculated levels of production of the Parties involved in the transfer concerned cannot exceed production limits imposed by the Protocol and that the Protocol Secretariat be notified of any such transfer. The industrial rationalization provision contains no similar requirement that a production increase by one Party be offset by a production decrease by another

The Agency does not believe it is necessary to require firms engaging in industrial rationalization to prove that they are doing so for the specified purposes. Economic theory suggests that in a free market, agreements to buy and sell are based on what the participants consider to be in their economic self interest. A firm's decision to export its production is thus by definition "economically efficient," one of the two purposes industrial rationalization is to serve.

While EPA believes that it has correctly interpreted the industrial rationalization provision, if the Parties to the Protocol clarify this provision in a manner inconsistent with EPA's interpretation, the Agency intends to modify its rule accordingly.

EPA received three comments from chemical producers that it had unnecessarily limited production transfers with 25-kilotonne Parties to those involving transfers to the United States, whereas the Protocol allows transfers of production both to and from 25-kilotonne Parties. EPA has modified its final rule to allow for this added flexibility. However, in the case of transfers of rights to 25-kilotonne Parties, EPA recognizes that interests beyond the narrow commercial ones of the involved firm may be at stake. For example, transfers may adversely impact domestic industry and may have broader trade implications. As a result, EPA has reserved the right to review and approve any proposed transfers of production rights to entities outside the United States.

Any trades occurring under this transaction are also limited in size because EPA believes that the Protocol negotiators did not intend 25-kilotonne Parties to exceed the 25-kilotonne ceiling as a result of the transfer. The Protocol negotiators were concerned that under the agreement's reduction schedule, it would become uneconomic for low-producing Parties to continue production. They therefore provided that Parties with less than 25-kilotonnes of production in 1986 could transfer their production rights to another Party that could produce controlled substances economically, or receive transfers of rights so that they could maintain economic production levels. They did not intend to allow 25-kilotonne Parties to actually *increase* their production capacity as a result of buying rights, but to make use of other Parties' existing capacity or their own. (This approach is consistent with that taken to developing countries; negotiators allowed Parties to increase their production in order to supply developing country Parties and obviate the need for developing countries to build further production facilities.) Accordingly, EPA will only approve transfers to 25-kilotonne Parties that do not result in the Party's total

production rights exceeding 25 kilotonnes.

9. Availability of Consumption Allowances in Addition to Baseline Consumption Allowances (§ 82.10)

Under this section, firms may receive additional consumption allowances upon proof of export of controlled substances. This provision is consistent with the Protocol's definition of consumption as production plus imports minus exports. EPA apportioned baseline consumption allowances equal to 1986 production plus 1986 imports minus 1986 exports. As a result, if the United States exported no controlled substances after the Protocol takes effect, it will still be in full compliance with the Protocol. Accordingly, to the extent controlled substances are exported, additional consumption allowances can be authorized without violating the consumption limits established by the Protocol.

In the initial years of the Protocol's operation, additional consumption allowances will be issued for all exports. However, the Protocol provides beginning on January 1, 1993, exports of controlled substances to non-Parties shall not be subtracted in calculating the consumption level of the exporting Party. To reflect this limitation, § 82.10(b) prohibits the grant of additional consumption allowances for exports to non-Parties also beginning on January 1, 1993.

Seven commenters (chemical producers and a trade association) stated that EPA had unnecessarily restricted the issuance of additional consumption allowances until exports had been received in the country of destination. They suggested that EPA instead consider a shipment an export when it departs the United States so that additional allowances for the shipment could be obtained much sooner. Since additional consumption allowances and authorizations to convert potential production allowances to production allowances can only be used during the control period in which they are granted, any significant lapse of time between shipment and the grant of allowances would substantially undermine the ability of firms to obtain and use these rights, particularly during the last quarter of a control period. These commenters argued that granting allowances at the time of export would not create a loophole (e.g., controlled substances not counted by any nation) as long as all nations agree that exports would be counted at the time of departure and imports at the time of arrival. The technical experts at the Nairobi meeting similarly recommended that a shipment should be considered an export at the time it leaves the country of origin. EPA has decided to grant consumption allowances and authorization to convert potential production allowances upon proof that controlled substances have been shipped from the United States, on the assumption that the other Parties will also consider a shipment an export upon its departure and an import upon its arrival. Such a uniform approach, which the technical experts group has recommended, will permit adequate monitoring of Parties' compliance. However, if the Protocol Parties do not adopt the technical experts' recommendations, EPA will reconsider its treatment of this issue.

Three commenters (one chemical producer and two halon users) also requested that EPA specify a time limit in which it will process requests for additional consumption allowances and other administrative reviews. EPA is not now in a position to accurately assess the time it will require to process applications, but will endeavor to minimize any delays in reviewing and acting on such applications. It will consider at some later date, as part of its operating procedures, establishing a goal for timely processing of applications.

Two chemical producers suggested that exporters be allowed to credit themselves with additional consumption allowances and conversion authority upon exporting and that EPA should monitor these exporters' activities by conducting an annual audit of each firm. EPA cannot accept this suggestion because it would create far too much uncertainty as to whether a particular export qualified for additional allowances and thus whether the United States was complying with the Montreal Protocol. EPA also believes that an affirmative decision by EPA on each application for additional allowances would reduce the possibility of fraud and provide greater market certainty for future transactions involving production and consumption allowances.

10. Exports to Parties (§ 82.11)

This section sets forth the process by which any person may export controlled substances to another Party to the Protocol and obtain from EPA authorization to convert potential production allowances to production allowances. The authorization will only be valid during the control period in which it is issued. Requests for authorization to convert will also be considered a request for additional consumption allowances under § 82.10.

Following the export of a controlled substance and receipt of authorization to convert potential production allowances to production allowances, the recipient has two options. If the person holds potential production allowances (issued under § 82.9), he may use his conversion authorization to produce controlled substances consistent with § 82.11 or, if he does not hold potential production allowances, he may transfer his conversion authorization under § 82.12 to a person that does. In keeping with the Protocol, EPA's rule sets a 10 percent limit on potential production allowances for the freeze and 20 percent reduction stages for Group I and Group II controlled substances and a 15 percent limit for the 50 percent reduction stage for Group I chemicals.

As discussed above in the context of the issuance of additional consumption rights (§ 82.10), several commenters requested that EPA consider a shipment an export when it leaves this country, instead of when it arrives in another. EPA has modified the rule to allow for exports to be counted at the time they leave the country. As a result, EPA has dropped that part of § 82.11 which requested, as part of the application for authorization, the date the shipment arrived at the foreign destination.

11. Transfer of Production and Consumption Allowances (§ 82.12)

EPA's proposed § 82.12 permitted the transfer of the allowances granted under this rule subject to certain procedural safeguards. This transfer section is reserved in today's final rule pending further review of the procedural safeguards. Even without the transfer provision, the regulation fully implements the Montreal Protocol. However, EPA recognizes that the transfer provision will make the rule more economically efficient. EPA expects to promulgate a final transfer provision in advance of the effective date of today's regulation.

12. Recordkeeping and Reporting Requirements (§ 82.13)

The December 14 NPRM outlined alternative reporting and recordkeeping requirements for producers, importers and exporters of controlled substances. Generally, EPA proposed that producers and importers maintain daily records of production or imports and submit monthly reports to EPA to monitor compliance. EPA also proposed that producers file and periodically update annual production plans for compliance purposes. Similarly, the Agency proposed that exporters report their

shipments on a monthly basis. In the December 14 preamble, EPA outlined several options of varying detail for reports and recordkeeping (52 FR 47504). In the discussion that followed those options, EPA stated that it was leaning toward requiring more detailed requirements to facilitate its monitoring of compliance.

Since the December 14 proposal, EPA has reviewed the comments on these reporting and recordkeeping requirements. In addition to these comments, EPA has met with the producers of controlled substances to discuss the reporting burdens of the proposed rule, and visited three plants to review current producer recordkeeping practices.

a. Producers. (1) Daily Recordkeeping—The December 14 proposed rule requested that producers maintain the following information: Daily records of the quantity of the controlled substances produced at each facility including controlled substances produced and consumed for feedstock purposes; daily records of the quantities of HCFC–22 and CFC–116 that may also be produced at the same facilities; continuous records of the reactive temperatures and pressures within the primary reactor and initial distillation column at each facility during the production operations; daily records of purchases and uses of specified materials consumed in producing the regulated chemicals; and daily records of the quantity and purchaser of controlled substances produced at each plant (Section 82.13(e)). The proposal required that these records be retained for a period of four years.

EPA requested daily records to obtain precise information on production as well as important independent checks for verification. These checks include the quantity of feedstock consumed in production and the volume of chemicals which could be produced within the same production unit (i.e., HCFC–22 and CFC–116), as well as sales of these chemicals. EPA believed that the more precise information would aid in verifying reported production and pinpointing violations.

Seventeen commentors believed that these daily recordkeeping requirements were unnecessary and excessive. Specifically, several commentors believed that such parameters as feedstock materials bought and used, records of sales volumes and customers, and reactor temperatures and pressure were unnecessary and in some cases meaningless as checks on production.

In reviewing the recordkeeping practices of producers, EPA found that much of the information required by the proposal is currently recorded on a daily basis by the industry. Since this information is already being recorded, EPA does not believe that a requirement for daily recordkeeping is excessively burdensome, and therefore maintains with modifications that requirement in the final rule. EPA recognizes that while continuous records of reactive temperature and pressure may provide a check on production, they would also entail detailed analysis for compliance monitoring when other information is available. For this reason, these parameters have been eliminated from the daily recordkeeping requirements. EPA has also eliminated the requirement for sales records which were to be maintained for each plant. In many cases, sales are recorded at the producer level but not at the plant level; based on its review, EPA believes that shipments serve as a better check on production. EPA has also eliminated recordkeeping requirements for the quantities of feedstocks purchased. Since these raw materials may be used in the production of chemicals other than controlled substances, purchase records may not provide a useful check on quantities of raw materials consumed for production of controlled substances.

For the final rule, producers are required to maintain dated records of the quantity of the CFCs and halons produced at each facility including the dated records of the quantity of controlled substances used as feedstocks in the manufacture of controlled substances and in the manufacture of non-controlled substances, any virgin, used or recycled controlled substances introduced into the production process of new controlled substances. They are also required to keep records of the following feedstock materials consumed in producing the regulated chemicals at each plant: Carbon tetrachloride, perchloroethylene, chloroform, hydrofluoric acid, chlorine, bromine, CFC–113; HCFC–22; and CFC–23. EPA requests records of feedstocks consumed since EPA can approximate the quantity of controlled substances produced by monitoring the materials consumed. Producers must also maintain dated records of HCFC–22 and CFC–116 produced within the same facility or production unit of a controlled substance. The production volume of HCFC–22 and CFC–116 will help determine the duration of time in which facilities are dedicated to the production of controlled substances if the plant maintains year round production. The Agency also requires records for the quantity of used or recycled controlled substances, the date received, and the names and addresses of the sources of recyclable or recoverable materials containing controlled substances which are recovered at each plant. EPA is also requesting that records of shipments of controlled substances from plants be maintained. This is a new requirement, recommended in discussion with industry, which is based on current practices and which EPA believes will aid the Agency in verifying production.

Based on a review of producer's methods of monitoring CFC and halon production, EPA believes that current methods of recordkeeping will generally be sufficient to satisfy the recordkeeping requirements. EPA is aware that some producers may not make daily production estimates over weekends, and that production may not be measured directly but determined from records of consumption, shipments, and inventories. EPA believes these accounting procedures are acceptable for purposes of this regulation, but needs to verify that currently maintained records are sufficient to comply with recordkeeping requirements. EPA is requiring producers to submit within 120 days of publication of this rule a report detailing how production is measured on a regular basis and how this data will be used to determine quarterly production figures in kilograms. Any change in accounting and measurement methods must be described and submitted to EPA within 60 days of the change. EPA reserves the right to require alternate measurement techniques if deemed necessary.

EPA has altered the requirement that these records be maintained from a period of four years to a period of three years. EPA believes that it may be necessary to review historical production records during investigations of potential violations and that three years of past activity should prove adequate for such review.

(2) Production Reports. In the December 14 proposal EPA requested monthly reports within 15 days after the reporting period from producers of the controlled substances for each plant and for all plants owned by the same company. EPA requested that the reports include summaries of monthly production of the controlled substances; quantities of HCFC–22 and CFC–116 produced that month at each facility; monthly summaries of the quantity of sales for each of the controlled substances; the quantity and source of material containing recoverable controlled substances and the quantity of controlled substances recovered; summaries of total monthly and control period-to-date production of the

calculated levels of Group I and Group II controlled substances; and the producer's total consumption allowances, production allowances and authorization to convert potential production allowances to production allowances.

In their comments, industry members argued that quarterly or annual reporting was sufficient, and that a 30- to 45-day filing period at the end of the reporting period was necessary. In addition, commenters believed that the reporting of unregulated chemicals was not required to measure compliance.

After consideration of these comments and based on meetings with producers and site visits, EPA has determined that quarterly reports with a filing period of 45 days after the close of the reporting period are appropriate. Quarterly reporting will provide EPA with periodic review of producer's compliance with the regulation during a control period and help target inspections while minimizing the reporting burden on producers. EPA has extended the filing period to 45 days to allow companies adequate time to review and verify their reports and to allow companies with more than one plant to compile the information into a single report. EPA has considered fiscal quarters rather than actual quarters. However, the Montreal Protocol does not allow EPA the flexibility to shift to fiscal control quarters.

Therefore EPA requires that producers report on a quarterly basis consistent with the applicable control period.

Since one purpose of these reports is to provide EPA with information to verify production, EPA requests that producers submit the following information: Summaries of quarterly production of the controlled substances, specifying the quantity used and consumed as feedstock for controlled and non-controlled substances; the quantity, the date received and source of material containing recoverable controlled substances and the quantity of controlled substances recovered; summaries of total quarterly and control-period-to-date calculated production levels of Group I and Group II controlled substances; and the producer's total expended and unexpended consumption allowances, expended and unexpended production allowances, potential production allowance, and authorization to convert potential production allowances to production allowances, as of the end of the quarter.

One change in the proposed reporting requirements involves reporting of the quantity of shipments from each plant for each of the controlled substances, instead of sales. This change has been made because shipments are a more accurate check than sales on production and records of these are currently maintained by producers. EPA has deleted the requirement that producers report the quantities of HCFC–22 and CFC–116 produced. This information is still required for recordkeeping purposes so that it can be reviewed during site inspections, but need not be included in reports to EPA.

(3) Annual Production Plan. EPA proposed in the December 14 NPRM that producers submit annual production plans for each facility and notify the Agency of any significant shifts in the location or quantity of production. EPA believed that such plans would provide useful information for monitoring compliance.

Industry members commented that the production plans are an unnecessary check on compliance. Furthermore, although firms are likely to develop an annual production plan for internal purposes, these plans rarely agree with actual monthly or quarterly production volumes. They also objected to the requirement that companies would need to notify EPA when production shifts occurred to meet demand shifts. EPA no longer believes that continual justification of production volumes with the production schedules in the production plan will assist it in monitoring compliance. For this reason, EPA has eliminated the annual production plan as a reporting requirement.

b. Importers. (1) Daily Recordkeeping—EPA proposed that importers maintain daily records of the quantity of controlled substances imported; the dates and ports of call for imports; the date and port of entry into the country; the dates on which and the country in which the imported controlled substances were produced; and a name of a person from whom additional information can be obtained. Similar to daily recordkeeping by the producers, EPA proposed daily recordkeeping by the importers to provide more precise information on import activities which would aid in evaluating trades and, pinpointing violations and allow comparison with U.S. Custom and Census data.

Comments on proposed daily records from importer's related primarily to the scope of items to be recorded. Because imports are now counted at the time they are received in a country, it is no longer necessary to know the date on which they were produced. For the same reason the Agency will not require the dates and ports of call for imports.

The final rule requires that importers maintain daily records of the following: the quantity of virgin used and recycled controlled substances imported; the date and port of entry into the United States or its territories; the country from which the imported controlled substances were exported and the port of exit. In addition, EPA requires importers to record the commodity code and his importer number for each shipment. Importers must also keep the following documentation to verify imports: the bill of lading, the invoice and U.S. Custom's Entry Summary Form (Form 7501). This information will allow EPA during compliance checks and investigations of potential violations to check U.S. Census reports against shipments. Retention of the bill of lading and the invoice is necessary to provide EPA with an independent check on quantities imported, separate from Census and Customs data.

(2) Monthly Reporting. EPA proposed to require importers to submit a monthly summary of the information recorded on a daily basis. In addition, monthly reports by importers were to include totals for control-period-to-date and the importer's total consumption allowances at the end of the month.

Commenters generally believed that monthly reporting is too frequent and that quarterly reporting would be sufficient. They also argued that a 30-day filing period after the close of the reporting period is needed to provide accurate reports to EPA.

For the final rule EPA requires that importers, like producers, file quarterly reports within 45 days of end of the reporting period. Importers may receive shipments at several ports throughout the country and 45 days are needed to collect this information. EPA believes that these companies need sufficient time to summarize the information and report accurate quantities. Also since several importers are also producers, the reporting period for importers should be consistent with the 45 day reporting period for producers. These reports must include the following: The quantity of controlled substances that are imported in that quarter; the calculated levels of Groups I and II controlled substances imported for the quarter and the total for the control period; the total quantity of expended and unexpended consumption allowances the importer holds at the end of the quarter. The importer must also provide a summary of his import activities which shall include the quantity of each import, the date and port of entry into the United States or its territories; the country from which the imported controlled substances were

imported and the port of exit; and a name and address from whom additional information can be obtained. In addition, the commodity code and his importer number have been included to assist with comparison and verification of importer records with U.S. Census and Customs records.

c. Exporters. EPA proposed that exporters who did not report under §§ 82.10 and 82.11 of the rule submit reports within one month of export which would include the name and address of the exporter and recipient of the export; the exporter's Employer Identification Number (EIN); the type and quantity of controlled substances exported; the date on which and port from which the exports were shipped; the date and country to which the exports were shipped; and the date and source from whom the exported controlled substance were purchased. EPA requested the information to provide a basis for independently verifying that exports were shipped.

EPA has modified these reporting requirements for exporters not requesting additional consumption rights under §§ 82.10 and 82.11. Firms not requesting additional consumption rights must report within 45 days of the end of the control period. EPA requires this information to comply with the Montreal Protocol and therefore does not believe that monthly reporting is necessary. Since consumption rights are not requested for these exports, periodic monitoring and independent verification is not needed. Consequently, these exporters need only report at the end of the control period.

From these exporters EPA requires the following: name and address of exporter and recipient of the exports, the exporter's Employer Identification Number (EIN); the type and quantity of controlled substances exported and the percent that is recycled or used; date and port from which the exports were shipped. The commodity code of the shipment is a new requirement which allows EPA to verify these shipments. Also, because exports are now to be counted at the time of their departure from this country instead of their date of receipt in a foreign country, EPA has eliminated the requirement that exporters report the date of a shipment's arrival in the receiving country. EPA has maintained the date and source from whom the exported controlled substance were purchased as a reporting requirement to ensure that in calculating its national consumption limit, only virgin controlled substances that are exported are subtracted from its total consumption.

EPA has added § 82.13(b) regarding the use of reports and records for purposes of compliance determinations to clarify the Agency's original intent that the records and reports required would be used not only for compliance monitoring, but also for compliance determinations. EPA does not intend to limit the use of other evidence admissible under the Federal Rules of Evidence. The Federal Rules of Evidence permit the introduction of all relevant evidence, subject to limited exceptions.

EPA is deferring decision on whether to make public any or all of the above reporting information required under § 82.13. EPA solicited public comment on this issue in its May 24, 1988 supplemental proposal. The reporting requirements will not become operative until after the rule takes effect, which will not occur before January 1, 1989, and the first reports will be submitted after that time. Affected persons must at the time of submission specify what of the submitted data is covered by 40 CFR Part 2, Subpart B, which governs the treatment of business information, or a waiver of any confidentiality claim will have occurred. EPA plans to make a determination as to the releasability of the reporting information at some future date.

13. Payment of Fees (§ 82.14)

In the preamble to the December 14 proposal, EPA discussed requiring payment of an administrative fee to cover the costs of operating the program (52 FR at 47505). This fee would be imposed under the Independent Offices Appropriation Act (31 U.S.C. 9701). The preamble described what activities might be covered by the fee, how EPA might determine the costs of these activities, and how the fee might be implemented. While seeking comment on these issues, EPA did not propose specific fee language in its proposed rule (proposed Section 82.14 was simply reserved for this purpose).

Many commenters objected to the imposition of an administrative fee. Fourteen chemical producers and users stated that the fee proposal had not been adequately detailed in the proposal, and that therefore EPA should not take final action without additional comment. Two chemical producers argued that EPA, by streamlining its administrative processes, could avoid any need for a fee to cover administrative costs.

EPA believes that modifications in the reporting and recordkeeping provisions have substantially reduced the administrative burden associated with the operations of the allocated quota system. Moreover, until the program begins, it is difficult to determine the costs of operation. The number of transfers and exports are unknown and will largely determine total program costs. Assuming a limited number of such transactions, EPA does not believe that substantial Agency resources will be required to operate the program and is concerned that the costs of operating the fee program will be a substantial share of the total costs of the allocated quota program.

Because of these concerns, EPA has not included in this notice a final provision requiring payment of an administrative fee. However, the Agency intends to reserve § 82.14 and will determine at some future date if resource costs justify promulgating an administrative fee requirement.

14. Appendices to Part 82

As part of the December 14 NPRM, EPA set forth several appendices to the proposed rule. Appendix A contains the ozone depletion weights for each of the controlled substances. These weights are based on the atmospheric lifetimes and the amount of bromine and chlorine in each of the chemicals contained on the list. The weights are used in determining the "calculated levels" of each controlled substance—the quantity of the chemical multiplied by its ozone depletion weight.

Appendix A contains the ozone depletion weights specified by the Montreal Protocol with one exception. EPA has included a weight of 6 for Halon 2402, whereas the Protocol leaves this weight for future determination.

EPA received several comments, questioning the scientific basis for the ozone depletion weights assigned to the halons. EPA clearly stated in the preamble to the December 14 NPRM that the weights assigned to the halons are based on more limited research than those assigned to the CFCs and therefore are substantially less certain. However, the current weights, including that assigned to Halon 2402, represent the best available information from the scientific community. Additional work is underway to review the determination of ozone depletion weights for each of the controlled substances. This analysis will be examined as part of the periodic assessments required by the Protocol and modifications to the weights will be made, if warranted. Moreover, if the Parties adopt a different weight for Halon 2402 than that contained in the final rule, the Agency will consider revising that aspect of the rule.

Two commenters from the refrigeration industry expressed concern that the weights for several of the CFCs

had changed from prior EPA publications and that the change had led to CFC–115 being "unexpectedly" added to the list of substances covered by the Montreal Protocol. EPA notes that the basis of the ozone depletion weights for the CFCs has not changed, but that the context in which the weights are being used has shifted. Early EPA studies reported weights on a per molecule basis which is generally more useful for the purposes of atmospheric modelling. When the context in which these weights were used shifted to regulatory controls, it becomes more appropriate to report weights on a per kilogram basis. Thus, the weight only changed to correspond to a change in the applicable unit of measurement. CFC–115 was appropriately included in the Protocol because it is among the commercially available fully halogenated compounds.

Taking these comments into consideration, EPA has not altered the ozone depletion weights included in Appendix A, but will continue to monitor relevant research and will modify these weights in the future if new information warrants such change.

15. Preemption of State and Local Regulations

Numerous commenters have urged EPA to state that the final rule preempts any state or local law. Section 159(b) of the Clean Air Act provides that if EPA adopts a regulation to protect the stratosphere, "no state or political subdivision thereof may adopt or attempt to enforce any requirement respecting the control of any such substance, practice, process, or activity to prevent or abate such a risk, unless the requirement of the state or political subdivision is identical to the subject of such regulation." EPA does not interpret section 159(b) as meaning that the adoption of any federal regulation of any substance, practice, process, or activity would preempt the entire field of stratospheric ozone regulation. As the Report by the Committee on Interstate and Foreign Commerce (House Report 95–294 (1977) p. 99) explained, "Thus, for example, if the Administrator were to promulgate regulations limiting or prohibiting use of halocarbon compounds as foaming or blowing agents in certain industrial processes, states and localities would be preempted from regulating or prohibiting such use of such compounds, except in accordance with federal regulation. State or local regulation of other uses of such compounds would not be preempted thereby, however." In EPA's view, states and political subdivisions would be prohibited from adopting any production or import limits not identical to those in EPA's regulation. However, since EPA's regulation only covers the production and importation of CFCs and halons, state or locally imposed limits, for example, on specific uses would not be precluded by the preemption provision.

V. Impact of Proposed Action

As part of its evaluation and response to public comments, EPA has revised its RIA. The results of the final RIA are described in the following sections. Significant comments received on the December RIA and on issues raised in the December 14 NPRM, along with EPA's response to these comments, are also presented.

A. Reductions in Ozone Depletion

Today's final action should substantially reduce the threat of stratospheric ozone depletion and the accompanying risks to human health and the environment. As shown earlier in Table 3, in the absence of regulatory action to limit the growth of CFCs and halons, ozone depletion of greater than 50 percent by the year 2075 would be likely. Implementation of the Protocol by the United States, most of the other developed nations and a large majority of the developing nations are projected to reduce the risks of depletion to under 2 percent in 2075. Because 37 nations have already signed the Montreal Protocol, assumptions concerning widespread participation by both developed and developing countries appear reasonable.

Given the large uncertainties inherent in the current atmospheric models, in projecting long-term growth rates for the relevant trace gases, and in predicting the degree of participation by other nations in the Protocol, EPA believes its action represents a reasonable response to the ozone depletion threat established by the scientific evidence available at the time of this rulemaking. However, as described above, the Ozone Trends Panel Summary suggests that important new evidence will soon be available. EPA intends to seek public comment on the full report when it becomes available and integrate this new evidence into a supplemental risk assessment the Agency is currently preparing. EPA also intends to work toward expediting and actively participating in upcoming assessments and reviews called for by the Montreal Protocol.

B. Economic Impact

As part of the accompanying RIA, EPA examined the potential costs to United States industry of meeting various levels of reductions in CFC and halon production and consumption. It also analyzed and compared these costs to the potential health and environmental benefits of reduced exposure to harmful ultraviolet radiation which would result from measures to protect the ozone layer. The health and environmental benefits assessed are those accruing to the United States alone, but are based on the assumption that most other nations, through their participation in the Montreal Protocol, join in making the same level of reductions undertaken by this country.

As explained in the preamble to the December 14 NPRM and detailed in the final RIA, the cost analysis takes a "bottom up" approach. It examines uses of CFCS and halons within eight major industrial groupings: Refrigeration; air conditioning; flexible foam; rigid foam; solvent cleaning; sterilization; fire extinguishant; and miscellaneous. Within these larger groupings it examined 74 specific use applications (e.g., commercial refrigeration, home refrigeration, etc.). To determine costs, the RIA examined over 900 technologically feasible options for reducing consumption of these chemicals. Since many of these options were eliminated from consideration because of high costs or possible toxicity, the analysis drew from approximately 300 technically feasible responses to controlling the use of CFCs and halons.

The potential benefits examined in the RIA also cover a broad range of health and environmental impacts. Any significant shift in the quantity and make-up of ultraviolet radiation striking the earth's surface would represent a major change in one of the basic environmental parameters, affecting most forms of biological life. While the RIA attempts to quantify some of the likely major impacts (e.g., skin cancers), limited research completed to date prevents the quantification of other potentially significant risks (e.g., immune suppression).

1. Economic Costs of Reductions

The analysis contained in the RIA examines and provides cost estimates for a wide variety of different control options over a long period of time. The types of controls examined include: Engineering controls; chemical substitutes; product substitutes; changes in work practices; and recycling and recovery technologies. The analysis sought to include technologies that were currently available, along with those that were likely to become commercially available over the next decade. It also took into consideration such factors as

changes in energy costs and compliance with other relevant environmental requirements (e.g., water pollution or worker exposure restrictions).

Estimates of the costs of reducing CFC or halon use to specified levels are developed using the Integrated Assessment Model (IAM), which is detailed in Appendix I of the RIA. Essentially, this model operates by prioritizing the potential reductions in CFC and halon use on the basis of least cost and the judgment of EPA contractors and staff based on discussions with industry representatives on how firms are likely to respond to reduction requirements. Several commenters raised concerns with the RIA's cost projections. Two chemical producers stated that EPA had underestimated the costs of reductions. In particular, they claimed that the large number of options that EPA predicted would save money suggested that EPA had left out factors affecting costs. EPA has reviewed its cost documentation and analysis and modified some of the cost estimates based on the additional information provided by commenters. (Specific changes are presented in Part 10 of Volume III of the RIA.) However, EPA's information and analysis still show that many options to reduce CFC and halon use can be implemented at little or no cost, and in some cases can decrease costs. Cost-saving options exist because all firms involved in using CFCs and halons do not possess perfect information as to available controls. Recent attention to this issue has already dramatically reduced the cost of obtaining information on control options. As a result, firms in certain industry segments are beginning to shift away fron these chemicals without incurring production cost increases. In any event, the RIA assumed zero costs (i.e., no cost savings) for those controls which EPA believes in some cases, based on engineering analysis, can save firms money.

Other commenters stated that an industry-supported economic analysis (Putnam, Hayes and Bartlett, 1987), which they argued contained cost projections that were substantially greater than those of the preliminary RIA, presented a more realistic estimate of future costs of compliance. EPA has reviewed both the methodology and the results of the industry's study. Unlike EPA's RIA which linked costs and reductions to specific technologies, the industry's analysis is based on industry's expert opinion on the quantity of reductions it would make if CFC prices increased by a certain amount. Because of this streamlined approach to estimating costs, it is extremely difficult to identify and compare specific differences in the two studies. Nonetheless, the results of the two studies do not differ dramatically. In fact, when differences in scope (e.g., treatment of halons) are taken into account, the industry's analysis generally falls well within the range of estimates presented in the RIA accompanying both the proposed and final rules.

In addition to making corrections and including new information provided in the public comments, EPA has also updated the engineering costs contained in its RIA to reflect rapidly emerging technologies to reduce and replace CFCs and halons. For example, in the time since the December NPRM was published, the food packaging industry reached an agreement to voluntarily eliminate its use of CFC–11 and –12 (generally by shifting to HCFC–22 and blends) by the end of this year. A major chemical producer has announced a blend of CFC–113 which contains 25–30 percent less of this chemical than current formulations at no additional costs and with no loss in cleaning effectiveness. A large electronics firm working with a small chemical company announced a terpene-based solvent substitute for use in some electronics cleaning. Work has also progressed on alternative blowing agents (e.g., HCFC–22, HCFC–141b, and HCFC–123) for many foam applications including insulation. Segments of the car air conditioning and servicing industries and the air conditioning and refrigeration industries have stepped up activities aimed at facilitating increased recycling and recovery at the time of servicing. In addition, further testing has been conducted on a blend containing dimethylether which reduces the use of CFC–12 in existing refrigeration and auto and space air conditioners. These options have now been incorporated into the RIA's cost analysis. Some are already being used by firms and are therefore considered in each scenario examined. Others, though promising, are not yet fully proven and commercially available, and therefore are examined as part of different cases (scenarios) presented in the RIA which compare the costs of compliance based on different assumptions about the timing and market penetration of various control technologies.

To reflect the substantial impact that the timing and degree to which these technologies are adopted by user industries have on cost estimate projections, the analysis in the RIA focuses on two cases. The differences in these cases are the rate at which firms adopt these measures, the percent of the firms in an industry who take this action (e.g. market penetration), and the quantity of emission reductions achieved by the technology. Case 1 assumes that key user industries delay their adoption of reduction technologies, market penetration of these controls is limited, and the magnitude of reductions they achieve is on the low end of the amount that now seems plausible. In contrast, Case 2 assumes that technologically available low-cost reductions are adopted expeditiously by key user industries. Specifically, in Case 2, the RIA assumes the following reduction technologies are employed within the next few years: Shifts to HCFC–22 in specific markets for rigid foam insulation; increases in recovery of CFCs from refrigeration; switches by some percentage of hospitals to disposable instruments and steam cleaning instead of CFC based sterilization; improved housecleaning by solvents users and substantial shifts to CFC–113 blends, terpene or aqueous cleaners; increases in recycling of CFC–12 at large auto shops when servicing car air conditioners; and shifts to water blown foam or modified polyols by molded and slabstock flexible foamers.

Table 4 presents the total social costs of complying with Case 1 and 2 for reductions required by the final rule (i.e., the Montreal Protocol case). It demonstrates that the costs through 2000 of meeting the control requirements could nearly triple depending on the rate at which firms adopt reduction technologies. The cost differential is substantially greater for the near term rather than over the longer term.

Table 4 also shows the potential windfalls or transfer payments which would result from this regulation. The potential amount of windfalls also varies considerably between the Case 1 and 2, particularly in the early years. The analysis suggests that even in Case 2, with its optimistic assumptions about shifts away from CFCs, the allocated quota system would create windfalls of almost $2 billion dollars through the turn of the century.

TABLE 4.—SOCIAL AND TRANSFER COST ESTIMATES FOR CASES 1 AND 2 COST SCENARIOS [a]

[In millions of 1985 dollars]

	Case 1	Case 2
Social Costs [b]		
1989-2000	2,730	1,012
1989-2075	39,530	20,760

TABLE 4.—SOCIAL AND TRANSFER COST ESTIMATES FOR CASES 1 AND 2 COST SCENARIOS [a]—Continued

[In millions of 1985 dollars]

	Case 1	Case 2
Transfer Costs: [c]		
1989-2000	7,300	1,900
1989-2075	13,600	6,900

[a] The assumed stringency and coverage used in this analysis are those of the CFC 50%/Halon Freeze case described in Chapter 5 of the RIA. CFCs are regulated with an initial freeze in 1989 at 1986 levels, 20 percent reduction in 1993, and 50 percent reduction in 1998, and halons are frozen at 1986 levels in 1992. The assumed rate of growth in CFC and halon use is the Middle Growth Scenario described in Chapter 4 of the RIA.

[b] Social costs are discounted at 2 percent.

[c] Transfer costs are discounted at a rate of 6 percent to reflect the opportunity cost of funds in the private sector. Transfer costs are not reduced by the taxes that would be paid on them.

Table 5 shows the CFC price increase for the final rule that would result from the assumptions about cost controls contained in the Cases 1 and 2. The increase in CFC prices will also vary dramatically based on the rate at which CFC user industries employ reduction technologies.

TABLE 5.—PROJECTED CFC AND HALON PRICE INCREASES FOR THE CASES 1 AND 2 COST SCENARIOS [a]

[1985 dollars]

	Control cost scenarios	
	Case 1	Case 2
CFC Price Increases:		
1989	6.69	0.00
1991	1.84	0.00
1993	3.93	1.55
1995	3.77	1.59
2000	5.48	3.77

[a] The stringency and coverage assumptions used are those of CFC 50%/Halon Freeze case described in Chapter 5 of the RIA. CFCs are regulated with an initial freeze in 1989 at 1986 levels, 20 percent reduction in 1993 and 50 percent reduction in 1998, and halons froze at 1986 levels in 1992. The assumed growth in CFC and halon use is the Middle Growth Case described in Chapter 4. Price increases are cited on a standardized "ozone-depleting equivalent" basis per kilogram.

2. Health and Environmental Benefits

The preliminary RIA described a wide range of potential health and environmental effects of ozone depletion. This description was based largely on the analysis contained in EPA's risk assessment.

As described in the risk assessment (and the SAB's review of it), varying amounts of research have been completed on different health and environmental effects. For example, while considerable research has led to the identification of a dose-response relationship between UV-B radiation and nonmelanoma skin cancer, only a limited number of case studies exist showing the nature of the impact of increased UV-B radiation on the formation of groundlevel ozone (smog). In fact, the SAB panel's interim report stated that they believed that the potential risk of harm was greater for some of the health and environmental effects where little was known (e.g., immune suppression and damage to plants and aquatics organisms) than for other areas where better information was available (e.g., skin cancers).

Because of these concerns, EPA attempted to develop dose-response relationships for many of the potential health and environmental impacts. This sometimes involved extrapolating from short-term case studies on one or more species or regions. EPA quantified these effects primarily to provide policy-makers with an illustration of the potential magnitude of impacts in these areas. Substantially more research will be necessary before reliable dose-response estimates are possible, particularly in the areas of plant and aquatic effects.

A chemical company and an industry research organization criticized EPA's efforts to quantify one or more of the potential environmental impacts (e.g., plant and aquatic effects, urban ozone formation and polymer degradation). As discussed above, EPA recognizes the limitations inherent in extrapolations from limited case studies, but believes that the analysis contains the appropriate caveats and, on balance, provides useful information for policy-makers. A public interest group criticized EPA for not including experimental results from Antarctica demonstrating dramatic losses in phytoplankton from increased exposure to UV-B radiation. EPA did not include this information in the RIA analysis because it has not yet been peer reviewed and therefore is of a preliminary nature. The Agency intends to more fully explore the potential health and environmental effects of the Antarctica ozone hole as part of its update of its risk assessment.

One chemical producer and a government agency criticized the RIA's estimates of future skin cancer cases and deaths. They suggested that the public would modify its behavior and avoid exposure and/or that improvements in medical technology would reduce damage and deaths from this form of cancer.

EPA knows of no evidence supporting the theory that behavior will be modified to avoid exposure. It also notes that behavioral changes, if they occurred, would themselves be a cost of ozone depletion. Nonetheless, the RIA includes a sensitivity analysis which reduces by 25 percent predicted mortality rates for skin cancers. In another sensitivity analysis, all mortality rates are reduced (e.g., medical advances decrease mortality from all causes not just from skin cancers). These results are presented in Chapter 10 of the final RIA and show the reduced number of projected deaths from skin cancers which occur under these assumptions.

One commenter raised the question of whether a recent report showing that UV-B radiation had decreased in the past decade suggested that the models linking ozone depletion to increased UV-B radiation were inaccurate. Accepted scientific theory suggests, if the ozone layer had depleted over the past decade, UV-B radiation striking the earth should have increased. EPA has reviewed the study cited by the commenter and believes that several aspects of its design may make its results unreliable. While the physical properties of ozone's absorption of UV-B radiation are well established in the scientific community, this particular study is based on a limited network of monitoring stations. Moreover, the monitoring sites are typically located near airports where increases in local pollution could have influenced the results. Nor has the effect of possible changes in local weather conditions (e.g., cloud cover and precipitation) been evaluated. EPA will continue to monitor research related to direct measurements of UV-B radiation, but does not believe that the study mentioned by the commenter provides sufficient grounds for altering its current assessment.

Other commenters stated that the relationship between UV-B and both melanoma and cataracts was so uncertain that it could not be quantified. While EPA recognizes that greater uncertainty exists as to the dose response relationship for these health effects, the RIA applies the methodology developed and reviewed as part of EPA's risk assessment document. In the case of melanoma, EPA conducted an extensive review of the literature and organized a panel of experts to explore its relationship to UV-B radiation. For both melanoma and cataracts, the findings contained in the EPA's risk assessment were extensively reviewed and approved by the SAB.

Table 6 provides a summary of the health and environmental benefits of reducing ozone depletion to the extent that would occur if the Montreal

Protocol were widely implemented. Because of the uncertainties in these [illegible]imates, it also provides a range of [illegible]es based on sensitivity analyses of [illegible]y variables.

TABLE 6.—SUMMARY OF BENEFITS FROM REDUCED OZONE DEPLETION *

	Reference scenario
Skin cancer cases (low and high sensitivity).	173.9 million (91 million to 306 million).
Skin cancer deaths (low and high sensitivity).	3.7 million (1.9 million to 6.8 million).
Cataract cases (low and high sensitivity).	19.1 million (10.4 million to 26.0 million).
Damage to crop yields (low and high sensitivity).	7 percent (extrapolation of soybean dose-response).
Decrease in fish harvests (low and high sensitivity).	25 percent (extrapolation of anchovy dose-response).
Damage to polymers (low and high sensitivity).	3.6 billion (extrapolation of PVC dose-response).
Increase in tropospheric ozone (low and high sensitivity).	29 percent (based on case studies from three cities).
Sea level rise (low and high sensitivity).	12.6 cm (± 50 percent).
Non-quantified Benefits	
Increase in actinic keratosis Immune suppression Tropospheric ozone impacts on pulmonary system.	
Pain and suffering from skin cancer.	
[illegible] temperature related [illegible]fects.	
[illegible]ch erosion from sea [illegible]level rise.	
Loss of coastal wetlands from sea level rise.	
UV effects on aquatic and terrestrial ecosystems.	
Tropospheric ozone impacts on non-grain crops, forests, other plant species, and man-made materials.	
UV effects on materials currently in use.	

* Benefits are derived by comparing health and environmental impacts in the absence of control (i.e. no controls case) to the Montreal Protocol case (i.e. 50% CFC/halon freeze case).

Assumptions

1. Benefits. Benefit estimates are estimated for the United States only.

2. Time horizon. Table shows avoided damages from Montreal Protocol case relative to "no controls" for populations alive today and born before 2075.

3. Dose-response. Health effects (skin cancer cases and deaths and cataract cases) are modelled based on dose-response estimates developed for EPA's risk assessment (EPA, 1987), and are summarized in Chapter 7 of EPA's Regulatory Impact Analysis (EPA, 1988). [illegible]amage to crops from UV-B is [illegible]esented for grain crops only based on dose-response developed for soybeans (EPA, 1987 and 1988). Damage to fish; is estimated for commercial harvest of fin and shell fish based on dose-response models developed for anchovies (EPA, 1987 and 1988). Increase in tropospheric ozone and damage to crops are based on case studies of 3 U.S. cities and national crop loss model (EPA, 1987 and 1988). Polymer estimates are based on dose-response models developed for PVC and extended to include acrylics and polyesters (EPA, 1987 and 1988). Sea level rise estimates based on parameterized radiative-corrective model modified to compute thermal expansion, (EPA, 1987 and 1988).

4. Sensitivity. Range for health effect estimates based on high and low dose-response coefficients.

3. Comparison of Costs and Benefits

Based on the costs and benefits presented above and detailed in the RIA, today's final action should result in a substantial net gain to society.

Comments on the RIA accompanying the December NPRM raised several issues concerning assumptions used in valuing benefits. Two federal agencies questioned the statistical value of life used in the RIA. One argued that it was too low and the other that it was too high. The preliminary RIA used a range of from $2–5 million with a reference case value of $3 million. Following a review of the economic literature, the final RIA maintains the value of $3 million, but a new study (Viscusi, 1988) suggests that this figure may substantially underestimate risks. As a result, a sensitivity analysis using a $12 million dollar value of life is also presented. A value of $2 million has been retained in the RIA to represent the low end of the range. These figures are used for illustrative purposes in performing the analysis in the RIA. Based on its review of the comments, the RIA does not conclude whether the value of reducing risks to human life for involuntary risks can be limited to $3 million dollars or whether it should be higher as suggested by new information contained in the economic's literature (Visusi, 1988).

A government agency also stated that the discount rate used in assessing costs and benefits over time was too low and that the RIA inappropriately increased the future value of life. Another government agency stated that the value of human lives should not be discounted. Appendix G of the RIA presents the justification for the assumptions contained in the final RIA. Where the benefits are long-lived and long lags exist before the benefits accrue, a discount rate toward the lower end of the range commonly understood as representative of the social rate of time preference was selected as an appropriate illustration in conducting the RIA.

The RIA increases the value of life over time to reflect the assumption that as society becomes wealthier, people are willing to pay greater amounts of money to reduce risks. EPA believes that this assumption is true and necessitates increasing the future value of life in the analysis. The RIA contains sensitivity analyses which examine alternative assumptions for both of these factors. These results do not alter the conclusion of the analysis.

VI. Additional Information

A. Executive Order 12291

Executive Order (E.O.) 12291 requires the preparation of a regulatory impact analysis for major rules, defined by the order as those likely to result in:

(1) An annual effect on the economy of $100 million or more;

(2) A major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic industries; or

(3) Significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

EPA has determined that this rule meets the definition of a major rule under E.O. 12291, and has prepared a regulatory impact analysis (RIA). Drafts of that document and this notice of rulemaking were submitted to the Office of Management and Budget (OMB) for review under Executive Order 12291. Any comments from OMB and any EPA responses to such comments are available for public inspection at the Central Docket Section, South Conference Room 4, Docket No. A–87–20, U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460. A copy of the RIA has also been placed in the rulemaking docket.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act, 5 U.S.C. 601–612, requires that Federal agencies examine the impacts of their regulations on small entities. Under 5 U.S.C. 604(a), whenever an agency is required to publish a general notice of proposed rulemaking, it must prepare and make available for public comment an initial regulatory flexibility analysis (RFA). Such an analysis is not required

Date: August 1, 1988.

Lee M. Thomas,

Administrator.

For the reasons set forth in the preamble, Title 40 CFR Part 82 is amended as follows:

PART 82—PROTECTION OF STRATOSPHERIC OZONE

1. The authority citation for Part 82 continues to read as follows:

Authority: 42 U.S.C. 7157(b).

2. Part 82 is amended by adding §§ 82.1–82.14 and Appendices A through D to read as follows:

Sec.

§ 82.1 Purpose and scope.

(a) The purpose of these regulations is to implement the *Montreal Protocol on Substances that Deplete the Ozone Layer* under authority provided by section 157 of the Clean Air Act. The Montreal Protocol requires each nation that becomes a Party to the Protocol to limit its total production and consumption (defined as production plus imports minus exports) of certain ozone-depleting substances according to a specified schedule. The Protocol also requires Parties to impose certain restrictions on trade in ozone-depleting substances with nonparties.

(b) This rule applies to any individual, corporate, or governmental entity that produces, imports, or exports controlled substances.

§ 82.2 Effective date.

Section 82.13(f)(1) of this part takes effect September 12, 1988. The remainder of the regulations under this part will take effect when the Montreal Protocol enters into force. The Montreal Protocol will enter into force on January 1, 1989, provided that at least 11 instruments of ratification, acceptance, approval of the Protocol or accession thereto have been deposited by States or regional economic integration organizations representing at least two-thirds of 1986 estimated global consumption of the controlled substances. If these conditions have not been fulfilled by January 1, 1989, the Protocol will enter into force on the ninetieth day following the date on which the conditions have been fulfilled.

§ 82.3 Definitions.

As used in this part, the term:

(a) "Administrator" means the Administrator of the Environmental Protection Agency or his authorized representative.

(b) "Baseline consumption allowances" means the consumption allowances apportioned under § 82.6.

(c) "Baseline production allowances" means the production allowances apportioned under § 82.5.

(d) "Calculated level" means the level of production, exports or imports of controlled substances determined for each Group of controlled substances by:

(1) Multiplying the amount (in kilograms) of production, exports or imports of each controlled substance by that substance's ozone depletion weight listed in Appendix A to this Part; and

(2) Adding together the resulting products for the controlled substances within each Group.

(e) "Consumption allowances" means the privileges granted by this Part to produce and import calculated levels of controlled substances; however, consumption allowances may be used to produce controlled substances only in conjunction with production allowances. A person's consumption allowances are the total of the allowances he obtains under § 82.7 (baseline allowances for Group I controlled substances), § 82.8 (baseline allowances for Group II controlled substances), and § 82.10 (additional consumption allowances upon proof of exports of controlled substances), as may be modified under § 82.12 [1] (transfer of allowances).

(f) "Control periods" means those periods during which the prohibitions under § 82.4 apply. Those periods are:

(1) For Group I controlled substances: [reserved]

(2) For Group II controlled substances: [reserved]

(g) "Controlled substance" means any substance listed in Appendix A to this Part, whether existing alone or in a mixture, but excluding any such substance or mixture that is in a manufactured product other than a container used for the transportation or storage of the substance or mixture. Any amount of a listed substance which is not part of a use system containing the substance is a controlled substance. If a listed substance or mixture must first be transferred from a bulk container to another container, vessel, or piece of equipment in order to realize its intended use, the listed substance or mixture is a controlled substance. Controlled substances are divided into two groups, Group I and Group II, as set forth in Appendix A.

(h) "Export" means the transport of controlled substances manufactured from raw materials or feedstock chemicals (i.e., virgin production) from within the United States or its territories to persons or countries outside the United States or its territories, excluding United States Military bases and ships for on-board use.

(i) Exporter means the person who contracts to sell controlled substances for export, or transfers controlled substances to his affiliate in another country.

(j) "Facility" means any process equipment (e.g., reactor, distillation column) to convert raw materials or feedstock chemicals into controlled substances.

(k) "Import" means the transport of virgin, used and recycled controlled substances from outside the United States or its territories to persons within the United States or its territories.

(l) "Importer" means the importer of record listed on U.S. Customs Service Form 7501 for imported controlled substances.

(m) "Montreal Protocol" means the *Montreal Protocol on Substances that Deplete the Ozone Layer* which was adopted on September 16, 1987, in Montreal, Canada.

(n) "Nations complying with, but not joining, the Protocol" means any nation listed in Appendix C to this Part.

(o) "Party" means any nation that is a party to the Montreal Protocol and listed in Appendix B to this part.

(p) "Person" means any individual or legal entity, including an individual,

[1] **Editorial Note:** Section 82.12 is currently reserved. The Environmental Protection Agency will add regulations in that section at a future date.

corporation, partnership, association, state, municipality, political subdivision of a state, Indian tribe, and any agency, department, or instrumentality of the United States and any officer, agent, or employee thereof.

(q) "Plant" means one or more facilities at the same location owned by or under common control of the same person.

(r) "Potential production allowances" means the production allowances obtained under § 82.9 (a) and (b).

(s) "Production" means the manufacture of a controlled substance from any raw material or feedstock chemical (i.e., virgin production); however, production does not include the manufacture by one person of controlled substances that are used and entirely consumed in the manufacture by the same person of other chemicals.

(t) "Production allowances" means the privileges granted by this Part to produce calculated levels of controlled substances; however, production allowances may be used to produce controlled substances only in conjunction with consumption allowances. A person's production allowances are the total of the allowances he obtains under § 82.7 (baseline allowances for Group I controlled substances), § 82.8 (baseline allowances for Group II controlled substances), and § 82.9 (c) and (d) (additional production allowances), as may be modified under § 82.12 [1] (transfer of allowances).

(u) "Twenty-five-kilotonne Party" means any nation listed in Appendix D to this Part.

(v) "Unexpended consumption allowances" means consumption allowances that have not been used. At any time in any control period, a person's unexpended consumption allowances are the total of the calculated level of consumption allowances he has authorization under this Part to hold at that time for that control period, minus the calculated level of controlled substances that the person has produced and imported in that control period until that time.

(w) "Unexpended production allowances" means production allowances that have not been used. At any time in any control period, a person's unexpended production allowances are the total of the calculated level of production allowances he has authorization under this Part to hold at that time for that control period, minus the calculated level of controlled substances that the person has produced in that control period until that time.

[1] **Editorial note:** Section 82.12 is currently reserved. The Environmental Protection Agency will add regulations in that section at a future date.

§ 82.4 Prohibitions.

(a) No person may produce, at any time in any control period, a calculated level of controlled substances in excess of the amount of unexpended production allowances held by that person under the authority of this Part at that time for that control period. Every kilogram of such excess constitutes a separate violation of this regulation.

(b) No person may produce or import, at any time in any control period, a calculated level of controlled substances in excess of the amount of unexpended consumption allowances held by that person under the authority of this Part at that time for that control period. Every kilogram of such excess constitutes a separate violation of this regulation.

(c) A person may not use his production allowances to produce a quantity of controlled substances unless he holds under the authority of this Part at the same time consumption allowances sufficient to cover that quantity of controlled substances, nor may he use his consumption allowances to produce a quantity of controlled substances unless he holds under authority of this Part at the same time production allowances sufficient to cover that quantity of controlled substances. However, consumption allowances alone are required to import controlled substances.

(d) Beginning one year after the effective date of this Part, no person may import any quantity of controlled substances from any nation not listed in Appendix B to this Part (Parties to the Montreal Protocol), unless that nation is listed in Appendix C to this part (Nations Complying with, But Not Party to, the Protocol). Every kilogram of controlled substances imported in contravention of this regulation constitutes a separate violation of this regulation.

§ 82.5 Apportionment of baseline production allowances.

Persons who produced one or more controlled substances in 1986 are apportioned calculated levels of baseline production allowances as set forth in paragraphs (a) and (b) of this section. Each person's apportionment is equivalent to the calculated levels of that person's production of Group I and Group II controlled substances in 1986.

(a) For Group I controlled substances:

Person	Calculated level
Racon, Inc	13,785,068
Kaiser Chemicals	28,187,273
Pennwalt Corp	39,126,239
Allied-Signal, Inc	77,701,820
E.I. du Pont de Nemours & Co., Inc	152,221,000

(b) For Group II controlled substances:

Person	Calculated level
E.I. du Pont de Nemours & Co., Inc	32,200,000
Great Lakes Chemical Corp	20,147,961
ICI Americas, Inc	6,406,452

§ 82.6 Apportionment of baseline consumption allowances.

Persons who produced, imported, or produced and imported one or more controlled substances in 1986 are apportioned calculated levels of baseline consumption allowances as set forth in paragraphs (a) and (b) of this section.

(a) For Group I controlled substances:

Person	Calculated level
Racon, Inc	13,466,026
Kaiser Chemicals	27,616,217
Pennwalt Corp	38,220,699
Allied-Signal, Inc	74,043,943
E.I. du Pont de Nemours & Co., Inc	139,373,484
Atochem, Inc	2,204,113
Pharmachem, Inc	28,602
Sumitomo Corporation of America	229,930
Hoechst Celanese Corp	329,597
Refricentro, Inc	420,931
Kali-Chemie Corp	437,940
National Refrigerants, Inc	3,069,091
ICI Americas, Inc	6,310,917
Holchem, Inc	212,159

(b) For Group II controlled substances:

Person	Calculated level
E.I. du Pont Nemours & Co., Inc	27,731,067
Great Lakes Chemical Corp	19,855,268
ICI Americas, Inc	6,347,800
Ausimont USA, Inc	206,400
Atochem, Inc	2,126,427
Kali-Chemie Corp	1,533,800

§ 82.7 Grant and phased reduction of baseline production and consumption allowances for Group I controlled substances.

(a) For each of the control periods that begins before July 1, 1993, every person is granted 100 percent of the baseline production and consumption allowances apportioned to him under §§ 82.5(a) and 82.6(a).

(b) For each of the control periods that occurs between July 1, 1993, and June 30, 1998, inclusive, every person is granted 80 percent of the baseline production and consumption allowances apportioned to him under §§ 82.5(a) and 82.6(a).

(c) For each of the control periods that begins after June 30, 1998, every person is granted 50 percent of the baseline production and consumption allowances apportioned to him under §§ 82.5(a) and 82.6(a).

§ 82.8 Grant and freeze of baseline production and consumption allowances for Group II controlled substances.

For each of the control periods specified in § 82.3(f)(2), every person is granted 100 percent of the baseline production and consumption allowances apportioned to him under §§ 82.5(b) and 82.6(b).

§ 82.9 Availability of production allowances in addition to baseline production allowances.

(a) Every person apportioned baseline production allowances for Group I controlled substances under § 82.5(a) is also granted a calculated level of potential production allowances equivalent to:

(1) 10 percent of his apportionment under § 82.5(a), for each control period ending before July 1, 1998; and

(2) 15 percent of his apportionment under § 82.5(a), for each control period beginning after June 30, 1998.

(b) Every person apportioned baseline production allowances for Group II controlled substances under § 82.5(b) is granted a calculated level of potential production allowances equivalent to 10 percent of his apportionment under § 82.5(b), for each control year specified in § 82.3(f)(2).

(c) A person may convert potential production allowances, either granted to him under paragraphs (a) and (b) of this section or obtained by him under § 82.12 [1] (transfer of allowances), to production allowances only to the extent authorized by the Administrator under § 82.11 (Exports to Parties). A person may obtain authorization to convert potential production allowances to production allowances either by requesting issuance of a notice under § 82.11 or by completing a transfer of authorization under § 82.12.[1]

(d) Any person may obtain production allowances from, or transfer his production allowances to, a foreign entity in accordance with the provisions of this paragraph.

(1) A nation listed in Appendix D to this part (Twenty-five-kilotonne Parties) must agree to either transfer to the person at a specified time some amount of the calculated level of production that the nation is permitted under the Montreal Protocol or receive from the person at a specified time some amount of the calculated level of production that the person is permitted under this part. The person must obtain from the principal diplomatic representative in that nation's embassy in the United States a document clearly stating that the nation agrees to reduce or increase, as applicable, its allowable calculated level of production by the amount being transferred to or from the recipient for the control period(s) to which the transfer applies and that after the transfer the nation's total allowable production of controlled substances will not exceed 25 kilotonnes.

(2) The person must submit to the Administrator a transfer request that includes a true copy of the document required by paragraph (d)(1) of this section and that sets forth the following:

(i) The identity and address of the person;

(ii) The identity of the Twenty-five-kilotonne Party;

(iii) The names and telephone numbers of Contact persons for the person and for the Twenty-five-kilotonne Party;

(iv) The amount of allowable calculated level of production being transferred;

(v) The control period(s) to which the transfer applies; and

(vi) For transfers to Twenty-five kilotonne Parties, the Twenty-five kilotonne Party's total allowable calculated level of production following the proposed transaction.

(3) After receiving a transfer request that meets the requirements of paragraph (d)(2) of this section, the Administrator will complete the following steps:

(i) Review any proposed transfer of production allowances to a Twenty-five-kilotonne Party and approve the transfer if it is consistent with the Montreal Protocol and domestic policy. The Administrator will consider the following factors in deciding whether to approve such a transfer:

(A) Possible creation of economic hardship;

(B) Possible effects on trade; and

(C) Potential environmental implications.

(ii) Notify the Secretariat of the Montreal Protocol of the transfer to the person or to the Twenty-five-kilotonne Party if approved under paragraph, (d)(3)(i) of this; and

(iii) Issue the person a notice granting or deducting production allowances equivalent to the calculated level of production transferred, and specifying the control periods to which the transfer applies. The change in production allowances will be effective on the date that the notice is issued.

§ 82.10 Availability of consumption allowances in addition to baseline consumption allowances.

(a) Except as limited by paragraph (b) of this section, any person may obtain, in accordance with the provisions of this subsection, consumption allowances equivalent to the calculated level of controlled substances (other than recycled or used controlled substances) that the person has exported from the United States or its territories. The consumption allowances granted under this section will be valid only during the control period in which the exports departed the United States or its territories.

(1) The exporters of the controlled substances must submit to the Administrator a request for consumption allowances setting forth the following:

(i) The identities and addresses of the exporter and the recipient of the exports;

(ii) The exporter's Employer Identification Number;

(iii) The names and telephone numbers of contact persons for the exporter and the recipient;

(iv) The quantity, calculated level, and type of controlled substances exported, and what percentage, if any, of the controlled substances are recycled or used;

(v) The source of the controlled substance and the date purchased;

(vi) The date on which and the port from which the controlled substances were exported from the United States or its territories;

(vii) The country to which the controlled substances were exported;

(viii) The bill of lading and the invoice indicating the net quantity of controlled substances shipped and documenting the sale of the controlled substances to the purchaser; and

(ix) The commodity code of the controlled substance exported.

(2) The Administrator will review the information and documentation submitted under paragraph (a)(1) of this section, and will assess the quantity of controlled substances (other than recycled or used controlled substances) that the documentation verifies were exported. The Administrator will issue the exporter consumption allowances equivalent to the calculated level of

[1] **Editorial note:** Section 82.12 is currently reserved. The Environmental Protection Agency will add regulations in that section at a future date.

controlled substances that the Administrator determined were exported. The grant of the consumption allowances will be effective on the date the notice is issued.

(b) No consumption allowances will be granted after January 1, 1993, for exports of controlled substances to any nation not listed in Appendix B to this Part (Parties to the Montreal Protocol).

§ 82.11 Exports to parties.

In accordance with the provisions of this section, any person may obtain authorization to convert potential production allowances to production allowances by exporting controlled substances to nations listed in Appendix B to this part (Parties to the Protocol). Authorization obtained under this section will be valid only during the control period in which the controlled substances departed the United States or its territories. A request for authorization under this section will be considered a request for consumption allowances under § 82.10, as well.

(a) The exporter must submit to the Administrator a request for authority to convert potential production allowances to production allowances. That request must set forth the following:

(1) The identities and addresses of the exporter and the recipient of the exports;

(2) The exporter's Employee Identification Number;

(3) The names and telephone numbers of contact persons for the exporter and for the recipient;

(4) The quantity, the calculated level, the type of controlled substances exported, its source and date purchased, and what percentage, if any, of the controlled substances that are recycled or used;

(5) The date on which and the port from which the controlled substances were exported from the United States or its territories;

(6) The country to which the controlled substances were exported;

(7) The bill of lading and invoice indicating the net quantity shipped and documenting the sale of the controlled substances to the purchaser; and

(8) The commodity code of the controlled substance exported.

(b) The Administrator will review the information and documentation submitted under paragraph (a) of this section, and assess the quantity of controlled substances (other than recycled or used control substances) that the documentation verifies were exported to a Party. Based on that assessment, the Administrator will issue the exporter a notice authorizing the conversion of a specified quantity of potential production allowances to production allowances in a specified control year, and granting consumption allowances in the same amount for the same control year. The authorization may be used to convert potential production allowances to production allowances as soon as the date on which the notice is issued.

§ 82.12 Transfers of production and consumption allowances [Reserved].

§ 82.13 Recordkeeping and reporting requirements.

(a) Unless otherwise specified, the recordkeeping and reporting requirements set forth in this section take effect as follows:

(1) For Group I controlled substances, beginning with the first day of the first control period specified in § 82.3(f)(1).

(2) For Group II controlled substances, beginning with the first day of the first control period specified in § 82.3(f)(2).

(b) Reports and records required by this section may be used for purposes of compliance determinations. The requirements of records and reports is not intended as a limitation on the use of other evidence admissible under the Federal Rules of Evidence.

(c) Unless otherwise specified, reports required by this section must be mailed to the Administrator within 45 days of the end of the applicable reporting period.

(d) Records and copies of reports required by this section must be retained for three years.

(e) In reports required by this section, quantities of controlled substances must be stated in terms of kilograms.

(f) Every person ("producer") who will produce controlled substances during a control period must comply with the following recordkeeping and reporting requirements:

(1) Within 120 days of the date this rule is published in the **Federal Register**, every producer must provide a report to the Administrator describing:

(i) The method by which the producer in practice measures daily quantities of controlled substances produced;

(ii) Conversion factors by which the daily records as currently maintained can be converted into kilograms of controlled substances produced, including any constants or assumptions used in making those calculations (e.g. tank specifications, ambient temperature or pressure, density of the controlled substance, etc.);

(iii) Internal accounting procedures for determining plant-wide production;

(iv) The quantity of any fugitive losses accounted for in the production figures; and

(v) The estimated percent efficiency of the production process for the controlled substance.

Within 60 days of any change in the measurement procedures or the information specified in the above report, the producer must submit the revised data or procedures to the Administrator.

(2) Every producer must maintain the following:

(i) Dated records of the quantity of each of the controlled substances produced at each facility;

(ii) Dated records of the quantity of controlled substances used as feedstocks in the manufacture of controlled substances and in the manufacture of non-controlled substances and any controlled substances introduced into the production process of new controlled substances at each facility;

(iii) Dated records of the quantity of HCFC–22 and CFC–116 produced within each facility also producing controlled substances;

(iv) Dated records of the quantity of the following raw materials and feedstock chemicals used at each plant for the production of controlled substances: carbon tetrachloride, perchloroethylene, chloroform, hydrofluoric acid, chlorine, bromine, CFC–113, HCFC–22, and CFC–23.

(v) Dated records of the shipments of controlled substances produced at each plant;

(vi) The quantity of controlled substances, the date received, and names and addresses of the source of recyclable or recoverable materials containing controlled substances which are recovered at each plant;

(3) For each quarter, each producer must provide the Administrator with a report containing the following information:

(i) The production by plant in that quarter of each controlled substance, specifying the quantity of any controlled substance used for feedstock purposes for controlled and non-controlled substances for each plant and totaled for all plants owned by the producer;

(ii) The calculated levels of production (expended allowances) for Group I and Group II controlled substances for each plant and totaled for all plants for that quarter and totaled for the control period to-date;

(iii) The shipments of each controlled substance from each plant in that quarter;

(iv) The producer's total of expended and unexpended consumption allowances, potential production allowances, expended and unexpended

production allowances and authorization to convert potential production allowances to production allowances, as of the end of that quarter;

(v) The quantity, the date received, and names and addresses of the source of recyclable or recoverable materials containing the controlled substance which are recovered at each plant; and

(4) For any person who fails to maintain the records required by this paragraph, the Administrator may assume that the person has produced at full capacity during the period for which records were not kept, for purposes of determining whether the person has violated the prohibitions at § 82.4.

(g) For Group I controlled substances, beginning with the first control period specified under § 82.3(f)(1), and for Group II controlled substances, beginning one year after the Montreal Protocol enters into force, importers of controlled substances during a control period must comply with the following recordkeeping and reporting requirements:

(1) Any importer must maintain the following records:

(i) The quantity of each controlled substance imported, either alone or in mixtures;

(ii) The date on which the controlled substances were imported;

(iii) The port of entry through which the controlled substances passed;

(iv) The country from which the imported controlled substances were imported;

(v) The port of exit;

(vi) The commodity code for the controlled substances shipped;

(vii) The importer number for the shipment;

(viii) A copy of the bill of lading for the import;

(ix) The invoice for the import; and

(x) The U.S. Customs Entry Summary Form.

(2) For each quarter, every importer must submit to the Administrator a report containing the following information:

(i) Summaries of the records required in paragraph (g)(1)(i)–(vii) of this section for the previous quarter;

(ii) The total quantity imported in kilograms of each controlled substance for that quarter;

(iii) The calculated levels of import (expended allowances) of Group I and Group II controlled substances for that quarter and totaled for the control-period-to-date; and

(iv) The importer's total sum of expended and unexpended consumption allowances at the end of that quarter.

(h) For any exports of controlled substances not reported under § 82.10 (additional consumption allowances) or § 82.11 (Exports to Parties), the exporter who exported the controlled substances must submit to the Administrator the following information within 45 days of the end of the control period in which the unreported exports left the United States:

(1) The names and addresses of the exporter and the recipient of the exports;

(2) The exporter's Employee Identification Number;

(3) The type and quantity of controlled substances exported and what percentage, if any, of the controlled substances that are recycled or used;

(4) The date on which and the port from which the controlled substances were exported from the United States or its territories;

(5) The country to which the controlled substances were exported; and

(6) The commodity code of the controlled substance shipped.

§ 82.14 Payment of fees [Reserved].

APPENDIX A

Controlled substance	Ozone depletion weight
A. Group I:	
CFC13—Trichlorofluoromethane (CFC–11)	1.0
CC12F2—Dichlorodifluoromethane (CFC–12)	1.0
CC12F–CC1F2—Trichlorotrifluoroethane (CFC–113)	0.8
CF2C1–CC1F2—Dichlorotetrafluoroethane (CFC–114)	1.0
CC1F2–CF3—(Mono)chloropentafluoroethane (CFC–115)	0.6
B. Group II:	
CF2BRC1—Bromochlorodifluoroethane (Halon 1211)	3.0
CF3BR—Bromotrifluoroethane (Halon 1301)	10.0
C2F4Br2—Dibromotetrafluoroethane (Halon 2402)	6.0

Appendix B—Parties to the Montreal Protocol [Reserved]

Appendix C—Nations Complying With, But Not Parties to, the Protocol [Reserved]

Appendix D—Twenty-Five-Kilotonne Parties [Reserved]

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