

**REGULATORY IMPACT ANALYSIS OF THE PROPOSED RULE TO ADOPT
THE INTERNATIONAL STANDARD ON WOOD PACKING MATERIAL IN
INTERNATIONAL TRADE**

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Policy and Program Development
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Riverdale, Maryland**

Executive Summary

In accordance with Executive Order 12866, this analysis is conducted to assess the impact of the proposed rule to adopt the International Plant Protection Convention (IPPC) Standards on Wood Packing Materials, which are guidelines on globally accepted measures that may be applied to solid wood packaging materials (SWPM) to reduce the entry of pests via this pathway. The IPPC guidelines require SWPM to be heat treated at 56° C for 30 minutes, or fumigated with methyl bromide.

Benefits of the Rule

Recent interceptions of pests at ports of entry show a steady increase in serious pests associated with SWPM from everywhere except China, whose SWPM must already be treated due to past pest interceptions. If left unchecked, pests imported with SWPM have the potential to cause significant economic damage to the agricultural and forest resources of the United States. The damage they cause could be similar in magnitude to the recent introduction of the Asian long-horned beetle (ALB) *Anaplophora glabripennis* (Coleoptera: Cerambycidae). Our regulations have already been changed to prevent further introductions of ALB from China, but adopting the IPPC guidelines could prevent the introduction of ALB or similar wood borers from other parts of the world, as well as prevent the introduction of other types of pests such as woodwasps and bark beetles. Imposing the IPPC guidelines' treatment and other requirements to prevent these introductions would yield net benefits. The benefits (avoided losses) that can be gained by preventing introduction of these pest types are discussed below. The actual magnitude of the benefits cannot be definitively ascertained, but they are likely to be much larger than the associated costs.

As an indicator of the damage ALB or similar wood borers could cause if introduced again in the future, consider the costs of the ALB introduction from China. The ALB, first discovered in New York City in 1996 and in Chicago, Illinois in 1998, was most likely introduced on wood packing material from China. The present value of urban trees at risk in the two affected cities is estimated at \$59 million over some 50 years. About \$6 million of urban trees have been destroyed due to pest infestation and eradication efforts since the introduction of ALB. So far, APHIS and State and local governments have spent over \$59 million in eradicating the pest in the two localities. If only New York City and Chicago were considered, it would appear that the current eradication program has yielded a net loss of about \$6 million (spending \$59 million in control activities to save \$53 million in resources). However, the eradication and quarantine activities are also the reason the pest has been confined to the two cities where it was initially detected. The potential damages from ALB spread to other areas can be gleaned from the Nowak *et al.* study that estimated losses to seven other cities. The present value of damage to urban trees in Baltimore City alone, not allowing for intervention, was estimated to be \$399 million. Additionally, without governmental intervention, forest resources would also be at risk

Wood borers such as ALB could cause the most damage of all types of pests associated with SWPM, but we have also projected that other types of pests could cause substantial damage. These include the *Sirex* woodwasp (Family: Siricidae) and the Eurasian spruce bark beetle (Family: Scolytidae). Projections of physical damages that can be caused by these types of pests range up to \$48 - \$607 million and \$208 million, respectively. Perhaps the greatest devastation posed by these pests that cannot be fully captured monetarily is their potential to cause irreversible loss to native tree species and consequential alterations to the environment and ecosystem.

The recent introduction of the emerald ash borer (EAB), *Agrilus planipennis* (Coleoptera: Buprestidae) a pest of ash trees, in Michigan and parts of Canada in June 2002 is a reminder of this threat. It is not known how the pest arrived in North America but, as with other exotic beetles, infested SWPM from Asia is suspected. The pest may have arrived some five years ago, before the interim rule on China was implemented. Ironically, many of the large ash trees favored by the pest were originally planted to replace elm trees killed by Dutch elm disease caused by yet another exotic pathogen. A preliminary assessment of the potential impact of the EAB on urban and timberland ash trees in the six quarantined counties in Michigan comes to about \$11 billion in replacement costs alone.¹ The nursery stock industry in the affected counties reported a loss in sales so far of \$2 million. These estimates serve to highlight the potential magnitude of damage that could be caused by one outbreak alone of a pest on the targeted list.

The adoption of the IPPC treatment standards for all importing countries would address pest threats posed not only by Cerambycidae, which was the primary target of the China rule, but nine other pest families as well. Approximately 95 percent of pests intercepted by APHIS inspectors in shipments worldwide are pests on the IPPC target pest list.

The treatment requirements specified in this rule are not expected to completely eliminate all pest interceptions related to SWPM. As evident from data reported between 2000 and 2001, two years following the implementation of the China rule, 7 percent of pest interceptions was still associated with China imports. To the extent that pest interceptions would be reduced, the risk of an outbreak would also be lower than in the absence of the rule. However, because pests continue to be intercepted albeit at a lower rate, benefits need to be correspondingly adjusted to reflect the risk.

Costs of the Rule

In discussing the costs that might result from adopting this proposed rule, it is essential to recognize that to some degree these costs will accrue when other countries adopt the IPPC Guidelines, whether or not the United States also adopts them. As other countries impose IPPC treatment requirements on imports containing SWPM the global

¹ NPAG Final Report to the PPQ Executive Team Representative on *Agrilus planipennis* (Emerald Ash Borer), August 26, 2002.

SWPM market will be greatly affected, likely causing a broader impact on the domestic wood packaging industry than the provisions of this proposed rule.

The impact of this rule would fall largely on foreign manufacturers of pallets. The increased treatment cost may add to the cost of packaging and transporting of goods which, in turn, would affect importers of commodities transported on pallets and final consumers of those goods are potentially impacted by this rule. The required treatments would add to the cost of packaging and transport of goods. Due to the very large number of pallets that are used to assist imported cargo, the overall cost may be substantial. The extent of the impact on U.S. consumers would depend on the ability of importers to pass on the additional costs to respective buyers. It is expected that most of the cost of treating pallets will be borne by foreign pallet manufacturers. Furthermore, given the small value of pallets as compared to the value of trade, increases in pallet prices are not expected to have a measurable effect on domestic consumers or on trade.

We also expect this proposed rule to affect U.S. purchasers of imported pallets, crates and boxes.² Between 1999 and 2001, an average of 38 million pallets was imported into the United States, over 80 percent of which came from Canada. Imported SWPM was valued at \$150 million during this time period. At approximately \$3.95 per piece, imported pallets are less expensive than domestic pallets where the average price ranges between \$8 and \$12 per pallet. Canadian pallets are primarily used by industries close to the U.S. and Canadian border. The wood pallet market is highly competitive and the demand for imported pallets can be characterized as elastic. While pallets made of alternative materials such as plastic, corrugated fiberboard, or processed wood are imperfect substitutes for wood, one wood pallet can easily substitute for another wood pallet.

Assuming a perfectly elastic supply and perfectly inelastic demand for imported pallets, and assuming a treatment cost that adds about \$2 on average to a pallet, U.S. purchasers of imported pallets could lose an estimated \$76 million in higher costs.³ The true extent of the impact however would be lower than this amount because demand is likely to be elastic and foreign importers are expected to share a greater burden of the cost increase. We do not know treatment costs for foreign pallet producers, but given the availability of substitutable domestic wood pallets, we do not expect U.S. purchasers of imported pallets to be significantly impacted.

The adoption of this rule would indirectly affect manufacturers who sell pallets, crates and boxes to foreign buyers. There are an estimated 3,000 manufacturers of pallets and

² Wood pallets are used as the unit of analysis simply because data on other types of wood packaging material were not available. The wood pallets industry is also the most organized of the industries involved in SWPM. We do not have a good accounting of the volume of other forms of SWPM such as crates or dunnage. The analysis uses data about 48x40 pallets that are the most commonly used size of pallet; however there are many other types and sizes of pallets which are not considered because of the lack of information on the number of units in circulation.

³ Treatment costs for firms in the U.S. using methyl bromide without gas recapture is estimated to range between \$1.82 and \$2.34 per pallet (including the cost of chemical and construction of a fixed fumigation structure).

containers in the United States. The primary importers of these items are Canada and Mexico. As these two countries prepare to implement the IPPC standard in 2003, only treated wood packing materials would likely be in demand for export. The extent of the impact on pallet and container manufacturers would depend on the ability of individual firms to put in place the necessary infrastructure for conducting treatments as required by the international standard. The number of firms that engage in export and would therefore be impacted is unknown. Regardless, the impact on the overall SWPM industry is expected to be small as the quantity of total pallets exported, estimated at about 10 million units, comprises only 2.5 percent of the 400 to 500 million pallets in production in the U.S. each year.

Domestic manufacturers of wood pallets may be indirectly affected in one other way. Because of the increasing trend in recycling of pallets for cost-cutting purposes, manufacturers may be faced with new demands for treated SWPM from domestic exporters who reuse pallets and wood containers to ship goods back from foreign countries. The number of firms affected in this way is unknown and may be large.

In sum, this rule would impact foreign manufacturers of pallets which may, in turn, affect importers and final consumers of goods transported on pallets. Because the cost of a pallet is a very small share of the bundle of goods transported on pallets, cost increases due to the treatment requirements are not expected to significantly affect domestic consumers and thus would not have a measurable impact on the flow of trade. This rule is not expected to reduce the amount of goods shipped internationally as is evident from observing trends in imports from China since implementation of the interim rule in 1999.

This rule would also affect U.S. consumers of imported pallets. Given the substitutability of wood pallets, the impact on consumers is expected to be small due to the availability of wood pallets. Foreign importers are likely to absorb a greater share of the cost increase.

Due to the trend in recycling, some domestic manufacturers of exported pallets may be indirectly impacted by the increase in demand for higher quality, treated pallets that would meet re-entry requirements into the United States.

The simultaneous adoption of the treatment standards by IPPC member countries that is directed at U.S. exports would likely create a broader impact on the domestic wood packaging industry than the provisions of this proposed rule. The adoption of the standard globally would ensure that U.S. producers and exporters are not placed at a competitive disadvantage by this rule as compared to their trading partners.

1. Need for Regulation

The free trade of goods in international commerce potentially brings with it negative externalities due to the inadvertent transport of exotic plant pests and pathogens that may be harbored in untreated wood packing materials. Such activities may impact various sectors of society, for example, in terms of altering the diversity and productivity of the forest ecosystem. The private cost of importing commodities does not account for the full social costs because importers responsible for unintended pest introductions are not charged for potential damages that may be caused by exotic pests. The market left to itself would continue to engage in undesirable commercial practices that could lead to detrimental impacts on agricultural and natural resources of the United States. Because societal costs could be substantial, Federal intervention is necessary to correct for the market failure as individual importers are unlikely to take sufficient action to prevent the introduction of harmful pests.

In response to the discovery of the Asian long-horned beetle (ALB), *Anaplophora glabripennis* (Coleoptera: Cerambycidae), in the northeastern United States, APHIS implemented an emergency interim rule on imports from China. While this rule has been effective, shipments from the rest of the world not subjected to this rule have resulted in significantly increased pest interceptions on wood packing materials. There is thus the need to replace the interim China rule with a rule that addresses the problem of pest transport in wood packing material globally.

This proposed rule would amend the wood importation regulations to adopt the International Plant Protection Convention (IPPC) Standards on Wood Packing Materials, which are guidelines on globally accepted measures that may be applied to wood packaging materials to reduce the entry of pests via this pathway. The United States is one of 116 member countries approving the International Standards, the adoption of which would harmonize requirements among signatory countries.

Although it is difficult to precisely estimate the total, long-term damage to the nation's resources without federal intervention, given existing evidences on pest infestations, it is expected that additional costs incurred by affected parties would likely be offset by gains resulting from the rule in terms of avoided pest damages to agricultural and natural resources of the United States.

The next section of the analysis provides a discussion of the potential economic impact of selected pests that may be harbored in solid wood packing material. These examples are meant to provide an indication of the possible magnitudes of damage that can result if imports are left unchecked. Benefits of the rule are discussed in section 3. A brief overview of trade and, specifically, trade with China since implementation of the interim rule, is presented in section 4 to provide a background to the ongoing pest threat. Section 5 contains a discussion of the wood pallet and container industry in the United States. Costs associated with the additional treatment requirements and their impact on various sectors of society including manufacturers of wood packing materials, importers of commodities transported on SWPM, and final consumers of those goods, are presented

in section 6. A summary of alternatives to wood packing material is outlined in section 7 followed by a discussion of alternatives that were considered in the development of this proposed rule in section 8. The potential impact on small entities is discussed in section 9, and a summary is provided in section 10.

2. Potential Impact of Pests Associated with SWPM

Forest pests can cause damage to trees, forests, and wooden structures. In addition to forests, other industries that are potentially at risk from introduced pests associated with SWPM include Christmas trees, fruits and nuts, nurseries, and ornamentals. Economic losses may be due to:

- tree mortality and timber volume loss
- wood defects and degradation
- tree growth loss
- decreased production of products such as maple syrup, fruits, nuts, seeds
- reduction in property values
- damage to property due to tree failures
- losses in recreation visitor days or tourism
- higher energy costs (resulting from loss of shade)
- increased costs for mitigating pest damage or restoring habitat
- loss of export markets
- cost of meeting requirements of other countries once a pest is found
- loss of non-market services provided by tree (aesthetics, cooling).

The actual value at risk due to pest damage depends on a variety of factors including the ability of a specific pest to colonize and spread. Some of the best evidence of the potential effect of SWPM on forest resources comes from the observed effects of the Asian long-horned beetle (ALB). It was the outbreak of this pest in 1996 that prompted the treatment requirements for SWPM-related imports from China. In the absence of this rule, the ALB and other wood borers that are harbored on imports from countries other than China could potentially cause damages similar in scale to that which have already occurred in the affected U.S. cities. Benefits of the interim rule on China thus serve to illustrate the potential magnitude of benefits to be gained from regulating wood boring pests on imports from all IPPC signatory countries.

In the discussion below, we present an update on the impact of the ALB that was reported in the regulatory impact analysis (RIA) of the interim rule on China⁴. We compare the observed impacts of the ALB, which takes into account governmental intervention, with those estimated by Nowak *et al* which were cited in the previous RIA.⁵ The authors estimated the stock of host trees in nine selected cities and predicted the potential, undiscounted losses to the urban tree populations and canopy cover that could occur if *A. glabripennis* is left unchecked. We present this discussion because the

⁴ USDA APHIS, Solid Wood Packing Material from China, Docket No. 98-087-1, Sept. 18, 1998.

⁵ Nowak et al. "Potential Effect of *Anoplophora glabripennis* (Coleoptera: Cerambycidae) on Urban Trees in the United States", J. of Econ. Entomology, February 2001.

observed impacts offer a more realistic view from which we can infer future pest outcomes.

Impact of Asian Long-Horned Beetle on Urban Trees

Based on an assumed spread rate of 300 meters per year, the study estimated that ALB would spread throughout the city of New York in 54 years, and Chicago in 46 years (Table 1). The net present value of the affected trees in New York City and Chicago were estimated to be \$293.7 million and \$191.5 million, respectively. The undiscounted value of resources at risk was estimated to range up to \$2.2 billion per city (Table 2).

However, the spread of *A. glabripennis* since its discovery in 1996 has been slower than that assumed by Nowak et al. Five years after the infestation was discovered in New York City in 1996, 5,152 trees have been destroyed or an average of 1,030 trees per year (Table 3). This comprises 26 percent of the 19,847 trees that would have been destroyed by an infestation moving at 300 m/yr. The annual value of the destroyed trees ranged from a high of \$1.6 million in 1999-2000 to a low of \$0.55 million in 2000-01. The value of trees destroyed over five years totaled about \$5.1 million (Table 4).

Three years into the infestation in Chicago, 1,484 trees have been destroyed or an average of 494 trees per year (Table 3). This amounted to 4 percent of the 10,860 trees that would have been destroyed by an infestation moving at 300 m/yr. The annual value of the destroyed trees varied from over \$400,000 in 1998-99 to nearly \$42,000 in 2000-01. The total value of trees destroyed over three years since the infestation is estimated to be over \$685,000 (Table 4).

Based on the average, annual observed spread, the present value of the urban trees at risk is \$55.7 million over 54 years for New York City, and \$3.2 million over 46 years for Chicago (Table 5). These estimates of actual damages in New York City and Chicago are much smaller than damages predicted by Nowak et al. The actual spread has been slowed by APHIS, State and local control efforts which include tree removal as part of the eradication strategy. Without APHIS involvement, the spread rate and the amount of damage would likely have been greater. From FY 1997 through FY 2000, APHIS spent approximately \$25 million to eradicate the ALB in New York and Illinois. During the same period, State and local governments in those areas have spent approximately \$6 million in direct costs. For FY 2001, direct program costs increased to \$55.3 million.

The value of losses discussed above pertains to urban forests and does not take into account potential losses should ALB become established in forests. Human assisted spread of the beetle can dramatically reduce the amount of time needed for the beetle to become established in distant locations from its original area of infestation. Forest resources also have non-market values that can be important. Non-market services associated with forests include recreation opportunities such as hiking, bird watching, hunting, fishing, wildlife habitat preservation, and tourism related to the fall colors. These non-market values are not assessed in this analysis.

Table 1. Estimated Tree Resources at Risk in Cities Currently Infested by *A. glabripennis* (based on the total of all living host preferred host species and a spread rate of 300 meters per year)

	Nowak et al estimate (undiscounted)	Years until entire city is infested	PV ^a of Nowak et al estimate
New York	\$2,251,240,000	54	\$293,751,789
Chicago	\$1,159,250,000	46	\$191,498,315

^a Present value (PV) discounted at 7 percent.

Table 2. Estimated Tree Resources at Risk from Infestation by *A. glabripennis* in Seven Cities Not Currently Infested (based on the total of all living preferred host species, spread rate of 300 meters per year)

Cities	Nowak et al estimate	Years until entire city is infested	PV ^a
Atlanta	\$391,280,000	35	\$93,226,122
Baltimore	\$1,361,540,000	29	\$399,145,415
Boston	\$794,360,000	23	\$298,083,729
Jersey City	\$72,160,000	12	\$42,108,024
Oakland	\$91,770,000	23	\$34,260,212
Philadelphia	\$772,670,000	35	\$183,942,258
Syracuse	\$260,210,000	16	\$130,828,261
Total 7 cities	\$3,743,990,000		\$1,181,594,021

^a Net present value (NPV) discounted at 7 percent.

Year totals are from May 1 to April 30.

Table 3. Number of Trees Destroyed due to Infestation by *A. glabripennis*

	96-97	97-98	98-99	99-00	00-01	Total
New York	1,220	784	954	1,640	554	5,152
Chicago	0	0	886	508	90	1,484

Table 4. Estimated value of trees destroyed due to infestation by *A. glabripennis*

	96-97	97-98	98-99	99-00	00-01	Total
New York	\$1,222,440	\$785,568	\$955,908	\$1,643,280	\$555,108	\$5,162,304
Chicago	\$0	\$0	\$409,332	\$234,696	\$41,580	\$685,608

Year totals are from May 1 to April 30.

Table 5. Estimated Tree Resources at Risk (based on actual spread, in cities currently infested by *A. glabripennis*)

Cities	Nowak et al estimate (undiscounted)	Estimated trees destroyed at average annual spread	PV ^a of trees destroyed based on average annual spread
New York	\$2,251,240,000	55,642	\$55,752,883
Chicago	\$1,159,250,000	22,754	\$3,180,246

^a Present value (PV) discounted at 7 percent.

Potential Impacts of Other Plant Pests

Given biological and ecological uncertainty, the potential for economic damage caused by plant pests can be difficult to quantify, especially for those species that threaten but have not yet become established in a new environment. However, observed impacts of exotic pests on resources in their country of origin provide a basis for judging the potential economic damages should these pests be introduced domestically. As part of the agency's ongoing efforts to manage and prioritize pests, quantitative projections of resource and monetary losses for exotic pest species or groups are developed based on observed behavior of pests in their native habitat. Projections for pest species on the IPPC targeted list include sirex woodwasp and European spruce bark beetle. Potential scenarios of introduction and spread over 30 years were devised based on the characteristics of the pests in their country of origin. The low and high extremes of

potential spread rates and damage potentials defined the slow spread and fast spread scenarios, respectively, for each pest:

- Of three locations modeled for introduction of a sirex woodwasp (*Sirex noctilio* F.) into commercial timberlands, the area around Atlanta, GA, would be expected to sustain the greatest damage levels with maximum annual volume losses of 550 million cubic feet to more than 6 billion cubic feet for the fast spread and slow spread cases, respectively. Cumulative discounted values of timber loss due to tree mortality over 30 years would range from \$48 million to \$607 million. For timber production around Minneapolis, MN, and San Francisco, CA, cumulative discounted monetary losses over 30 years would be between \$7 million and \$77 million, depending upon spread rates⁶.
- The European spruce bark beetle (*Ips typographus* L.) was assumed to attack and kill only spruce, which is limited to timberland areas in the Northern United States and high elevations of the mountainous West. At the slower rate of spread, populations are expected to remain very localized. However, under a fast spread scenario, values of annual timber volume loss could range up to 919 million cubic feet for introduction into Minneapolis, 758 million cubic feet for introduction into New York, and 98 million cubic feet for introduction into Seattle. Cumulative discounted values for timber loss after 30 years would be \$101 million for Minneapolis, \$93 million for New York, and \$14 million for Seattle⁷.

The discussion presented above provides an indication of the potential magnitude of damage that can be caused by pests introduced via the SWPM pathway if imports were left unchecked. These impacts are summarized in Table 6. While the implementation of the interim rule in 1998 has been effective in reducing the number of pest interceptions on imports from China, pest interceptions on SWPM imports from the rest of the world has actually increased over the same time period. The adoption of this proposed rule would address the continued pest threat posed on the agricultural and natural resources of the United States.

⁶ USDA Forest Service, 1992. Pest risk assessment of the importation of *Pinus radiata* and Douglas-fir logs from New Zealand. Miscellaneous Publication 1508. Washington, D.C.: U.S. Department of Agriculture, Forest Service.

⁷ USDA Forest Service, 1991. Pest risk assessment of the importation of larch from Siberia and the Soviet Far East. Miscellaneous Publication 1495. Washington, DC: U.S. Department of Agriculture, Forest Service.

Table 6. Summary of Potential Impacts of Selected Pests Associated with SWPM⁸

Pest	Estimated Losses due to Pest Damage over 30 years	Estimated Present Value of Losses due to Pest Damage and/or Control Costs (over 30 years)
<i>Sirex</i> woodwasp	550 million to 6 billion cubic feet of timber	\$ 48 million to \$607 million
European spruce bark beetle	1.175 billion cubic feet of timber	\$208 million

3. Benefits of the Rule

Recent interceptions of pests at ports of entry show a steady increase in serious pests associated with SWPM from everywhere except China, which must already be treated due to past pest interceptions. The adoption of the international standard for solid wood packing material would yield benefits in terms of the potential damages that are avoided by foregone pest introductions via world-wide imports associated with SWPM.

APHIS' inspection data indicated that from 1996 through 1998, an average of 402 live pests per year associated with SWPM were intercepted at U.S. ports of entry. Of these, 156, or 39 percent, were from China. A marked decline in pest interceptions associated with SWPM from China was noted following the treatment requirement for SWPM from China. For 2000-2001, an average of 355 pests per year associated with SWPM was intercepted at U.S. ports of entry. Of these, 24, or 7 percent, were from China.

The international standard requires SWPM to be heat treated or fumigated with methyl bromide. These two treatments are efficacious in treating target pests named in the IPPC Guidelines, i.e., bark beetles, wood borers, and certain nematodes (Table 1). If left unchecked, these pests have the potential to cause significant economic damage to the agricultural and forest resources of the United States similar to the damage caused by the Asian long-horned beetle (ALB), *Anaplophora glabripennis* (Coleoptera: Cerambycidae).

The ALB, first discovered in New York City in 1996 and in Chicago, Illinois in 1998, was most likely introduced on wood packing material from China. The value of urban trees destroyed due to pest infestation and eradication efforts since the introduction of the pest has totaled about \$6 million. So far, APHIS and State and local governments have spent over \$59 million in eradicating the pest in the two localities. The present value of urban trees at risk in the two affected cities, taking into account control actions, is estimated at \$59 million over some 50 years. If only New York City and Chicago were considered, it would appear that the current eradication program has yielded a net loss of about \$6 million (spending \$59 million in control activities to save \$53 million in

⁸ APHIS Memo for the Record, Cost of selected pests associated with solid wood packing material (SWPM).

resources). However, because of governmental eradication and quarantine activities, the pest has been confined to the two cities where it was initially detected. One indication of the potential damages should the ALB become established in other areas can be gleaned from the Nowak et al. study that estimated losses to seven other cities (Table 5). The present value of damage to urban trees in Baltimore City alone, not allowing for intervention, was estimated to be \$ 399 million. Additionally, without governmental intervention, forest resources would also be at risk. It is clear then that the treatment requirements such as that outlined in the China rule would yield net benefits, the actual magnitude of which cannot be definitively ascertained but can be presumed to be large.

To the extent that other types of wood borers, including the ALB from other parts of the world, may behave similarly in the United States, the avoided losses that can be expected from this proposed rule can be indicated by those of the China rule. The adoption of the IPPC treatment standards for all importing countries would address pest threats posed not only by Cerambycidae, which was the primary target of the China rule, but nine other pest families as well. Approximately 95 percent of pests intercepted by APHIS inspectors in shipments worldwide are pests on the IPPC target pest list.

Estimates of damage that could be caused by exotic pests via the SWPM pathway other than a wood borer such as the ALB are also examined. These include the *Sirex* woodwasp (Family: Siricidae) and the Eurasian spruce bark beetle (Family: Scolytidae). Projections of physical damages that can be caused by these types of pests range between \$48 to \$607 million and \$208 million, respectively. Perhaps the greatest devastation posed by these pests that cannot be fully captured monetarily is their potential to cause irreversible loss to native tree species and consequential alterations to the environment and ecosystem.

The recent introduction of the emerald ash borer (EAB), *Agrilus planipennis* (Coleoptera: Buprestidae) a pest of ash trees, in Michigan and parts of Canada in June 2002 is a reminder of this threat. It is not known how the pest arrived in North America but, as with other exotic beetles, infested SWPM from Asia is suspected. The pest may have arrived some five years ago, before the interim rule on China was implemented. Ironically, many of the large ash trees favored by the pest were originally planted to replace elm trees killed by Dutch elm disease caused by yet another exotic pathogen. A preliminary assessment of the potential impact of the EAB on urban and timberland ash trees in the six quarantined counties in Michigan comes to about \$11 billion in replacement costs alone.⁹ The nursery stock industry in the affected counties reported a loss in sales so far of \$2 million. These estimates serve to highlight the potential magnitude of damage that could be caused by one outbreak alone of a pest on the targeted list.

It should be noted that the treatment requirements specified in this rule are not expected to completely eliminate all pest interceptions related to SWPM. As evident from data reported between 2000 and 2001, two years following the implementation of

⁹ NPAG Final Report to the PPQ Executive Team Representative on *Agrilus planipennis* (Emerald Ash Borer), August 26, 2002.

the China rule, 7 percent of pest interceptions was still associated with China imports. To the extent that pest interceptions would be reduced, the risk of an outbreak would also be lower than in the absence of the rule. However, because pests continue to be intercepted albeit at a lower rate, benefits need to be correspondingly adjusted to reflect the risk.

4. Overview of Trade with SWPM

The value of international trade has been steadily increasing in the last decade. Since 1993, imports into the U.S. have nearly doubled from \$580.6 billion to \$1,141.0 billion in 2001. During the same time period, exports from the U.S. increased from \$465.1 billion to \$729.1 billion. Up to 70 percent of all goods traded internationally are accompanied by some type of solid wood packing material. With increases in trade, imports associated with SWPM are expected to rise correspondingly, increasing the likelihood of pest introduction in the absence of regulation. The wood packing material is usually of low quality, making it more susceptible to pest infestation.

In developing this analysis, APHIS conducted a survey of selected U.S. ports to determine the type and amount of imports that contain SWPM. The ten commodities (by two-digit Harmonized Code) that were frequently identified with SWPM include machinery, electrical machinery, optic and medical instruments, woven apparel, knit apparel, furniture and bedding, toys and sports equipment, plastic, footwear, and leather goods. The 2001 value of these imports was approximately \$494 billion, or over 43 percent of the total value of U.S. imports in that year. It was estimated that between \$350 billion and \$424 billion in value of the ten imports are associated with some type of SWPM.

The U.S. imports two-thirds of its goods from trading partners who will adopt the IPPC standard. Countries exporting to the U.S. have the responsibility for ensuring that systems for exports meet the requirements set out in this rule. This includes monitoring certification that verifies compliance and establishing inspection procedures or accreditation and auditing of commercial companies that apply the measures.

Pests associated with solid wood are a problem not confined only to the United States. For example, the Plant Quarantine Service of Finland found that 5 percent of all tested packing wood from the U.S, Canada, and China was infested with pine wood nematode. During 2000, 149 interceptions of pine wood nematode were made by nine European countries. The adoption of the IPPC guidelines globally would harmonize treatment requirements among trading partners. The broad implementation of the standard would not unfairly disadvantage one country over another.

Trade with China since Implementation of SWPM Rule for China

An examination of the trend in imports from China reveals the most relevant evidence on the possible effects of treatment requirements for SWPM. Since December 1998, SWPM arriving from China has been subject to methyl bromide fumigation or heat

treatment. These treatments were not required of imports from other countries yet imports from China have continued to increase.

Attachment 1 shows the top twenty-five countries ranked by dollar value of imports in 2001. Of these top countries, imports into the United States from 1998 to 1999 increased in value for only six of the countries in the year following implementation of the interim rule on China in 1998. Chinese imports into the United States increased by nearly 13 percent in value in 1999 keeping pace with the increase in the total value of imports at slightly over 12 percent in the same year. Even with stricter regulations, Chinese imports have continued to increase annually since the implementation of the 'China rule' in December of 1998 (7 CFR Part 319.40-5). The rule does not appear to have adversely affected imports from China as compared to other countries.

Individual imports containing SWPM also do not appear to be affected by the treatment requirements. Attachment 2 shows the top 20 values of imports from China by two-digit Harmonized Standard code. A survey of port directors was conducted in 1998 to determine the approximate percentage of imports of a particular good that are associated with wood packing material. The survey showed that for two of the largest ports receiving Chinese imports, in Seattle, WA and in Long Beach, CA, there were ten groups of commodities most likely to be associated with SWPM among the top ranking import groups. These products include electrical machinery, machinery, optical and medical instruments, iron and steel products, vehicles (excluding rail cars), metal tools and cutlery, miscellaneous art of base metal, ceramic products, precious stones, and wood products.

In sum, the implementation of the 'China rule' does not appear to have had a measurable adverse impact on imports containing SWPM from China. Depending on the commodity, increased costs due to additional treatment requirements would be absorbed by the manufacturer of the SWPM, passed on to importers and/or retail consumers of the commodity, or shared by the manufacturer and importer/retail consumer. Furthermore, as the cost of SWPM is only a small part of the total cost of a good, a change in the costs associated with treating SWPM are unlikely to have any measurable impact on overall trade.

5. Description of the U.S. Pallet Industry¹⁰

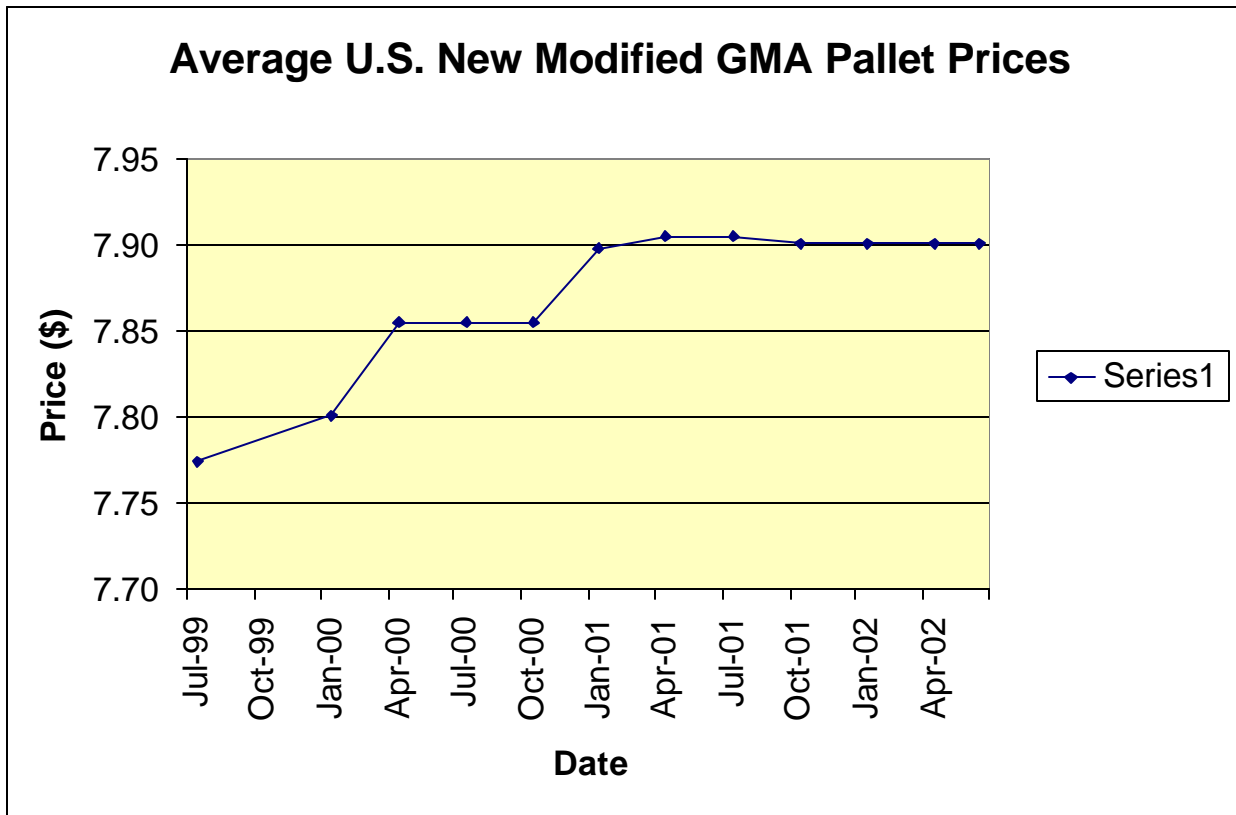
Four hundred to 500 million pallets were manufactured in the U.S. in 1999. On any given day, there are 1.5 billion pallets in use. Approximately 95 percent of the pallets in use are made of wood. According to the National Hardwood Lumber Association

¹⁰ Wood pallets are used as the unit of analysis simply because data on other types of wood packaging material were not available. The wood pallets industry is also the most organized of the industries involved in SWPM. We do not have a good understanding of the volume of other forms of SWPM such as crates or dunnage. The analysis uses data about 48x40 pallets that are the most commonly used size of pallet; however there are many other types and sizes of pallets which are not considered because of the lack of information on the number of units in circulation.

(NHLA), nearly 40 percent of all hardwood produced in the United States is used annually for containers and pallets. About 70 percent of all pallets are manufactured using hardwood lumber, most of which is low-grade material. Approximately one-third of the solid wood used by the pallet and container industry in 1999 was softwood. A significant fraction of softwood pallet lumber is already kiln dried.

There are over 400 different pallet sizes used by companies in the United States. The most widely used size, comprising 31 percent of all sizes, is the 48x40 pallet used by the grocery, produce and the consumer packaged goods industries, commonly referred to as GMA (Grocery Manufacturer Association) pallets. Custom pallets remain the preferred option for many industries.

Information on prices is more readily available for the common GMA pallet than for other types of pallet. Pallets can be manufactured to meet any packaging need and prices for specialty pallets are difficult to characterize. Figure 1 shows the average U.S. price for a new, modified GMA pallet. Prices vary by region from \$7.00 to \$8.00. For each reporting region, prices have been very stable since at least fall of 1999. Prices for used pallets typically range from \$5.00 to \$6.00 and have also been very stable.



The GMA pallet market is highly competitive. Pallet manufacturers who attempt to raise prices are typically faced with competitors unwilling to follow price increases. Since Fall 1999, pallet prices have been relatively stable in light of the variability in lumber prices in the Southern California, Northern California, and Pacific Northwest

markets (Figures 2, 3 and 4). The difficulty in passing along price increases to consumers is characteristic of a competitive market. That is, suppliers, as ‘price takers’, must be willing to supply at the market price or face losing their share of the market. Thus, a change in APHIS regulations is not expected to result in a noticeable change in the pallet price.

Figure 2. Lumber Prices in Southern California

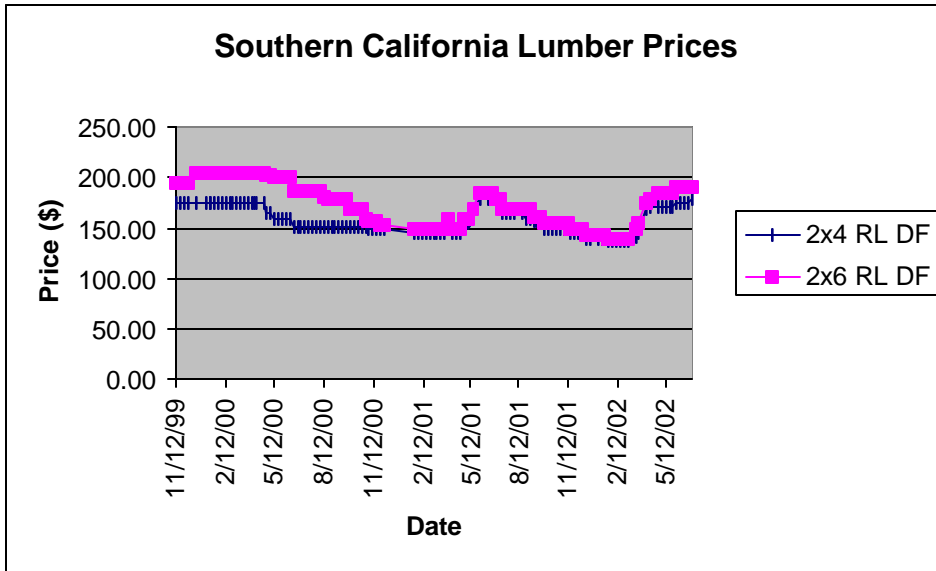


Figure 3. Lumber Prices in Northern California

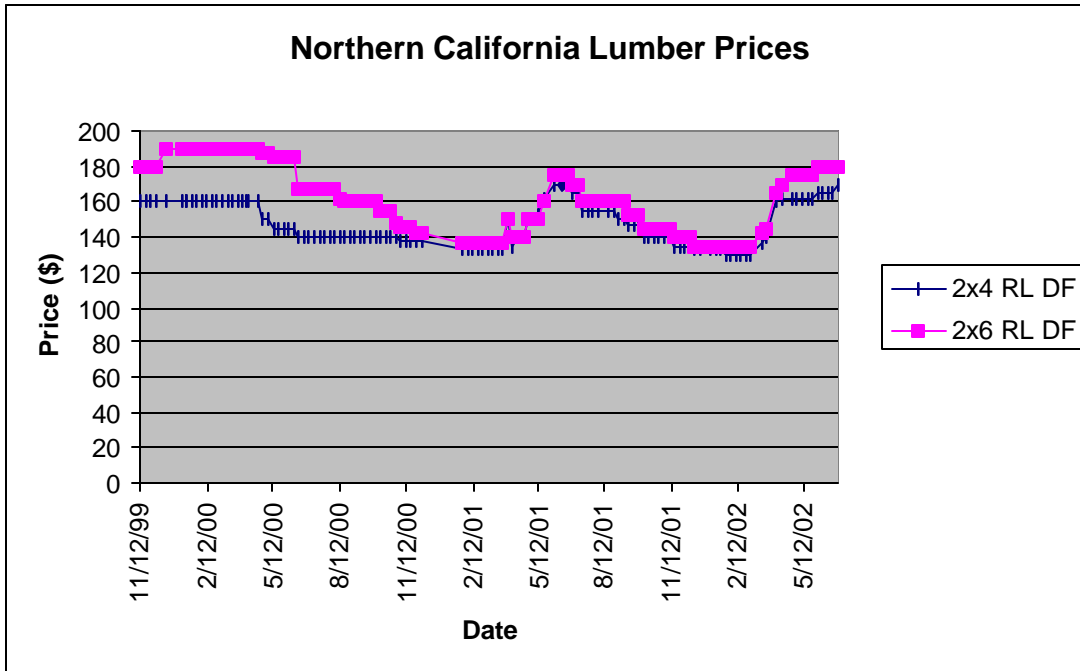
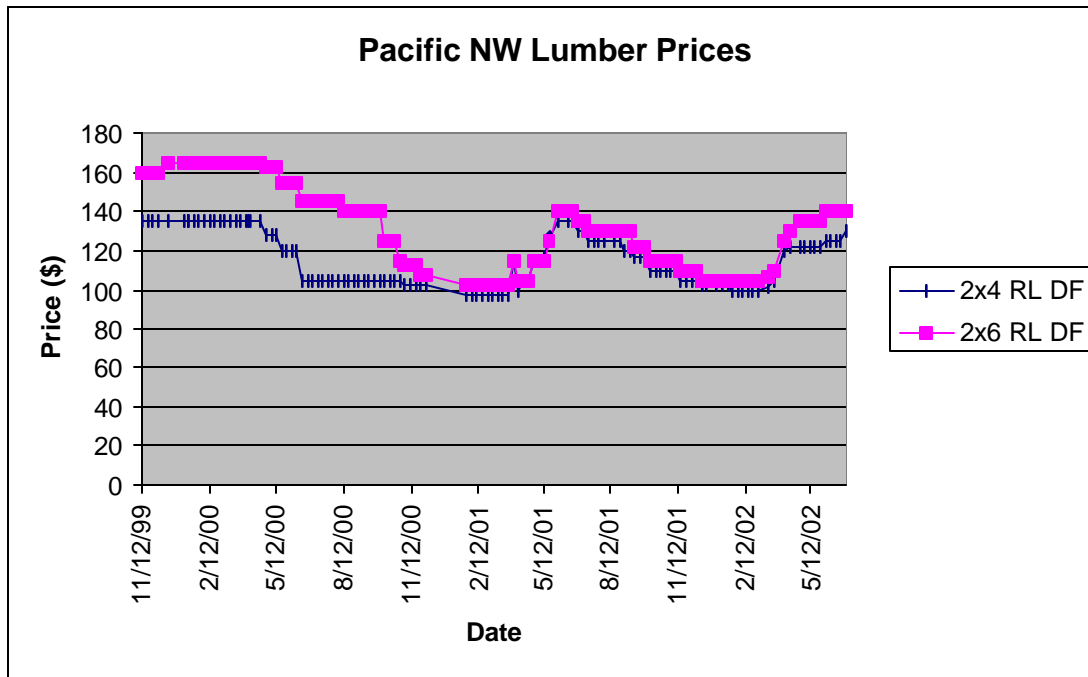


Figure 4. Lumber Prices in the Pacific-Northwest



The purchase price of a pallet is only one part of the overall cost of a pallet. The true cost of a pallet is most accurately reflected in the average cost per trip. The cost per trip is determined by the initial purchase price, the average number of trips until the pallet needs to be repaired, and the average cost of a repair. Industry estimates of cost per trip range from \$5.00 to \$7.06. Cost per trip can be as low as \$2.02 for pallets used in a co-op arrangement where there is a formal exchange based on an enforceable pallet standard.¹¹

In 1995, it was estimated that 171 million pallets were recovered. Approximately 139 million of these pallets (or 81 percent) were repaired or recycled and returned to service. Additional uses for recovered pallets include fuel, animal bedding, and landscape mulch. Less than 1 percent of the recovered pallets were sent to landfills.

Recycling of pallets has increasingly become an important avenue for reducing costs. Single-use pallets or containers have become less economical as the disposal cost in landfills has increased. With the reuse of pallets, the actual cost of a pallet is reflected in the cost per trip rather than the initial purchase price. A survey of the pallet industry found that in 2000, some 56 percent of pallet firms engaged in some type of recycling or reconditioning of pallets.

¹¹ K. Auguston. "The trouble with tallying pallet costs," Modern Materials Handling, Oct. 1996.

6. Costs and Impacts on Affected Entities

The proposed rule to adopt the IPPC standard would require that all solid wood packaging be treated and marked for international shipment prior to entry into the United States. All repaired wood packaging would also have to be re-treated and re-marked. Treatments are permissible in one of two ways: either by heat treatment with a time-temperature schedule that achieves a minimum wood core temperature of 56⁰ C for a minimum of 30 minutes, and the treatment indicated by the mark HT; or with methyl bromide fumigation, and the treatment indicated by the mark MB. The temperature schedule and dosage rate can be found in the docket.

The impact of this rule would fall largely on foreign manufacturers of pallets. The increased treatment cost may add to the cost of packaging and transporting goods which, in turn, would affect importers of commodities and final consumers of those goods are potentially impacted by this rule. The required treatments would add to the cost of packaging and transport of goods. Due to the very large number of pallets that are used to assist imported cargo, the overall cost may be substantial. The extent of the impact on U.S. consumers would depend on the ability of importers to pass on the additional costs to respective buyers. However, given the small value of pallets as compared to the value of trade, increases in pallet prices are not expected to have a measurable effect on domestic consumers or on trade. Following the implementation of the 'China rule', the volume and value of imports into the U.S. from China continued to increase. It does not appear that foreign manufacturers are able to pass on the cost of treatment to U.S. importers or consumers. The impact of this rule is likely to fall on foreign manufacturers of pallets and not on U.S. firms or consumers. The simultaneous adoption of the treatment standards by IPPC member countries that is directed at U.S. exports would likely create a broader impact on the domestic wood packaging industry than the provisions of this proposed rule.

For purposes of illustration, let us assume that 100 to 125 million pallets per year are used for goods imported into the United States, and that the value of imported goods associated with pallets is approximately \$1 trillion. This figure is obtained from the Bureau of Economic Analysis' estimate of the value of imported goods less petroleum and related products which accounted for 25 percent of durable and non-durable goods purchased in 2001.¹² Assuming that each imported pallet is worth \$4, the total value of 125 million pallets imported with goods would be \$500 million. This amount represents

¹² The number of pallets imported with goods is estimated to be 100 to 125 million pallets. This estimate is derived as follows. There are approximately 400 to 500 million pallets manufactured in the U.S. each year and 1.5 billion pallets in circulation at any given time. In 2001, domestic personal consumption plus export of goods accounted for about \$3.4 trillion or 75 percent of goods produced. (Personal consumption expenditures on durable and non-durable goods excluding gasoline, fuel oil, and other energy-related goods were \$2.7 trillion). Imported goods less petroleum and related products accounted for \$1.1 trillion or 25 percent of durable and non-durable goods purchased in the same year. If 400 to 500 million new pallets are needed for domestic production, and assume that domestically produced goods and foreign produced goods require the same proportion of pallets, then 100 to 125 million pallets are needed to assist the import of cargo into the United States. (Source: U.S. Department of Commerce, Bureau of Economic Analysis, Real Gross Domestic Product and Related Measures, December 12, 2002.)

0.044 percent of the \$1 trillion in value of the goods imported (less petroleum and related products). Thus, for each \$100 of goods imported, the value of the pallets associated with those goods is merely 4.4 cents. Even if importers can pass on the full cost increase to consumers, the price of a pallet comprises only a small share of the overall value of a bundle of imported goods that even a doubling of the price of a pallet would not likely cause a significant impact on consumers. For this reason, we do not expect the treatment costs that are required by this rule to have a measurable impact on trade. Our observation on imported cargo associated with SWPM from China has also shown no measurable decline since the implementation of the interim rule in 1998.

Additionally, we expect U.S. consumers of imported pallets, crates and boxes to be impacted by the requirements of this rule. Between 1999 and 2001, an average of 38 million pallets was imported into the United States, over 80 percent of which came from Canada (Table 7). Imported SWPM was valued at \$150 million during this time period. At approximately \$3.95 per piece, imported pallets are less expensive than domestic pallets where the average price ranges between \$7 and \$8 per pallet. Canadian pallets are primarily used by industries close to the U.S. and Canadian border. The wood pallet market is highly competitive and the demand for imported pallets can be characterized as elastic. While pallets made of alternative materials such as plastic, corrugated fiberboard, or processed wood are imperfect substitutes for wood, one wood pallet can easily substitute for another wood pallet.

Assuming a perfectly elastic supply and perfectly inelastic demand for imported pallets, and assuming a treatment cost that adds about \$2 on average to a pallet,¹³ U.S. purchasers of imported pallets could lose a maximum of \$76 million in higher costs. The true extent of the impact however would be lower than this amount because demand is likely to be elastic and foreign importers are expected to share a greater burden of the cost increase. Treatment costs for foreign pallet producers are not known but given the availability of substitutable domestic wood pallets, U.S. buyers of imported pallets are not expected to be significantly impacted.

The adoption of this rule may indirectly affect U.S. manufacturers of wood packing materials who sell to foreign buyers. The primary importers of U.S. pallets, crates and boxes are Canada and Mexico. As these two countries prepare to implement the IPPC standard in 2003, only treated wood packing materials would likely be in demand for export. According to the U.S. Bureau of Census, the average total value of sales of U.S. SWPM between 1999 and 2001 was estimated at over \$69 million. During the same time period, Canada and Mexico's combined purchase of U.S. SWPM was worth on average \$38.5 million, or 56 percent of total sales value. The extent of the impact on pallet manufacturers would depend on the ability of individual firms to put in place the necessary infrastructure for conducting treatments as required by the international standard. Regardless, the impact on the overall SWPM industry is expected to be small

¹³ Treatment costs for firms in the U.S. using methyl bromide without gas recapture is estimated to range between \$1.82 and \$2.34 per pallet (including the cost of chemical and construction of a fixed fumigation structure).

as the quantity of total pallets exported, estimated at about 10 million units, comprises only 2.5 percent of the 400 to 500 million pallets in production in the U.S. each year.

The number of U.S. firms manufacturing SWPM which would need and/or be able to adapt to the new technology is unknown. For firms facing treatment with methyl bromide without gas recapture, treatment is estimated to cost between \$1.82 and \$2.34 per pallet (including the cost of chemical and construction of a fixed structure). The cost to fumigate using a tarpaulin structure ranges from \$1.79 and \$2.70 per pallet. These costs would add approximately 25 percent to the cost of producing a pallet, which is estimated to be about \$7-8 per unit. In California and parts of Texas where gas recapture is required, the cost of methyl bromide treatment could be higher by 30 to 50 percent.

Because of its ozone-depleting properties, heat treatment may be the preferred option of large firms that can afford the high fixed cost of constructing a heat treatment facility. The cost to build a kiln-dry structure is estimated to range between \$20,000 and \$50,000. The cost of kiln-drying wood per cubic meter can range from \$10 to \$20, or about \$2.50 to \$5 per pallet. Information from one kiln manufacturer indicates that pallets can be kiln-dried for about \$0.26 per pallet plus labor cost. Treated pallets are likely to command a premium price which could more than offset the additional costs.

Domestic manufacturers of wood pallets may be indirectly affected in one other way. Because of the increasing trend in recycling of pallets for cost-cutting purposes, manufacturers may be faced with new demands for treated SWPM from domestic exporters who reuse pallets and wood containers to ship goods back from foreign countries. The number of firms affected in this way is unknown and may be large.

Despite this fact, the adoption of the treatment standards by IPPC member countries that is directed at U.S. exports would likely create a broader impact on the domestic wood packaging industry more so than the provisions of this proposed rule. Most pallet suppliers do not keep a record of customers' uses of pallet (domestic versus international commerce). The potential market impact of the adoption of the international standard by IPPC importing countries is difficult to determine with precision because the amount of hardwood lumber that is used by U.S. firms for export packaging, which then would require treatment, is unknown. If customer demand can be accurately predicted, pallet users may opt to carry two inventories of pallets: one for domestic use and one for international shipments, although some firms may find this to be an unwieldy option in the long run.

The heat treatment requirement of the international standard may create a shift in demand for softwood lumber pallets as a significant amount of softwood pallet lumber is already kiln dried and therefore meets the IPPC standard. One industry source has indicated that if many companies switch to softwood lumber, there would not be enough pine to fulfill demand without using grade material. Exporters then would have to balance the cost of purchasing grade pine with that of heat treating hardwood pallet.

Currently, the United States, as with many other countries, lack the kiln capacity to handle the coming demand for treated pallet lumber.¹⁴

Table 7: Pallets Imported into the United States, 1999-2001

Country	1999	2000	2001	Percent of Total Pallet Imports		
				1999	2000	2001
World	37,781,554	42,034,312	35,633,155			
Canada	35,761,214	33,506,716	26,307,689	95%	80%	74%
Chile	461,937	6,341,444	7,334,435	1%	15%	21%
Mexico	1,366,208	1,562,273	1,290,275	4%	4%	4%

To summarize, this rule would have a direct effect on foreign manufacturers of pallets which may affect importers and final consumers of goods transported on pallets. Because the cost of a pallet is a very small share of the bundle of goods transported on pallets, cost increases due to the treatment requirements are not expected to significantly affect domestic consumers and thus would not have a measurable impact on the flow of trade. This rule is not expected to reduce the amount of goods shipped internationally as is evident from observing trends in imports from China since implementation of the interim rule in 1999.

Due to the trend in recycling, some domestic manufacturers of exported pallets may be indirectly impacted by the increase in demand for higher quality, treated pallets that would meet re-entry requirements into the United States.

7. Alternatives to Wood Pallets

There are several alternatives to wood packing materials, all of which were developed to meet specific needs rather than as a direct substitute for most wood pallets. Alternatives to wood pallets, which comprise no more than 5 percent of the market, include plastic, corrugated and panel deck pallets (plywood, oriented strand board), and slipsheets.

Corrugated Paperboard Fiberboard Pallets

Corrugated pallets have been in use since the late 1940's, but it was not until the 1980's that the corrugated pallet expanded its market beyond corrugated box plants. The

¹⁴ "Bug Buster – Will Pest Issue Turn the Pallet Lumber Market Upside Down?", by Chaille Brindley, April 2001 article in Pallet Enterprise.

¹⁶ Reddy, V., R. Bush, P. Araman, Wood Material Used in the US Pallet and Container Industry in 1995, Virginia Tech Center for Forest Products Marketing.

fiberboard used in both corrugated is classified “containerboard” by the paper industry. Thinner material, often made from recycled paper and used in non-shipping container applications such as cereal boxes, are classified as “boxboard”. Production of paperboard in the U.S. is about 49 million tons per year with about 60 percent of that in the form of containerboard which makes it the single largest component of the total paper industry.

The components of corrugated fiberboard are flat linerboards and corrugated medium bonded together by adhesives. The paper components are made from virgin and recycled fiber.

Anything shipped in a corrugated container is a candidate to be shipped on a corrugated pallet. Corrugated pallets are suited for some specific applications including:

1. Export Shipments – As a manufactured product, corrugated pallets are not restricted under the new IPPC standard for SWPM.
2. Air Freight – Lighter corrugated pallets can be less expensive to ship by air as compared to heavier wooden pallets.
3. Point-of-Sale Shipments – Allow retailers to easily sell right off the pallet.
4. Total Packaging Concept – Corrugated container and corrugated pallet are designed as one unit.

Some of the industries currently using corrugated pallets include automotive, electrical, pharmaceutical, dry goods, paper products, packaged chemicals, and clothing. Corrugated pallets can be recycled. Benefits of corrugated pallets include the avoidance of handling hazards caused by nails or splinters and they are about one-third the weight of wood pallets. Obstacles to increasing market share for corrugated pallets include concerns about moisture, forklift abuse, compatibility with two rail rack systems and with roller/conveyor systems.

The price of corrugate pallets fluctuates in response to demand. However, a typical price would be approximately \$15.75 per pallet. Corrugated pallets now have only 2 percent of the market out of 460 million pallets sold in the U.S. each year.

Structural Wood Panels

Structural wood panels are classified as plywood, composite (veneer and particles), waferboards, oriented strand boards (OSB), and structural particle boards. Plywood and OSB are most commonly used in pallet construction. In 1995, the U.S. production of plywood and OSB was 19,367 and 7,903 million square feet (3/8 inch basis), respectively. An estimated 61.1 and 13.3 million square feet (3/8 inch basis) of plywood and OSB were used to manufacture pallets in 1995¹⁶.

Structural wood panels, also sometimes called Panel Deck Pallets, cost about \$20-\$30 per pallet. There were 9 million plywood deck pallets and one million OSB pallets manufactured in the U.S. in 1995. Together, they represent about 2 percent of market. These pallets are specifically designed for heavy loads. The weight of panel deck pallets

make them unattractive as a widespread alternative to standard pallets because the weight adds to transportation costs

Plastic Pallets

Plastic pallets have been in use since the early 1970's. There is no definitive information about the number of plastic pallets manufactured in the U.S. In 1999, industry sources estimated that 3.5 million plastic pallets were sold in 1995. Sales in 1998 were approximately 11 to 13 million plastic pallets. According to the same source, the available information seems to indicate that most plastic pallet manufacturers are operating at capacity.

In 1992, five plastic pallet companies exhibited at a materials handling show in Detroit. In 1999, 17 plastic pallet companies had products on display at the same show¹⁷. Plastic pallets are generally made of thermoplastics, which can be re-softened by heating. The raw material for thermoplastics is polyethylene. Virtually any common plastic materials can be used to make a pallet. The current material of choice for plastic pallets is High Density Polyethylene. U.S. productive capacity for HDPE was about 10 billion pounds in 1995 with producers utilizing about 90 percent of capacity. There are basically no shortages of plastic materials.

Plastic pallets must compete with wood which is much less expensive on a cubic foot basis. To compete effectively, plastic pallets must be durable. Cost per trip is the major determining factor for users of plastic pallets. Low cost per trip can only be achieved through high frequency use. Economic feasibility of plastic pallets involves five variables: 1) raw material cost, 2) quantity of material required to make a functional pallet, 3) cost of processing the material, 4) long term durability of the pallet, and 5) cost of disposal.

Because plastic pallets come in a multitude of shapes and sizes, their prices are difficult to estimate. Generally plastic pallets are more expensive than standard wooden pallets. Another drawback to plastic pallets is that their production requires a closed loop system which the pallet industry has not yet been able to manage on a large scale.

Slipsheets

Slipsheets are flat, solid fiber sheets with a load-bearing area used as a platform for unitizing, handling, storing, and shipping. They are made from multiple plies of kraft linerboard laminated to form a sturdy single sheet. Slipsheets have a pull-tab on one or more sides to enable a push-pull attachment to grip the load. Slipsheets have been used in the hardware, pharmaceuticals, food, pet food, and paint industries.

Slipsheets cost about \$1 each, but typically cannot be re-used. The push-pull attachment for forklift costs \$6,000 - \$10,000 each. They have a lower per unit price, but

¹⁷ E. Fuller, NWPCA - The Performance Design and Manufacturer of Pallets Made of Other Materials Seminar, Atlanta GA, June 1999.

the required special handling equipment hinders wider usage. Most people in the pallet industry do not consider slipsheets a viable alternative to pallets.

In summary, alternatives to wood pallets have been available since the 1970's. While they have come to be used for specific applications, none has found the widespread acceptance of wood pallets. With the adoption of the IPPC standard, some alternatives to wood pallets may increase market share for specific uses if shippers seek to avoid the need to comply with the SWPM regulation. Alternatives to wood pallets are likely to continue slowly gaining market share, but at this time they are not, on a large scale, a viable substitute for wood pallets.

8. Evaluation of Options

In the development of this proposed rule, four other alternatives were examined and subsequently rejected. A discussion of these alternatives and the reasons for not considering them at this time are presented below.

Option 1 – Take no action. This option can be characterized as no change in the existing regulations that apply to the importation of SWPM. While not contributing to the further mitigation of risk, the analysis of the no action alternative provides a baseline for comparison.

The no action alternative relies upon inspection and current regulations to ensure that all SWPM entering the United States poses negligible pest risk. Total imports of goods and services into the U.S. have increased from \$245 billion in 1980 to \$1,218 billion in 2000. The number of pests associated with SWPM is expected to increase along with the amount of imports into the United States. In 2001 with a slight downturn in the economy, the amount of imports decreased to \$1,141 billion. Trade has been steadily increasing in the post World War II period, and the downturn in 2001 is not expected to persist.

Under this alternative, manufacturers of SWPM, importers and shippers would not incur additional costs of having to apply measures to guard against the introduction of pests. Given the greater number of pest interceptions, APHIS would need to increase inspections of regulated articles at ports of entry for visual signs of pest infestations. With increasing international trade, the amount of resources and staffing needed would make this option impractical. Moreover, even though some reduction of risk may be expected of increased inspection, certain types of pests such as wood-borers cannot be easily detected by visual inspection.

An additional cost that can be expected of the no action option is the damage to natural resources due to pest introductions that could be prevented with more stringent measures. These costs are discussed earlier in the analysis and have been documented extensively in the Draft Pest Risk Assessment (USDA, APHIS and Forest Service, 2000). Given the high frequency of pests intercepted on SWPM in recent years, the absence of

regulation requiring treatments poses a significant threat to the natural resources and agricultural industry of the United States.

Option 2 - Apply the same requirements concerning SWPM from China to SWPM from the rest of the world (i.e., require SWPM imported from any part of the world to be heat treated, fumigated, or treated with preservatives prior to arrival in the United States).

Extending the provisions of the rule on China to the rest of the world would provide a more thorough treatment than the IPPC guidelines because the ‘China rule’ is more stringent. Current APHIS regulations pertaining to Chinese imports require fumigations at higher concentrations and longer exposure period than the IPPC guidelines. The prescribed heat treatment under this alternative would set a prescribed minimum core temperature of 71.1° C for at least 75 minutes as compared to a minimum core temperature of 56° C for at least 30 minutes as recommended in the international standard. The greater degree of risk reduction afforded by this option would also be more costly to affected entities due to the stringency in requirement as compared to the IPPC guidelines.

However, efficacy data to support this alternative is currently inadequate and regulations for higher temperature or dosage, and longer exposure periods than those under the IPPC guidelines would require additional research to scientifically justify their implementation. In the interim, the adoption of the IPPC standard would eliminate and reduce certain pest risks that currently exist without regulation.

Option 3 - Implement a comprehensive risk reduction program (more expansive than the regulations currently applying to China or provided for under the new international standards). This would be categorized as a broad risk mitigation strategy that involves various options such as increased inspection, heat treatment, fumigation, wood preservatives, irradiation, controlled atmosphere, selective prohibition, and disposal.

A more expansive regulation than the regulations currently applying to China or provided for under the new international standard would offer greater protection against some of the pests that are more tolerant of the present treatments of wood packing materials. This option would allow for the use of fumigants other than methyl bromide. While certain methods such as irradiation may be more expensive for some entities to implement, the comprehensive risk reduction program offers the greatest flexibility for selecting treatments that are most effective at eliminating specific pests.

Other fumigants that are candidates for use with solid wood packing material include carbonyl sulfide, phosphine, and sulfuryl fluoride. A detailed discussion of some of the methods that have potential for quarantine use can be found in the Importation of Solid Wood Packing Material Environmental Impact Statement.

Carbonyl sulfide (COS) as a fumigant was patented in Australia in 1992. It is used in a manner similar to methyl bromide. Tests have shown it will control a wide range of pests such as beetles, fruit flies, moths, mites, termites, molds and nematodes. It has shown good efficacy in tests of grains, legumes, dried fruit, cut flowers, and both hard and soft timbers. Its efficacy on wood products at commercial application levels has not been conclusively demonstrated for insect pests and fungi of quarantine significance. Any future decision by APHIS to allow the use of COS to treat SWPM for quarantine certification must be based upon its efficacy against these quarantine pests.

Phosphine is highly penetrative to many commodities, but has somewhat limited penetration of wood. As a fumigant it is widely used to kill insects in stored products. It is used in low concentrations, but because it is less effective than other fumigants, it must be used in treatments that have long exposure periods. APHIS has removed phosphine treatment from its PPQ Treatment Manual. Efficacy tests showed the schedule for this fumigant was not effective, and it was removed until additional testing can be completed.

Sulfuryl fluoride is widely used in structures, vehicles, and wood products against a wide range of pests, including dry wood termites, wood infesting beetles, other insects, and rodents. It has excellent penetrability for wood. This fumigant is effective against major insect pests of timber such as bark beetles, wood-wasps, longhorned beetles, and powder post beetles. However, eggs of many insects are tolerant to even high concentrations of sulfuryl fluoride. Therefore, it is no longer approved by APHIS as a treatment for wood boring beetles because it has difficulty in penetrating insect eggs. Many insect eggs still hatch following fumigation. Sulfuryl fluoride treatment should be considered only for hitchhikers and surface feeders. This limited applicability of sulfuryl fluoride minimizes the suitability since wood boring beetles are an important concern with respect to SWPM.

Quantifying the costs of these treatments and their impacts would be difficult at this time without knowing the specific measures that would be required.

Option 4 - Require the use of substitute materials that are not hosts of plant pest or diseases (e.g. plastic, metal, rubber, or fiberglass).

Among the alternatives considered, prohibiting the use of SWPM would provide the strongest protection against pests being imported through wood packing material. This option would necessitate a switch from wooden pallets to alternative materials for international shipments. Domestic shipments would be able to continue to use wooden pallets. However, many countries would not likely be able to meet this requirement because wooden pallets currently account for over 90 percent of the pallet market. There is currently insufficient capacity in the short run to accommodate a switch from wood to alternative packing materials.

The cost of requiring the use of substitute materials is the cost of switching from SWPM to the approved alternatives. Alternatives are generally more costly than wooden pallets and crates. The option would require a long implementation period as importers and exporters make the transition to alternative materials. Currently these alternatives

account for less than 10 percent of the market for packing materials due to higher costs and the fact that alternatives are currently manufactured to meet specific transportation needs rather than serve the broader market.

9. Impact on Small Entities

The provisions of this rule are not expected to directly affect U.S. manufacturers of wood packing material. However, some exporters may be impacted if they reuse pallets to ship goods back to the United States. This may create an increased demand by exporters for treated pallets.

The pallet industry in the U.S. is characterized by many small firms and a few larger firms. No one firm is able to dominate the market. U.S. Census data show that there are approximately 3,000 firms in the wood pallet and container industry. Other estimates of the number of firms in the industry range up to 3,500 pallet manufacturers in the U.S.¹⁸ Most firms sell their products within a 350 mile radius. The average number of employees in 1997 was 17. Thirty two percent of the firms had less than five employees. The average sales were \$1.5 million.

The Small Business Administration (SBA) classifies wood container and pallet manufacturers as small businesses if they have less than \$500,000 in annual receipts. The 952 firms with four or less employees have average annual receipts of \$172,000. Firms with five or more employees have, on average, annual receipts of more than \$500,000. Approximately 32 percent, (952 of 2,996 firms), are classified as small business according to SBA regulations.

Small businesses may be adversely impacted by this rule if they are unable to adapt to the increased demand for treated pallets. The number of small businesses potentially impacted is unknown. However, the adoption of the treatment standards by IPPC member countries that is directed at U.S. exports would likely create a broader impact on the domestic wood packaging industry (small and large businesses alike) than the provisions of this proposed rule.

10. Summary

One indication of the magnitude of benefits of this rule can be gathered from the recent experience with the Asian long-horned beetle in the United States. To the extent that wood borers, including ALB, from other parts of the world could potentially cause damage similar in scale to the 1997 ALB outbreaks, benefits of this proposed rule can be characterized by those of the China rule.

The ALB, first discovered in New York City in 1996 and in Chicago, Illinois in 1998, was most likely introduced on wood packing material from China. The present value of urban trees at risk in the two affected cities is estimated at \$59 million over some 50 years. About \$6 million of urban trees have been destroyed due to pest infestation and

¹⁸ National Wooden Pallet and Container Association.

eradication efforts since the introduction of ALB. So far, APHIS and State and local governments have spent over \$59 million in eradicating the pest in the two localities. If only New York City and Chicago were considered, it would appear that the current eradication program has yielded a net loss of about \$6 million (spending \$59 million in control activities to save \$53 million in resources). However, the eradication and quarantine activities are also the reason the pest has been confined to the two cities where it was initially detected. The potential damages from ALB spread to other areas can be gleaned from the Nowak *et al.* study that estimated losses to seven other cities. The present value of damage to urban trees in Baltimore City alone, not allowing for intervention, was estimated to be \$399 million. Additionally, without governmental intervention, forest resources would also be at risk

In addition to wood borers, estimates of damage that could be caused by other exotic pests via the SWPM pathway such as the *Sirex* woodwasp and the European spruce bark beetle range between \$48 to \$607 million and \$208 million, respectively. Perhaps the greatest devastation posed by these pests that cannot be fully captured monetarily is their potential to cause irreversible loss to native tree species and consequential alterations to the environment and ecosystem.

In sum, this rule would impact foreign manufacturers of pallets which may, in turn, affect importers and final consumers of goods transported on pallets. Because the cost of a pallet is a very small share of the bundle of goods transported on pallets, cost increases due to the treatment requirements are not expected to significantly affect domestic consumers and thus would not have a measurable impact on the flow of trade. This rule is not expected to reduce the amount of goods shipped internationally as is evident from observing trends in imports from China since implementation of the interim rule in 1999.

Due to the trend in recycling, some domestic manufacturers of exported pallets may be indirectly impacted by the increase in demand for higher quality, treated pallets that would meet re-entry requirements into the United States.

As other countries impose IPPC treatment requirements on imports containing SWPM the global SWPM market will be greatly affected, which will likely create a broader impact on the domestic wood packaging industry than the provisions of this proposed rule. The adoption of the standard globally would ensure that U.S. producers and exporters are not placed at a competitive disadvantage by this rule as compared to their trading partners.

Table 1 Wood Container and Pallet Manufacturers

Industry Statistics		All Employees			Production Workers			Value added by manufacturers (\$1,000)	Cost of Materials (\$1,000)	Value of Shipments (\$1,000)	Total capital expenditures (\$1,000)	
NAICS or SIC code	Industry	Companies	All Establishments	Number	Payroll	Number	Hours (1,000)					Wages (\$1,000)
321920	Wood container and pallet mfg	2,875	2,996	51,516	980,629	43,443	79,838	697,091	2,013,086	2,496,292	4,503,376	131,982
242920	Special product sawmills, n.e.c.	N	24	684	14,493	554	1,138	10,587	28,397	40,036	68,695	1,106
244100	Nailed wooden boxes & shook	N	318	4,885	108,629	3,879	7,368	68,532	194,705	212,151	405,966	7,379
244800	Wood pallets & skids	N	2,349	39,378	728,567	33,649	61,248	530,713	1,544,458	1,948,484	3,487,165	111,066
244900	Wood containers, n.e.c.	N	255	5,679	109,928	4,676	8,854	75,036	211,386	264,296	475,438	10,931
249920	Wood products, n.e.c.	N	50	890	19,012	685	1,230	12,223	34,140	31,325	66,112	1,500
	n.e.c. = not elsewhere classified											
	N = Not available											
Source: U.S. Census Bureau, 1997 Economic Census, Manufacturing Industry Series, Wood Container and Pallet Manufacturing, Table 2, Aug 25, 1999												
Shook = a set of the pieces used in assembling a single box, cask, etc.												

N = not available

Source: U.S. Census Bureau, 1997 Economic Census, Manufacturing Industry Series, Wood Container and Pallet Manufacturing, Table 2, Aug 25, 1999

Table 2 Wood Container and Pallet Manufacturers

Industry Statistics by Employment Size: 1997											
Employment size class	All establishments		All employees		Production workers			Value added by manufacturers (\$1,000)	Cost of materials (\$1,000)	Value of shipments (\$1,000)	Total capital expenditures (\$1,000)
	Total	With 20 employees or more	Number	Payroll	Number	Hours (1,000)	Wages (\$1,000)				
321920, Wood container and pallet mfg.											
All establishments	2,996	201	51,516	980,629	43,443	79,838	697,091	2,013,086	2,496,292	4,503,367	131,982
Establishments with 1 to 4 employees	952	-	2,047	33,293	1,837	2,782	25,911	77,534	86,910	164,552	4,926
Establishments with 5 to 9 employees	588	-	4,004	68,992	3,290	5,429	50,554	151,208	176,166	327,050	9,301
Establishments with 10 to 19 employees	655	-	9,070	165,455	7,509	12,886	118,753	369,793	425,168	793,862	23,506
Establishments with 20 to 49 employees	584	584	17,233	340,496	14,477	27,012	237,942	704,483	910,231	1,612,243	47,135
Establishments with 50 to 99 employees	166	166	11,135	213,530	9,493	18,547	151,184	419,560	531,241	950,541	26,305
Establishments with 100 to 249 employees	47	47	6,656	132,291	5,695	10,772	97,854	261,616	317,216	574,787	15,927
Establishments with 250 to 499 employees	4	4	1,371	26,572	1,142	2,410	14,893	28,892	49,360	80,341	4,882
Establishments with 500 to 999 employees	-	-	-	-	-	-	-	-	-	-	-
Establishments with 1,000 to 2,499 employees	-	-	-	-	-	-	-	-	-	-	-
Establishments with 2,500 employees or more	-	-	-	-	-	-	-	-	-	-	-
Administrative Records	1,057	-	4,198	58,717	3,578	5,121	42,562	131,883	141,244	272,634	9,223

Some payroll and sales data for small single-establishment companies with up to 20 employees were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate statistics for these small establishments. Data are also included in respective size classes shown.

Source: U.S. Census Bureau, 1997 Economic Census, Manufacturing Industry Series, Wood Container and Pallet Manufacturing, Table 4, Aug 25, 1999

ATTACHMENTS

Attachment 1: World Trade Atlas, US General Imports, Customs Value by Country, Millions of Dollars

Rank	Country				% Share	% Share	% Share	% Change
		1999	2000	2001	1999	2000	2001	2001/2000
0	-- World --	1,024,618.24	1,218,022.03	1,140,999.40	100	100	100	-6.32
1	Canada	198,711.12	230,838.33	216,267.84	19.39	18.95	18.95	-6.31
2	Mexico	109,720.57	135,926.41	131,337.93	10.71	11.16	11.51	-3.38
3	Japan	130,863.91	146,479.40	126,473.31	12.77	12.03	11.08	-13.66
4	China	81,788.22	100,018.43	102,278.34	7.98	8.21	8.96	2.26
5	Germany	55,228.41	58,512.80	59,076.66	5.39	4.8	5.18	0.96
6	United Kingdom	39,237.23	43,345.07	41,368.80	3.83	3.56	3.63	-4.56
7	Korea, South	31,178.65	40,307.68	35,181.43	3.04	3.31	3.08	-12.72
8	Taiwan	35,204.44	40,502.77	33,374.52	3.44	3.33	2.93	-17.6
9	France	25,708.58	29,800.11	30,408.19	2.51	2.45	2.67	2.04
10	Italy	22,356.54	25,042.73	23,789.88	2.18	2.06	2.09	-5
11	Malaysia	21,424.31	25,568.20	22,340.35	2.09	2.1	1.96	-12.62
12	Ireland	10,994.34	16,463.58	18,499.26	1.07	1.35	1.62	12.36
13	Venezuela	11,334.47	18,623.18	15,250.48	1.11	1.53	1.34	-18.11
14	Singapore	18,191.37	19,178.29	14,999.95	1.78	1.58	1.32	-21.79
15	Thailand	14,329.89	16,385.32	14,727.19	1.4	1.35	1.29	-10.12
16	Brazil	11,313.84	13,852.53	14,466.42	1.1	1.14	1.27	4.43
17	Saudi Arabia	8,253.55	14,364.71	13,272.22	0.81	1.18	1.16	-7.61
18	Israel	9,864.31	12,964.42	11,959.03	0.96	1.06	1.05	-7.76
19	Philippines	12,352.76	13,934.72	11,325.42	1.21	1.14	0.99	-18.73
20	Belgium	9,196.08	9,929.27	10,158.43	0.9	0.82	0.89	2.31
21	Indonesia	9,525.38	10,367.04	10,103.64	0.93	0.85	0.89	-2.54
22	India	9,070.83	10,686.63	9,737.17	0.89	0.88	0.85	-8.88
23	Switzerland	9,538.64	10,159.89	9,669.61	0.93	0.83	0.85	-4.83
24	Hong Kong	10,527.90	11,448.99	9,646.26	1.03	0.94	0.85	-15.75
25	Netherlands	8,475.03	9,670.58	9,515.25	0.83	0.79	0.83	-1.61

Attachment 2: World Trade Atlas, US General Imports – Customs Value from China, Millions of US Dollars

HS	Description	1996	1997	1998	1999	2000	2001	% with SWPM			
								2001	1998 to 1999	Seattle	Long Beach
	China	51,512.59	62,557.60	71,168.68	81,788.22	100,018.43	102,278.34	8.96	12.98		
85	ELECTRICAL MACHINERY	8,909.64	10,568.79	12,780.99	15,058.80	19,531.04	19,727.37	19.29	15.13	5	100
84	MACHINERY	4,473.80	5,993.13	7,613.58	10,190.48	13,403.53	13,720.66	13.42	25.29	100	100
95	TOYS AND SPORTS EQUIPMT	7,495.24	9,364.07	10,557.61	11,079.62	12,383.19	12,214.64	11.94	4.71	75	70
64	FOOTWEAR	6,393.52	7,422.31	8,007.36	8,434.00	9,185.53	9,757.11	9.54	5.06	10	0
94	FURNITURE AND BEDDING	2,393.24	3,018.65	3,946.64	5,548.79	7,202.34	7,491.98	7.33	28.87	20	40
62	WOVEN APPAREL	3,509.72	4,161.91	3,811.19	3,750.88	4,167.28	4,153.43	4.06	-1.61	0	0
42	LEATHR ART;SADDLRY;BAGS	2,625.94	2,957.55	2,924.23	3,007.74	3,835.05	3,909.66	3.82	2.78	50	0
39	PLASTIC	1,742.33	1,977.77	2,082.77	2,468.81	2,914.13	3,237.42	3.17	15.64	50	0
90	OPTIC,NT 8544;MED INSTR	1,538.11	1,982.19	2,224.33	2,284.17	2,808.11	2,758.60	2.7	2.62	70	100
61	KNIT APPAREL	1,514.95	1,836.92	1,859.71	2,024.86	2,034.07	2,277.55	2.23	8.16	0	0
73	IRON/STEEL PRODUCTS	667.70	874.69	1,120.98	1,383.84	1,881.96	2,108.50	2.06	18.99	100	50
87	VEHICLES, NOT RAILWAY	545.25	720.82	858.18	1,069.78	1,956.73	1,544.13	1.51	19.78	5	100
63	MISC TEXTILE ARTICLES	589.37	717.16	823.24	966.62	1,101.95	1,205.71	1.18	14.83	0	0
82	TOOL,CUTLRY, OF	400.19				918.88	1,000.22	0.98	21.33	100	100

	BASE MTLs		508.80	600.83	763.79						
83	MISC ART OF BASE METAL	386.26	455.12	564.99	728.38	856.11	988.22	0.97	22.43	100	100
67	ARTIF FLOWERS,FEATHERS	605.57	701.23	780.93	871.22	929.40	963.35	0.94	10.36	0	0
69	CERAMIC PRODUCTS	595.38	687.09	753.36	790.41	911.29	917.53	0.9	4.69	100	100
71	PRECIOUS STONES,METALS	275.82	350.20	399.93	546.15	751.51	869.96	0.85	26.77	100	0
96	MISCELLANEOUS MANUFACT	388.16	470.62	539.58	755.16	748.84	849.57	0.83	28.55	75	25
44	WOOD	258.12	340.15	460.28	596.26	752.21	841.47	0.82	22.8	100	100

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