

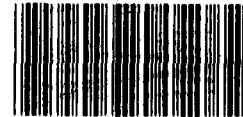
GAO

Report to the Chairman, Subcommittee  
on Regulation, Business Opportunities,  
and Energy, Committee on Small  
Business, House of Representatives

August 1992

# CANCER TREATMENT

## Actions Taken to More Fully Utilize the Bark of Pacific Yews on Federal Land



147523

**RESTRICTED--Not to be released outside the  
General Accounting Office unless specifically  
approved by the Office of Congressional  
Relations.**

555270 RELEASED





Resources, Community, and  
Economic Development Division

B-247750

August 31, 1992

The Honorable Ron Wyden  
Chairman, Subcommittee on Regulation,  
Business Opportunities, and Energy  
Committee on Small Business  
House of Representatives

Dear Mr. Chairman:

This letter responds to your request that we examine issues related to the utilization of Pacific yew bark. The Pacific yew, the source of the anticancer drug taxol, grows primarily in Pacific Northwest forests managed by the Department of Agriculture's Forest Service and the Department of the Interior's Bureau of Land Management (BLM). On March 4, 1992, with your concurrence, we presented our preliminary observations in testimony before three House subcommittees.<sup>1</sup> This report completes our review and updates our testimony with additional information about

- the extent to which the Pacific yew bark that could have been collected from federal lands in fiscal year 1991 was collected (utilized) and
- the steps taken by BLM and the Forest Service to help ensure more complete utilization of Pacific yew bark in fiscal year 1992.

## Results in Brief

The limited supply of Pacific yew bark, coupled with the existing and potential demand, necessitates that the bark be utilized to the extent practicable. However, in the fiscal year 1991 agreements with Bristol-Myers Squibb, Co., and its yew bark collectors, neither BLM nor the Forest Service established, as a goal or requirement, that all usable bark be collected. For a variety of reasons, not all of the usable bark that could have been collected from federal lands during the fiscal year 1991 harvest season was collected.

For the 1992 harvest season, both BLM and the Forest Service have taken actions to ensure increased utilization of yew bark. They have

- incorporated strict utilization standards in their program plans and operational procedures;

<sup>1</sup>Cancer Treatment: Efforts to More Fully Utilize the Pacific Yew's Bark (GAO/T-RCED-92-36, Mar. 4, 1992).

- required bark collectors to return to previously harvested sites to recover bark that was left;
- established collection priorities requiring that, whenever practicable, yew bark be collected before it is destroyed during timber harvesting activities; and
- required agency field managers to review bark collectors' compliance with the utilization standards, formally document the findings, and notify Bristol-Myers and its bark collectors of any problems.

---

## Background

The bark of the Pacific yew is the only approved source of taxol, an anticancer drug discovered through research supported by the National Cancer Institute. Initial clinical trials of taxol show progress in treating some women with ovarian cancer, and the drug is also being tested in the treatment of other types of cancer. Estimates of the number of cancer patients who could potentially benefit from the drug approach 60,000 a year.

Although inventories of the Pacific yew had not been completed as of July 1992, it is generally recognized that future demand will outstrip the amount of taxol that can be produced from the bark. About 60 pounds<sup>2</sup> of bark is needed to produce enough taxol to treat one cancer patient for 1 year. This amount is about the equivalent of the bark from three average Pacific yew trees. The greatest concentration of existing Pacific yew trees in the United States is found on federal lands in the Pacific Northwest.

In January 1991, the National Cancer Institute and Bristol-Myers, a major pharmaceutical company, entered into a cooperative agreement to collaborate in research on and the development of taxol as an antitumor agent. Prior to entering into the cooperative agreement, Bristol-Myers had entered into a contract with Hauser Chemical Research, Inc., in 1990 to collect Pacific yew bark, process it, extract the taxol, and supply the taxol to Bristol-Myers. Hauser Chemical then formed a subsidiary, Hauser Northwest, Inc., to collect and initially process the bark. Hauser Northwest, in turn, contracted with other companies and individuals to collect the bark.

In June 1991, the Secretaries of Agriculture, the Interior, and Health and Human Services entered into a memorandum of understanding to give their best efforts, in accordance with applicable laws and policies, to help obtain the Pacific yew bark needed to produce taxol. Pursuant to this

---

<sup>2</sup>All amounts shown are in dry weight.

---

memorandum of understanding, the Forest Service and BLM each entered into a cooperative agreement with Bristol-Myers to provide Pacific yew bark to the company. The Forest Service and Bristol-Myers then agreed to a Pacific yew program plan for the remainder of fiscal year 1991 that defined in more detail the parties' obligations under the cooperative agreement.

The yew bark is collected from dead trees that are left behind after the harvest of trees to be sent to sawmills and from living trees that are harvested and stripped. The bark is peeled either mechanically or by hand in the field or mechanically at Hauser Northwest's plant. During fiscal year 1991, enough bark was collected to provide taxol to treat about 15,000 cancer patients for 1 year.

---

### Some Usable Pacific Yew Bark Was Not Collected in Fiscal Year 1991

Usable Pacific yew bark was not collected in fiscal year 1991 primarily for four reasons. First, not all yew bark was collected before sawmill timber harvesting began. To avoid damage to the bark, it should be collected before the timber that is destined for the sawmills is harvested. Otherwise, according to Forest Service and BLM officials, a significant percentage of the yew bark may be lost in some instances when the trees are dragged to central collection points or crushed by other larger trees that are cut down. Both the Forest Service and BLM instructed their field personnel to have the yew bark collected before sawmill timber was harvested whenever doing so was practicable, and a number of existing Forest Service timber sales contracts were modified to exclude the yew tree. However, the yew bark was not always collected before the sawmill timber was harvested because neither the Forest Service nor BLM took action to fully ensure that this occurred.

Second, usable bark was not always collected from branches and stems of smaller diameter. In fiscal year 1991, the Forest Service and BLM allowed bark collectors to decide whether all bark that feasibly could be collected had been. Because of this policy, coupled with the inability of Hauser Northwest's earlier equipment to debark yew logs smaller than about 4 inches in diameter, collectible yew bark was being left on branches and stems of smaller diameter.

Third, usable bark was not always collected from trees that were scattered throughout wide geographical areas. Both the Forest Service and BLM generally allowed bark collectors to decide whether there were sufficient numbers of yew trees in an area to warrant collection. As a result, some

collection decisions were driven by the cost-effectiveness of collecting the bark rather than by a goal of full utilization.

Finally, some yew bark was not collected before the taxol content deteriorated. The taxol content of dead tree bark diminishes over time, and if the bark is not collected within a certain period of time (usually within 18 months after a tree has died), the trees are either abandoned or burned. During fiscal year 1991, the decisions about collection were left, to a large extent, to Hauser Northwest's judgment.

## Agencies' Fiscal Year 1992 Plans Call for Fuller Utilization of Pacific Yew Bark

Both BLM and the Forest Service have revised their Pacific yew program plans and associated operational procedures for fiscal year 1992 to ensure more complete utilization of yew bark. In addition, Hauser Northwest has taken steps to collect more usable bark.

BLM's and the Forest Service's fiscal year 1992 program plans and operational procedures include utilization standards that address both the minimum size of trees and limbs to be peeled and the minimum amount of bark to be stripped from trees and limbs designated for peeling. BLM's standards require that yew bark be collected when there is more than 5 pounds in a project area. The Forest Service requires that collectors remove all of the yew bark that can be feasibly collected, adding that collecting 95 percent of the available bark should be a practical goal. Both agencies have required bark collectors to return to previously harvested sites to recover bark left in excess of these new standards.

Both BLM and the Forest Service have established collection priorities for yew bark to ensure that the bark is collected before it is destroyed by timber harvesting practices or the taxol content deteriorates. High priorities are assigned to areas where yew bark collection is required prior to the burning of debris remaining after the removal of the sawmill timber and to areas where yew bark needs to be collected prior to the logging of sawmill timber. According to Forest Service, BLM, and Hauser Northwest officials, purchasers of sawmill timber are being very cooperative in allowing the yew bark to be collected before sawmill timber is harvested, whenever this procedure is practicable.

The fiscal year 1992 program plans and associated operational procedures assign responsibilities for ensuring increased utilization of the yew bark among the respective parties—BLM, the Forest Service, and Hauser Northwest. In addition, the plans and procedures require on-site

---

monitoring of yew harvest activities to ensure compliance with the utilization standards. Both agencies and Hauser Northwest are required to monitor operations; agency field managers are also required to formally document their findings, notify Bristol-Myers and its bark collectors of any noncompliance, and follow up to ensure that the appropriate corrective action has been taken.

Both BLM and the Forest Service have established monitoring procedures for contract administration and harvest accountability. These procedures include the use of closely controlled documents that must accompany each load of yew bark. In addition, agency field managers or inspectors must certify that the collection of the yew bark has been approved and is in compliance with the utilization standards. Agency personnel must certify in writing that all known usable yew bark has been removed from the authorized harvest area before debris burning can take place in the area.

For its part, Hauser Northwest now has harvest guidelines instructing its collectors to collect bark from all limbs 1 inch in diameter and larger. A Hauser Northwest official informed us that a new portable mechanical debarker has been developed that can peel the bark from stems and limbs as small as 1 inch in diameter.

For fiscal year 1992, the Forest Service and BLM have projected that the total amount of yew bark collected will increase to about 907,000 pounds. Appendix I shows the Forest Service's and BLM's actual collections in fiscal year 1991 and projections for fiscal year 1992 by region, national forest, and state office.

---

## Conclusions

In fiscal year 1991, neither the Forest Service nor BLM had effective timber sale administrative procedures or utilization standards. As a result, some usable yew bark was not collected in fiscal year 1991. In fiscal year 1992, both agencies and Hauser Northwest have taken actions to ensure more complete utilization of yew bark. If properly implemented, the agencies' fiscal year 1992 program plans and associated operational procedures should help ensure that more of this limited and valuable resource is recovered.

---

## Agency Comments

We discussed the facts and conclusions in this report with officials of the Forest Service's Timber Management Staff and BLM's Division of Forestry.

---

They generally agreed with our facts and conclusions; in a few instances they made technical suggestions. We made changes where appropriate. However, as requested, we did not obtain written agency comments on a draft of this report.

---

## Scope and Methodology

To determine the collection practices during fiscal year 1991, we interviewed the Pacific yew coordinators for the Forest Service's headquarters and Pacific Northwest Region and for BLM's headquarters and Oregon State Offices. In addition, we interviewed representatives of Hauser Northwest, Inc. We also made several visits to sites that contained Pacific yews.

To determine what steps the agencies have taken to ensure maximum utilization of the Pacific yew bark, we reviewed the 1992 Pacific yew program plans and associated operational procedures developed by both the Forest Service and BLM. We did not review the subsequent actions of the agencies to determine whether these utilization standards have been fully implemented.

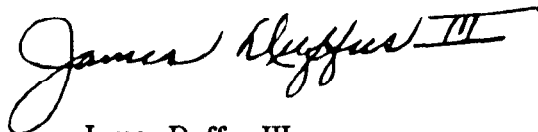
Our review was performed between December 1991 and June 1992 in accordance with generally accepted government auditing standards.

---

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 21 days after the date of this letter. At that time, we will send copies to the Secretaries of Agriculture, the Interior, and Health and Human Services. We will make copies available to others on request.

Please contact me at (202) 275-7756 if you or your staff have any questions concerning this report. Major contributors to this report are listed in appendix II.

Sincerely yours,



James Duffus III  
Director, Natural Resources  
Management Issues





# Pacific Yew Bark Harvested in Fiscal Year 1991 and Projected Harvest for Fiscal Year 1992 by the Forest Service and BLM

Amounts in pounds		
Forest Service	Fiscal year	
	1991	1992 projected
<b>Pacific Northwest Region</b>		
Umpqua	352,360	160,000
Williamette	188,166	90,000
Rogue River	95,859	92,000
Mt. Hood	62,243	65,000
Gifford Pinchot	25,597	45,000
Olympic	3,055	3,000
Mt. Baker-Snoqualmie	878	5,000
Siskiyou	0	10,000
Umatilla	0	20,000
<b>Subtotal</b>	<b>728,158</b>	<b>490,000</b>
<b>Northern Region</b>		
Nez Perce	87,688	160,000
Kootenai	6,905	0
Idaho Panhandle	3,038	12,000
Clearwater	0	30,000
Flathead	0	100,000
Lolo	0	1,000
<b>Subtotal</b>	<b>97,631</b>	<b>303,000</b>
<b>BLM</b>		
Oregon State Office	61,194	113,920
<b>Total</b>	<b>886,983</b>	<b>906,920</b>

Source: Forest Service and BLM Pacific yew coordinators and Hauser Northwest.

---

# Major Contributors to This Report

---

**Resources,  
Community, and  
Economic  
Development  
Division, Washington,  
D.C.**

**Gus Johanson, Assistant Director  
John P. Murphy, Assignment Manager**

---

**Seattle Regional  
Office**

**Leo H. Kenyon, Evaluator-in-Charge  
Carole J. Blackwell, Staff Evaluator**



---

### **Ordering Information**

**The first copy of each GAO report is free. Additional copies are \$2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.**

**U.S. General Accounting Office  
P.O. Box 6015  
Gaithersburg, MD 20877**

**Orders may also be placed by calling (202) 275-6241.**

United States  
General Accounting Office  
Washington, D.C. 20548

Official Business  
Penalty for Private Use \$300

First-Class Mail  
Postage & Fees Paid  
GAO  
Permit No. G100