Northwest and Alaska Fisheries Center

National Marine Fisheries Service

U.S. DEPARTMENT OF COMMERCE

NWAFC PROCESED REPORT 88-26

The Effects of MARPOL, Annex V, on the Ports of Kodiak and Unalaska

September 1988

This report does not constitute a publication and is for information only. All data herein are to be considered provisional.

A REPORT TO THE

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ON

THE EFFECTS OF MARPOL, ANNEX V, ON THE PORTS OF KODIAK AND UNALASKA

BY

PACIFIC ASSOCIATES

SEPTEMBER, 1988

TABLE OF CONTENTS

INTRODUCTION

1.0 OVERVIEW OF MARPOL 1

2.0 STATE LAWS AND REGULATIONS 4

2.1 Area Affected 4
2.2 Practices Prohibited 4
2.3 Permits Issued 4
2.4 Other Prohibitions 4
2.5 Other Powers 4

3.0 REVIEW OF PORT OF NEWPORT PROGRAM 6

3.1 Port of Newport Project 6
3.2 Similarity to Alaska Situation 6
3.3 Scope of Newport Program 6
3.4 Results of Program 7
3.5 Potential Benefits to Alaska 7

4.0 OVERVIEW OF KODIAK AND UNALASKA 8

4.1 Introduction 8
4.2 Kodiak 9
4.3 Unalaska 10
4.4 Present and Future Role of the Seafood Industry 12
4.5 Present and Future Role of the Oil and Gas Industry 14
4.6 Present and Future Role of the Freight Industry 15
4.7 Present and Future Role of the Passenger Industry 16
4.8 Present and Future Role of Other Maritime Users 16

5.0 HISTORICAL AND PRESENT VESSEL TRAFFIC PATTERNS IN THE PORT OF KODIAK 21

5.1 Commercial Fishing 21
5.2 Freight Industry 24
5.3 Passenger Traffic 24
5.4 Other Maritime Users 25

6.0 ANTICIPATED MODIFICATIONS IN FUTURE VESSEL TRAFFIC PATTERNS IN THE PORT OF KODIAK 27

6.1 Commercial Fishing 27
6.2 Freight Industry 28
6.3 Passenger Traffic 28
6.4 Other Maritime Users 28

7.0 HISTORICAL AND PRESENT VESSEL TRAFFIC PATTERNS IN UNALASKA 29

7.1 Commercial Fishing 29
7.2 Freight Industry 32
7.3 Passenger Traffic 33
7.4 Other Maritime Users 33

8.0 ANTICIPATED MODIFICATIONS IN FUTURE VESSEL TRAFFIC PATTERNS IN UNALASKA 35

8.1 Commercial Fishing 35
8.2 Freight Industry 37
8.3 Passenger Traffic 37
8.4 Other Maritime Users 38

9.0 ANTICIPATED VOLUME AND TYPES OF GENERATED REFUSE IN THE PORT OF KODIAK 39

9.1 Garbage Type 39
9.2 Historic 39
9.3 Garbage Units 39
9.4 Baseline Data 41
9.5 Garbage Generated by the Commercial Fishing Industry 42
9.6 Garbage Generated by Maritime Shipping Companies 44
9.7 Garbage Generated by Passenger Vessels 44
9.8 Garbage Generated by Other Maritime Users 45

10.0 ANTICIPATED VOLUME AND TYPES OF GENERATED REFUSE IN UNALASKA 49

10.1 Garbage Type 49
10.2 Historic 49
10.3 Garbage Units 49
10.4 Baseline Data 50
10.5 Garbage Generated by the Commercial Fishing Industry 51
10.6 Garbage Generated by Maritime Shipping Companies 54
10.7 Garbage Generated by Passenger Vessels 55
10.8 Garbage Generated by Other Maritime Users 55

TABLES

Table 1:	MARPOL Dumping Rules And Regulations	3
Table 2:	Gulf Of Alaska Groundfish Harvests	18
Table 3:	Bering Sea/Aleutian Islands Groundfish Harvests	19
Table 4:	Projected Bering Sea/Aleutian Islands Groundfish Harvests	20
Table 5:	Kodiak Fisheries	26
Table 6:	Normal Kodiak Port And Harbor Refuse Pick Up In Five Yard Dumpster Loads	46
Table 7:	Frequency Of Kodiak Area Season Openings Resulting In Increased Refuse	47
Table 8:	Documentable Vessel Trip Times, Season Lengths And Estimated At-Sea Refuse in Kodiak	48
Table 9:	Estimate Of Potential Factory Trawler Annual Generated Refuse In Unalaska As A Result Of Annex V	57
Table 10:	Estimate of Potential Refuse Generated by Other Maritime Users in Unalaska As A Result Of Annex V	58
Table 11:	Total Amount Of Additional Refuse Anticipated To Be Generated Annually In The Port Of Kodiak As A Result Of Annex V	61
Table 12:	Total Amount Of Additional Refuse Anticipated To Be Generated Annually In Unalaska As A Result Of Annex V	62

PACIFIC ASSOCIATES

September 30, 1988

Dear Reader:

In late 1987, the United States Senate gave its advice and consent to ratification by the United States of Annex V of the "International Convention for the Prevention of Pollution by Ships", otherwise known as MARPOL. Subsequently, the President signed Public Law 100-220, known as the "Marine Plastic Pollution Research Control Act of 1987" into effect, thereby completing U.S. ratification of MARPOL. As a result, Annex V will enter into effect internationally on December 31, 1988.

The practical effects of Annex V on U.S. sea ports and coastal communities are unknown. However, since Annex V places severe restrictions on the ability of sea going vessels to dump refuse in the ocean, it is assumed significant quantities of additional refuse from sea-going vessels will be returned to shore for disposal. This additional refuse poses potential problems for municipal waste management systems, particularly in remote Alaskan seaports.

In order to gage the impact of Annex V on municipal waste management systems, the Alaska Department of Environmental Conservation, in concert with the National Marine Fisheries Service, contracted with Pacific Associates, a Juneau based consulting firm, to evaluate the waste management systems in Kodiak and Unalaska relative to their ability to handle the increased refuse expected to result from the implementation of Annex V. Specifically, Pacific Associates was asked to:

- Review current laws and regulations to identify any potential interactions or conflicts with Annex V.

- Characterize the vessel traffic in Kodiak and Unalaska by type, volume, seasonal patterns, duration of in-port stay, destination while in-port, crew size, etc.

119 SEWARD STREET · SUITE 9 · JUNEAU · ALASKA 99801 907 · 586-3107

- Estimate the range of types and volumes of refuse that might be generated by each type of vessel category.

- Discuss the impact of the delivery of the additional refuse into Kodiak and Unalaska, and recommend possible solutions for those areas where present capacity may be inadequate.

The following report constitute the project results.

Sincerely,

Larry Cotter

Eric Eckholm

Chris Blackburn

Randolph Bayliss

OVERVIEW OF ANNEX V, MARPOL

1.0 During the past several years, there has been increased international concern with the degree of ocean pollution. The disposal at sea of garbage and other forms of refuse seriously threatens the marine environment. In a 1975 study, the National Academy of Scientists estimated that about 6.4 million metric tons of refuse, including some 1 million metric tons of plastics, are discharged annually into the world's oceans by commercial sources. The impact on the marine environment is substantial. It is estimated that over 1 million sea birds and in excess of 100,000 marine mammals and sea turtles die each year from ingestion of, or entanglement, in plastic debris. The toll for human beings in terms of dollars spent or lost, and danger to health and safety, is equally significant.

Annex V of MARPOL is intended to severely curtail the discharge of refuse into the world's oceans. It imposes strict limits on the types, the areas, and the distance from shore in which refuse can be discharged into the ocean. Table I, reprinted from the Coast Guard Advance Notice of Proposed Rulemaking, outlines the conditions and areas in which different types of refuse may be discharged into the marine environment by different types of marine operations.

The legislation implementing Annex V mandates that the provisions of Annex V apply to U.S. vessels anywhere and to foreign vessels while operating within the 200 mile Exclusive Economic Zone of the United States. There is no minimum size limit under which a vessel can avoid the requirements of Annex V. Therefore, with very few exceptions, the disposal at sea of refuse inside the defined areas is prohibited. As a result, vessels will either have to dispose of their refuse (excluding plastics) outside of those defined areas, incinerate their refuse, or return it to shore. All plastics must be returned to shore for disposal.

Annex V also contains reception facility requirements. The United States Coast Guard is currently in the process of defining the word "facility". In the Advance Notice of Proposed Rulemaking, the Coast Guard states that, "...consideration is being given to applying these regulations to commercial terminals or ports which load and offload commercial cargo (including fish catches) and to marinas where recreational and commercial vessels pay for dockage or purchase fuel and other boating supplies."

The Coast Guard is considering three criteria for determining whether or not a reception facility adequately meets the requirements of MARPOL: 1.) capacity, 2.) accessibility to ships, and 3.) ability to handle U.S. Department of Agriculture (USDA) regulated wastes. Presumably, a "facility" which is not determined to be "adequate" will not be allowed to load or offload cargo, including fish catches.

Although the regulations implementing Annex V have not yet been clearly defined, it is safe to assume the amount of refuse brought into port by marine vessels will increase and that the Kodiak Island City and Borough and the City of Unalaska will bear the burden of disposing the additional refuse.

Table 1. MARPOL Annex V Summary of Garbage Disposal Limitations

Garbage Type	All vessels		*** Offshore Platforms & Assoc. Vessels
	Outside Special Areas	** In Special Areas	
Plastics - includes synthetic ropes and fishing nets and plastic garbage bags	Disposal prohibited	Disposal prohibited	Disposal prohibited
Floating dunnage, lining and packing materials	>25 miles off shore	Disposal prohibited	Disposal prohibited
Paper, rags, glass, metal bottles, crockery and similar refuse	>12 miles	Disposal prohibited	Disposal prohibited
* Paper, rags, glass, etc. comminuted or ground	>3 miles	Disposal prohibited	Disposal prohibited
Food waste not comminuted or ground	>12 miles	> 12 miles	Disposal prohibited
* Food waste comminuted or ground	>3 miles	> 12 miles	> 12 miles
Mixed refuse types	More stringent requirements apply.	More stringent requirements apply.	More stringent requirements apply.

* Comminuted or ground garbage must be able to pass through a screen with mesh size no larger than 25 mm.
** Special areas are the Mediterranean, Baltic, Red and Black seas areas, and the Gulf's area.
*** Offshore platforms and associated vessels includes all fixed or floating platforms engaged in exploration or exploitation of seabed mineral resources, and all vessels alongside or within 500m of such platforms.

STATE LAWS AND REGULATIONS

2.1 Area Affected

Lands and waters within the state, and coastal waters within three miles of state lands, lie within the jurisdiction of the state for solid waste disposal.

2.2 Practices Prohibited

No person may dispose of garage or other solid wastes in state waters or lands without a permit issued by the Alaska Department of Environmental Conservation (AS 46.03.100) Solid waste includes seafood processing , sludges and other wastes from industries, but does not include hazardous wastes. DEC has promulgated regulations (18 AAC. 60) which prescribe permitting procedures and details.

2.3 Permits Issued

DEC has issued a permit to the Kodiak Island Borough for the operation of a baler and landfill. The baler compacts solid waste, thereby decreasing its volume. The bales of solid waste are then covered with soil. Solid wastes, other than household garbage, may be landfilled without compaction if those wastes would cause problems with the baling machine. The permits prohibit the disposal of hazardous wastes and require the Kodiak Island Borough to test the ground water around the landfill to determine the extent of subsurface contamination.

DEC has issued a permit to the City of Unalaska for their operation of a sanitary landfill. That permit requires the City to cover the waste at least once weekly with soil and designates a certain area for burning certain wastes. The permit also specifies a ground water testing program and prohibits disposal of hazardous wastes.

2.4 Other Prohibitions

Federal law prohibits garbage being taken ashore from foreign vessels unless that garbage has cleared customs and has been sterilized before landfilling, or incinerated, or ground and disposed of in an acceptable sewage treatment system.

2.5 Other Powers

State law also provides for DEC to grant up to 50% of the construction costs of solid waste disposal facilities that are publicly owned. Such projects are funded by legislative appropriation through the capital budget process.

Another possible source of revenue for upgrading solid waste facilities might be the Alaska Clean Water fund, a revolving loan fund. The statute establishing the fund would have to be appended to include solid waste projects. The fund is currently limited to water and wastewater type projects. Because the expanded community service would benefit industrial users it may be a more appropriate use of state funding as opposed to an outright grant.

SUMMARY OF PORT OF NEWPORT MARPOL PROJECT

3.1 Port of Newport Project

The Port of Newport conducted a project, entitled "The Marine Refuse Disposal Project", from January of 1987 through March of 1988. The project was intended to develop a program which would provide guidance to ports related to the upcoming implementation of MARPOL, Annex V, regulations.

The project involved two major goals: 1.) to encourage the return of refuse to port through education of port users, and 2.) to make facilities available to receive the Annex V generated refuse.

3.2 Similarity to Alaska Situation

The Port of Newport has a number of similarities with Alaskan ports: Newport is a multi-use port, with a number of various maritime users operating from or through the port and utilizing refuse facilities. As with Alaskan ports, there is a heavy emphasis on commercial fishing in Newport, although Newport does experience a much higher level of use by transient sports fishermen than most Alaskan ports.

The Newport project dealt only with building awareness of the need for mariners to deal with marine debris, and helping the port to create a system to handle the additional refuse generated at the port. The project did not focus on the capability of the community's refuse system to handle the increased loads.

3.3 Scope of the Newport Program

The Newport study identified five tasks necessary to meet their objective of establishing convenient refuse reception facilities and encouraging their use:

> Task 1: Determine the extent of, and scheduling for, the labor and equipment needed to provide convenient refuse reception facilities. Develop a system to allow marine operators to relay mariner needs to the waste management operators. Promote and advertise the program to the using public.
>
> Task 2: Maintain a complete record of all services and expenses incurred in order to develop a prototype system.

Task 3: Devise, but not enact, a schedule of charges, taxes or other revenue generating mechanisms to pay for the refuse reception system.

Task 4: Solicit and record vessel owner and operator reactions to the system and its intent.

Task 5: Provide the National Marine Fisheries Service (NMFS) with a detailed report of the entire project to help other ports plan their facilities. (The report is available from NMFS).

3.4 Results of the Program

The project was judged to be very successful. Through careful analysis of refuse disposal needs, a system was devised which provided an easy method of handling refuse by boat operators and port employees. The increased refuse capacity at each site reduced handling somewhat, and did not greatly increase the costs associated with handling the refuse. The establishment of a method for separating recyclable material allowed efficient handling of the refuse.

Perhaps the most important aspect of the project was the involvement of port employees, community members and vessel operators through education and promotion. The increased awareness of the problems associated with marine debris, and the availability of an easy method of handling refuse, created a situation in which an estimated 80% of the fishermen in the port are now voluntarily returning their plastics and other non-biodegradable material to port.

3.5 Potential Benefits to Alaska

The result of this project, and the work contained in this report, indicates that in order for communities to effectively deal with marine wastes and the implementation of MARPOL, Annex V, regulations, a total system must be established which includes:

a.) Waste facilities that are easy for vessels to use, and adequate to meet their needs.

b.) An educational and promotional program that communicates the need for and availability of a waste disposal system for that port.

c.) The capability of handling the increased volumes of refuse generated.

OVERVIEW OF KODIAK AND UNALASKA

4.1 Introduction

Kodiak and Unalaska are island communities located in Southwest Alaska. There is no road link to either island. As a result, marine transportation plays a critical role in the social and economic fabric of the communities. With limited air borne exceptions, all freight is transported to or from the islands by water, nearly all of which is by common carrier. Both communities have well developed public and private harbor facilities. Both communities are bustling and undergoing analysis of additional harbor expansion.

The Ports of Kodiak and Unalaska are primarily fishery oriented. Both ports are extremely busy, and both rank high nationally in terms of the poundage and the value of seafood delivered. The communities are located immediately adjacent to some of the world's richest fishing grounds. Most of Kodiak's seafood industry activity is related to the Gulf of Alaska, while most of Unalaska's seafood activity comes from the Bering Sea and Aleutian Islands. Almost all commercial vessel traffic is related to the seafood industry, either in the form of fishing or processing vessels, or in freighters used to move the product.

The oil and gas industry has had a minor affect on both communities. For a period of time, offshore drilling activity took place in areas immediately adjacent to each community. None of the activity resulted in operating wells or platforms, and the industry has since departed. There is the continuing possibility of subsequent offshore oil and gas development which could be staged from one or both communities.

Six domestic marine transportation companies provide freight service to Kodiak and Unalaska. This industry can be broken into three components: 1.) U.S. oceangoing container lines, 2.) U.S. domestic freight companies, and 3.) foreign tramp freighters. Since the private sector economies of both communities are almost totally dependent on the fishing industry (98% in the case of Unalaska), almost all freight traffic is related in one way or another to the fishing industry. Substantial increases in seafood landings in either port, likely in the immediate future as Americanization of the offshore fishery resource within the U.S. 200 mile Exclusive Economic Zone continues, could result in increases in the level of marine freight service to that community.

The passenger component of the marine industry includes port calls by vessels of the Alaska Marine Highway System (AMHS) and oceangoing tour ships. The AMHS calls in Kodiak twice weekly and four or five times per year in Unalaska. Tour ship visits are infrequent. The number of tour ships calling for the past two years has remained steady with one per year in Kodiak and two vessels per year in Unalaska.

Other maritime users also call in Kodiak and Unalaska, particularly Unalaska. These users include United States and foreign government and research vessels, foreign processing and fishing vessels.

4.2 Kodiak

Kodiak is served by two main harbors: St. Paul Harbor (also known as the small boat harbor), adjacent to the downtown area, and St. Herman's Harbor, next to Near Island, which is connected to the Island of Kodiak by bridge. There is also a transient float near the downtown area, two grids, and a loading dock in the small boat harbor.

There are two cargo docks owned by the City of Kodiak. The Crane Dock, or the Sea-Land Dock as it is commonly called, primarily serves oceangoing container ships and large barges. The other dock, the City Cargo Dock, serves smaller freighters, factory trawlers, seafood processing vessels, occasional fishing vessels seeking to load or offload cargo, and tour ships. The City of Kodiak is currently in the process of developing a 400 foot extension to this dock.

Additionally, there is a private cargo dock/barge landing located in Women's Bay, about 10 miles from town. This facility is used to load and offload construction equipment, supplies, and occasional cargo to and from common carrier barges.

City port facilities are operated as an enterprise operation under the auspices of the City of Kodiak. All operating costs for the harbor are paid from the enterprise fund. The fund itself is generated by moorage fees, dock fees, wharfage fees, grid fees, etc., for all vessels.

The Kodiak Island Borough performs garbage service for the City of Kodiak and then bills the City of Kodiak for garbage pickup and city facilities. The City of Kodiak, in turn, bills the Harbor Port Enterprise Fund for garbage pick up in the boat harbor and cargo port areas. In the 1988-89 budget, the Port and Harbor budgeted $59,000 for all utilities, including $25,000 for garbage pickup at the City cargo docks.

In value of seafood landings, the Port of Kodiak is the second largest port in the United States. Each year an estimated 2,000 vessels directly involved in the seafood industry use the port. The resident fishing fleet is estimated to number 1,200 vessels.

There are 11 seafood processing facilities in the community. All operate year round. A wide variety of seafood species are harvested and processed in the Kodiak area, including salmon, herring, king and Tanner crab, Dungeness crab, halibut, black cod, Pacific cod, pollock and flounder.

The type of gear used by the fishing fleet to harvest their catch consists of pots, trawls, longlines, seines and setnets.

4.3 Unalaska

Unalaska, also known as Dutch Harbor, has developed a reputation as the "busiest port in the State of Alaska." The Unalaska harbormaster estimates there are approximately 4,000 vessel port calls each year. Most of the vessels using Unalaska's docks are in transit: fishing vessels coming from or going to the Bering Sea; factory trawlers and catcher processors; floating processors serving fisheries throughout the Bering Sea, Togiak and Bristol Bay; foreign and domestic cargo vessels; research ships; fuel barges; foreign processing vessels, and others.

Unalaska municipal port facilities include a 400 foot city dock facility, known as the Ballyhoo Dock, and a "small boat harbor." The Ballyhoo Dock has multiple uses including cargo transfer, fuel and water transfer, and mooring. Petro Marine Services, a fuel distributor company, operates a two million gallon tank farm in the vicinity of the Ballyhoo Dock and provides fuel transfer from the dock itself. Commercial utilization of the Ballyhoo Dock exceeds the dock's capacity. The City of Unalaska is currently seeking funding for an 800 foot extension to the dock. When the Ballyhoo Dock expansion project is completed, the facility is intended to function as a factory trawler support base.

Unalaska's small boat harbor is primarily used by commercial fishing vessels on layover to or from trips to the Bering Sea. According to the Unalaska Harbormaster, the average size of vessels using the small boat harbor is 117 feet.

The number of vessels which have used the Ballyhoo Dock and the small boat harbor during the first six months of 1988 are shown below:

Number of Vessels Per Month Which Used
the Ballyhoo Dock and Small Boat Harbor During 1988

	Jan.	Feb.	March	April	May	June
Small Boat Harbor	79	90	85	66	57	47
Ballyhoo Dock	29	49	75	63	52	48
Total	108	139	160	129	109	95

The small boat harbor is used primarily by fishing vessels. Average length is estimated at 117 feet. The Ballyhoo Dock is used as moorage for a wide range of vessels. In June, 1988 the dock was used by:

11	U.S. factory trawlers
10	Tugs
2	Government vessels
8	Soviet trawlers
1	British research ship
1	State of Alaska ferry
1	Fuel barge
14	Various vessels taking on fuel

This mix of vessels is believed to be about average for the Ballyhoo Dock.

Private docks experience a variety of users. Unalaska's two surimi plants have about 6 fishing vessels combined, with each vessel making a delivery once every 2 to 4 days through most of the year. The American President Lines container dock provides moorage for 10 to 15 ships per month. These are primarily container ships, although some catcher-processors and factory trawlers also call. The harbormaster estimates the total at the remaining private docks to range from 15 to 70 vessels a month, depending on the time of the year.

There are 15 primary private docks in Unalaska. Major privately owned and operated dock facilities, and their function, include:

Crowley Maritime	Cargo facility
Offshore Systems, Inc.	Cargo facility

American President Lines	Cargo facility
Underwater Construction	Cargo facility
Delta Western	Fuel delivery/Cargo facility
Alyeska Seafoods	Seafood delivery
Aleutian Processors	Seafood delivery
East Point	Seafood delivery
Great Land's Seafoods	Seafood delivery
Universal Seafoods	Seafood delivery
Standard Oil Dock	Fuel delivery

Two of Unalaska's seafood processing facilities are surimi production plants. The remainder of the seafood processing facilities process crab, salmon, halibut, Pacific cod, and other species. All the community's processing facilities operate year round or nearly year round. Floating processing vessels frequently anchor in Unalaska, particularly during crab season.

The City of Unalaska contracts with a private contractor, Williwaw Sanitation, for garbage pickup. Private businesses may also request garbage service by Williwaw Sanitation, but garbage pickup service is optional rather than mandatory.

Foreign processing and fishing vessels, research vessels, and government vessels pay frequent visits to Unalaska for the purpose of reprovisioning and/or shore leave.

4.4 Present and Future Role of the Seafood Industry

Both Kodiak and Unalaska are among the Nation's leading fishing ports in terms of poundage landed and the value of landings. Both communities are heavily dependent upon the seafood industry as their private sector economic base.

The seafood industry in Alaska consists of traditional species such as salmon, crab, herring, and halibut, and emerging species such as pollock, Pacific cod, and other groundfish or bottomfish species. The traditional species are fully utilized; that is they are fully harvested and processed by U.S. harvesting and processing entities (this is also referred to as DAP -- Domestic Annual Production). Emerging fisheries, on the other hand, are in a state of transition from being harvested and processed entirely by foreign fleets, to being harvested by American fishermen and processed by foreign processing vessels, to being fully utilized by American industry. That transition is well underway.

As a fishing community, Kodiak has long relied upon traditional fisheries as the backbone of its seafood industry. There are substantial salmon runs in the Kodiak area, and Kodiak is located very close to prime halibut, crab and herring resources. Only during the past few years has bottomfish begun to play a significant role in the economy of Kodiak's industry.

The growth of Unalaska's seafood industry initially occurred with the development of the king crab fishery in the early 1970's. That fishery peaked, and subsequently collapsed, in the early 1980's. There is little in the way of commercial salmon or herring resources in the area around Unalaska. Following the collapse of the king crab resource, the health of Unalaska's seafood industry has been tied directly to the growth of the U.S. bottomfish industry. The development of the C. opilio Tanner crab fishery has also played an important role.

Both Kodiak and Unalaska are located close to major seafood resources and international shipping lanes. As a result, both communities function not only as seafood processing centers, but as transshipment receiving and distribution centers. Since both communities are so heavily dependent upon the fishing industry for their economic livelihood, and since the level of vessel traffic in both ports is directly linked to the activities associated with the fishing industry, it is important to project future changes in the industry in order to analyze the potential impact of Annex V.

In 1976, Congress passed, and the President signed into law, the Magnuson Fishery Conservation and Management Act. The Act established a 200 mile Exclusive Economic Zone (EEZ) in adjacent waters to the United States. Prior to 1976, and for a short period of time thereafter, foreign fishing fleets harvested and processed virtually all fishery resources within 200 miles of Alaska in the North Pacific. The Act was designed to replace foreign fleets with American harvesting and processing components.

In 1978, the first "joint venture" took place. A joint venture is when U.S. fishing vessels harvest the fishery resource and deliver the catch to foreign processing vessels where the catch is processed. During the mid 1980's, joint ventures experienced substantial growth in terms of total harvest. Correspondingly, foreign harvests decreased substantially. Also in the mid-1980's, the U.S. processing sector began to increase its share of the harvest and production of EEZ resources. By 1988, all foreign fishing in the EEZ had been eliminated, the level of joint venture harvest was decreasing rapidly, and the amount of U.S. harvested and processed product was dramatically increasing. Tables 2 and 3 chart the harvest levels of the three entities over the years in the Gulf of Alaska and the Bering Sea respectively.

Virtually all industry participants and fishery managers agree that the trend of declining joint venture harvests and increasing U.S. harvesting and processing will continue. Predictions vary, but it is generally assumed there will be little, if any, joint venture activity in the North Pacific EEZ by 1991. This would mean the entire harvestable fishery resource in the Gulf of Alaska and Bering Sea EEZ would be fully harvested and processed by U.S. industry. Table 4 predicts the harvest changes during the next few years in the Bering Sea (the Gulf of Alaska is already fully utilized).

The impacts associated with full U.S. utilization of the fishery resources within the EEZ are profound: full utilization will mean the doubling, at least, of the amount of product currently harvested and processed by U.S. industry in the Bering Sea. Additionally, in the Gulf of Alaska, where we currently have full utilization, there are substantial fishery resources whose development is currently constrained due to a variety of factors. Should those factors be resolved in the political arena, an additional 400,000 metric tons (1.1 billion pounds) per year of harvest could occur in that region. The likelihood of this occurring within the next few years, however, is poor.

As the process of "Americanization", or full utilization, moves ahead, there will be an increase in the level of domestic common carrier freight activity in the region. It is also anticipated that the use of foreign tramp freighters will decrease correspondingly, although not be eliminated.

The process of Americanization cannot be reversed. Its successful conclusion during the next few years is inevitable. Therefore, substantial increases in vessel utilization of both Kodiak and Unalaska are also inevitable.

4.5 Present and Future Role of the Oil and Gas Industry

The oil and gas industry has played a very limited role in the region. During the years 1976 through 1981, there was anticipation of an offshore oil and gas lease sale in Shelikof Straight, immediately adjacent to Kodiak. During that time period, some limited survey work and exploratory drilling took place. That activity resulted in a lack of desire on the part of the oil and gas industry to engage in further, expanded activity. Although it is possible there may still be a lease sale, it is unlikely it will take place in the near future.

During the time period 1982 through 1986 there was substantial oil and gas activity based out of Unalaska. Survey vessels and mud boats regularly called in Unalaska. A port facility was constructed by Offshore Systems, Inc., to serve the fleet. The activity ceased in 1986. It is unlikely there will be further

activity in the near future. However, because of Unalaska's location, the advent of any Bering Sea or Aleutian Islands offshore oil and gas lease sales or drilling activity could result in the re-emergence of this activity in Unalaska once again.

Because there is no current oil and gas activity, and none is anticipated to occur during the next five years, we will not be addressing this category of marine industry further in this report.

4.6 Present and Future Role of the Freight Industry

Six domestic marine transportation companies currently provide freight service to Kodiak and Unalaska. Since the private sector economies of both communities are almost totally dependent on the fishing industry, almost all freight traffic is related in one way or another to the fishing industry. Substantial increases in seafood landings in either port, likely in the immediate future as full utilization of the fishery resource within the EEZ takes place, could result in increases in the level of marine freight service to that community.

This industry can be broken into three components: 1.) U.S. oceangoing container lines, 2.) U.S. domestic freight companies, and 3.) foreign tramp freighters.

There are two U.S. oceangoing container lines which provide service to Kodiak and Unalaska: Sea-Land Services and American President Lines (APL). In addition to their oceangoing container vessels, both companies provide barge service to both communities either through the use of their own barges or through joint venture arrangements with other companies. Sea-Land provides oceangoing container vessel service to Kodiak but only provides barge service to Unalaska. Conversely, APL provides oceangoing container service to Unalaska, but only barge service to Kodiak. Sea-Land's freight service is oriented to the Alaska Northwest trade, and the vessels only travel between Alaska and the Pacific Northwest. APL's oceangoing service is Pacific Rim oriented, and all of their oceangoing container vessels are en route from the Pacific Northwest to the Far East via Unalaska.

There are four U.S. domestic freighter companies which provide service to Kodiak and Unalaska. This type of service involves the use of freighter vessels and tug and barge service.

The use of foreign tramp freighters has been prevalent during the past several years. Twelve to fifteen foreign trampers call each year in Kodiak and 250

foreign trampers call in Unalaska each year. Foreign trampers are the only means, exclusive of the foreign processing vessel itself, of transporting joint venture processed seafood to the market. The destination of this product is always international because it is unlawful to import that product directly into the United States. Foreign trampers will often enter a U.S. port, before or after visiting the foreign joint venture processing vessel, to top off or augment their loads. As joint ventures are phased out during the next few years, it is expected that the level of foreign tramper activity will decrease and the level of domestic shipping activity will, correspondingly, increase.

Kodiak and Unalaska operate as transportation hubs for the region. During the salmon season in Kodiak, and throughout the year in Unalaska, barges regularly transport fish products from outlying regions into Kodiak and Unalaska for transshipment to the Pacific Northwest or the Far East. Therefore, as EEZ fishery resources become fully utilized, the level of freight activity in Kodiak and, particularly, Unalaska will also show an increase due to seafood processing activities in other communities.

4.7 Present and Future Role of the Passenger Industry

The passenger industry is primarily composed of commercial tour ship operations and visits by the Alaska Marine Highway System.

The level of tour ship activity in Kodiak and Unalaska has been slight. During the past several years, an average of one tour ship has called in Kodiak and two have called in Unalaska. No change in the number of visits during the next few years are anticipated. However, some tour ships carry up to 1,000 crew and passengers. Because of the size of the vessels and total number of people on board, the amount of refuse generated by each vessel is substantial. Therefore, even a slight increase in tour ship calls can generate a large increase in refuse, assuming that refuse is offloaded in Kodiak or Unalaska.

Vessels of the Alaska Marine Highway System (AMHS) visit Kodiak twice weekly and Unalaska four or five times per year. This level of visitation is not expected to change substantially in the near future. AMHS vessels retain their refuse on board and do not dispose of it in Kodiak or Unalaska.

4.8 Present and Future Role of Other Maritime Users

Because of the proximity of Kodiak and Unalaska to the Bering Sea and Gulf of Alaska, both communities serve as ports of call for other maritime users. In particular, government vessels, foreign processing vessels, and research vessels often visit both communities, particularly Unalaska. Since these

vessels only make a port call for the purpose of reprovisioning and/or shore leave, they are included in this report as "other maritime users".

Kodiak receives relatively few visits by other maritime users. This is not expected to change significantly in the future.

Kodiak does serve as a major Coast Guard base for the region and there is substantial Coast Guard related maritime traffic. The Coast Guard disposes of its own refuse. Therefore, this report does not deal with any Coast Guard generated refuse in the Kodiak area.

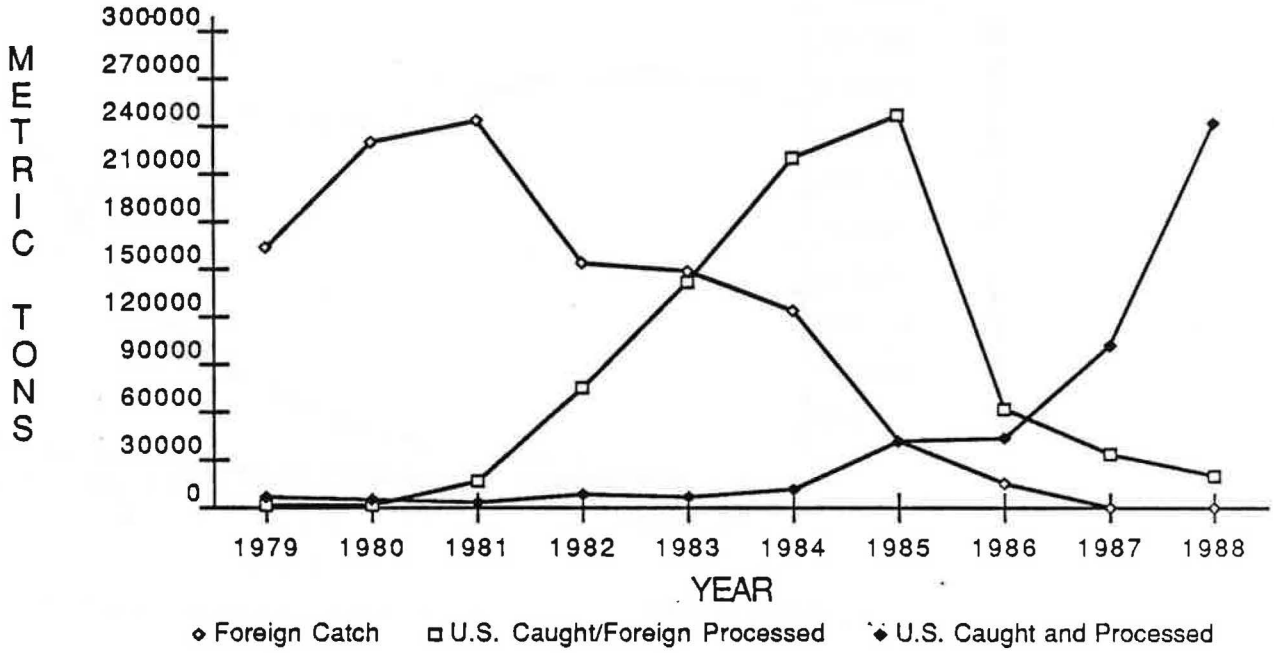
Unalaska receives a substantial number of visits from vessels in this category. There are two main reasons for this:

First, as noted in other sections of this report, the only joint venture fishing activity which takes place occurs in the Bering Sea. As a result, foreign processing vessels often pay a port call to Unalaska for reprovisioning or shore leave.

Second, the level of national and international fishery and marine environment research activity in the Bering Sea has continued to increase from year to year. This increase is related to the growing international concern with the ocean environment in general and the interrelationship of fishery stocks which are harvested in the International Waters of the Bering Sea, otherwise known as the "Donut Hole". Since the Bering Sea ecosystem is so economically and environmentally important from an international perspective, it is expected the level of research activity in the future will continue at, or increase beyond, the current level.

Table 2

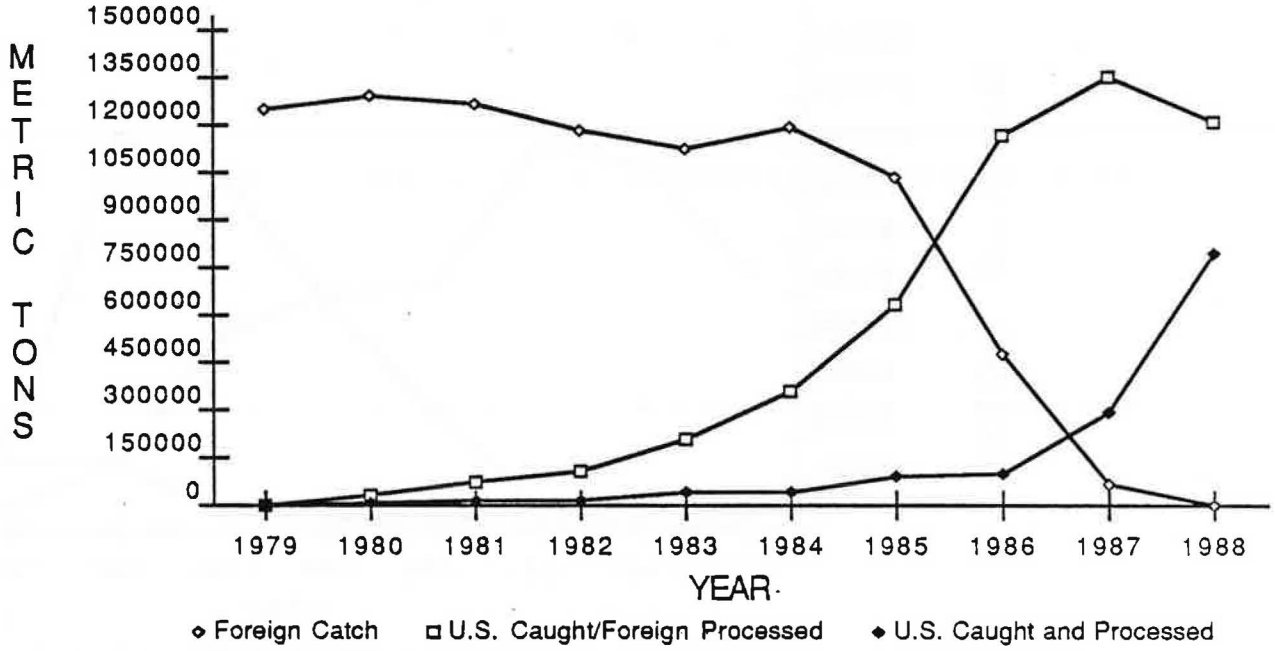
GULF OF ALASKA GROUNDFISH HARVESTS



Source: North Pacific Fishery Management Council

Table 3

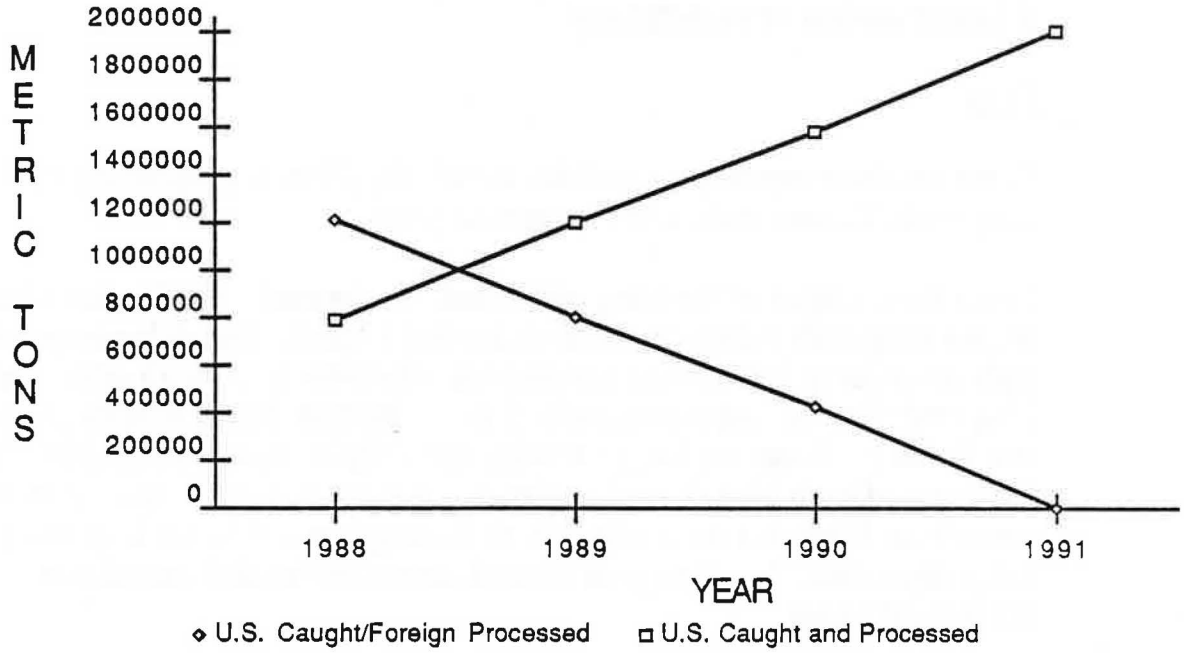
BERING SEA/ALEUTIAN ISLANDS GROUNDFISH HARVESTS



Source: North Pacific Fishery Management Council

Table 4

PROJECTED BERING SEA/ALEUTIAN ISLANDS GROUNDFISH HARVESTS



HISTORICAL AND PRESENT VESSEL TRAFFIC PATTERNS IN THE PORT OF KODIAK

5.1 Commercial Fishing

Approximately 2,000 vessels currently operate in the Kodiak area. The fleet is primarily composed of vessels which belong to Kodiak residents or vessels which homeport in Kodiak. There are seven primary fishing seasons prosecuted by five gear types. Table 5 outlines the commencement date for each fishery, the length of each fishery, the type of gear used, and the approximate number of vessels which operate out of Kodiak. The following is a brief review of each fishery:

Crab

There are three types of crab fisheries which affect vessels based in Kodiak: king crab, Tanner crab, and Dungeness crab.

Since the collapse of the king crab stocks in the early 1980's, there has not been a king crab fishery in the area around Kodiak. Small landings of king crab do occur in late September and early October as a result of the Bristol Bay king crab fishery. Approximately 5 to 12 Kodiak-based vessels participate in that fishery. These are large vessels, normally in excess of 95 feet. During the years of high king crab abundance, the Kodiak fleet would primarily operate on Kodiak area stocks. Both Bering Sea and Kodiak stocks continue to be depressed. No change in Kodiak area commercial abundance is expected for several years.

There are two commercially viable species of Tanner crab: C. opilio and C. bairdi. C. opilio are found in deep water in regions of the Bering Sea distant from Kodiak. Although some Kodiak based vessels participate in this fishery, the level of this participation is slight (5 to 12 vessels during 1988).

The distribution range of C. bairdi Tanner crab includes the area around Kodiak extending into the Bering Sea. The fishery is prosecuted with crab pots and commences January 15. There are 200 Kodiak vessels which participate in this fishery. Under current harvest levels the season lasts until February 15. Vessel traffic related to the C. bairdi fishery commences several weeks in advance of the season opening date as vessels move their pots from storage to the grounds. Some Kodiak vessels (5 to 12) participate in the Bering Sea C. bairdi fishery as well, which also opens on January 15.

The C. bairdi resource in the Kodiak area has been depressed for several years, although there continues to be a commercially viable population. C. bairdi stocks in the Bering Sea have likewise been depressed for several years with no commercial harvest until 1988. Recent population surveys of the Bering Sea C. bairdi population indicate, however, the emergence of some strong year classes which may produce a substantial commercial harvest in approximately 4 years.

The Dungeness fishery is largely a "fill-in" fishery for local fishermen. The season starts in May and runs through December. Dungeness stock populations vary wildly from one year to the next. Most vessels participate in this fishery between other, more lucrative fisheries. The number of vessels which participate varies from year to year dependent upon price and abundance. Approximately 30 to 120 vessels currently participate. This is not expected to change appreciably during the next few years.

Herring

The herring fishery is a roe fishery normally commencing in April. The fishery is prosecuted by 42 seine vessels and 57 gillnetters. The fishery takes place around Kodiak and in Bristol Bay or Togiak. The larger amount of activity is associated with the Togiak fishery. Togiak stocks are on a downward trend; however, because the fishery is so lucrative the level of vessel participation is not expected to change.

Salmon

The salmon season runs from June through September. Approximately 376 Kodiak seine vessels participate in the fishery. Additionally, another 40 "tenders" (vessels which buy fish on the grounds and run them to town for processing) participate. Depending upon the strength of the year's salmon runs, closures of the season sometimes take place. When this occurs, the fleet returns to Kodiak until the fishery reopens. The strength of salmon runs vary from year to year, however harvesting vessel participation in the fishery in limited by law. Therefore, changes in the strength of the run generally do not have major effects on the level of vessel participation.

Sablefish

The directed sablefish fishery opens April 15 and generally runs 60 days in the Kodiak region. Sablefish management is currently the subject of intense discussion in the political arena. The North Pacific Fishery Management

Council is in the process of determining whether a different season opening date should apply, whether a different form of effort management should be enacted and, if so, what. These decisions will not be made until after the completion of this report and probably will not have any appreciable impact for two or three years should there be changes enacted.

The sablefish fishery is prosecuted by longline vessels. Many of these vessels are homeported in communities other than Kodiak. Some of those vessels return their harvest to their home communities, while others come into Kodiak to offload. In recent years, approximately 250 vessels have used Kodiak as a homeport or delivery base for their sablefish activity.

Halibut

The halibut fishery in the Kodiak area normally consists of three openings of 1 to 3 days per opening. The first opening occurs in April or May, with the subsequent two openings in June and September. The level of vessel participation in this fishery is great, with approximately 1,800 vessels homeporting or using Kodiak as a operational base. The harvesting fleet consists of everything from the smallest skiff to the largest vessel capable of longlining. Vessels from almost every segment of the commercial fishing fleet participate.

The halibut fishery, like sablefish, is under intense scrutiny by fishery managers. Any changes, however, will not have an appreciable impact for three to four years at least. The halibut resource is at a record high, although there are signs that a decrease in harvest levels may be imminent. It is questionable, however, whether a decrease in the harvest level will have any meaningful impact on the level of vessel participation.

Trawl Fisheries

There are 40 shore based trawl vessels in the Kodiak fleet. These vessels normally fish year round on a variety of species. The length of their trip is usually two to four days. With the exception of pollock in the Shelikof Straight area, the species upon which their harvest is based are generally in good shape.

Factory Trawlers

Factory trawlers are vessels which have the capacity to both harvest and process their own catch. Currently, there are no factory trawlers home based

in Kodiak, and very few factory trawlers call in Kodiak. However, an increase in the level of factory trawl activity in Kodiak can be expected.

5.2 Freight Industry

Three shipping companies provide regular marine freight service to Kodiak: American President Lines, Sea-Land Services, and Sampson Tug & Barge. One other domestic marine freight company, Sunmar, provides service to Kodiak approximately four times each year.

Of the three companies which regularly provide marine freight service to Kodiak, Sea-Land is the only one which uses oceangoing container vessels. Those vessels regularly stop in Kodiak as part of Sea-Land's Tacoma-Anchorage run. The vessels visit Kodiak twice each week. Kodiak also functions as a transportation hub for Sea-Land operations originating in other outlying communities. These hub operations occur during the summer in conjunction with the salmon season. Generally, two barges per week arrive in Kodiak as part of this operation.

American President Lines and Sampson Tug & Barge provide regular barge service to Kodiak. During the summer, the level of service increases. The increase is, again, related to the advent of the salmon season.

The length of port stay in Kodiak for each of the vessels represented by Sea-Land Services, American President Lines, and Sampson Tug & Barge is merely the length of time necessary to offload and load cargo. In almost every instance this amounts to a matter of hours.

Sunmar makes periodic calls in Kodiak to pick up processed seafood for transportation to Seattle. The vessels call in Kodiak infrequently, four times per year. Their length of stay is only as long as necessary to complete their loading operations.

Kodiak has not experienced substantial use of foreign tramp freighters during the past several years. On the average, 12 to 15 foreign trampers call in Kodiak. The number of calls in Kodiak is directly related to resource abundance. As is the case with the other maritime freight operations, the length of stay for a foreign tramper is only as long as necessary to load the cargo.

5.3 Passenger Traffic

There are two types of activity associated with passenger traffic: tour ships and Alaska Marine Highway System vessels. The level of this type of activity has remained constant during the past few years.

During the period 1986 through 1988, three tour ships called in Kodiak. During 1986, tour ship traffic consisted of one vessel which called eight times. During 1987, one vessel called once. And, during 1988, two vessels have called once. The number of crew and passengers associated with a tour ship varies with the size of the vessel. Of the two vessels which called in Kodiak during 1988, one of the vessels was 675 feet and the other was 400 feet. The 675 foot vessel carried a total of 1,000 passengers and crew, while the 400 foot vessel carried 125 passengers and crew. When possible, tour ships tie up to the City Dock. Each vessel's stay in port varies from 6 to 12 hours.

The Alaska Marine Highway System provides year round, twice weekly service to Kodiak with the M/V Tustumena. The M/V Tustumena docks at the Ferry Dock downtown. The length of stay for the vessel normally doesn't exceed 2 1/2 hours.

5.4 Other Maritime Users

Kodiak receives relatively few visits by other maritime users. The occasional government or research vessel calls during the course of a year. For the past several years, Kodiak has averaged 3 to 4 visits by research vessels each year. Each vessel carries an average of 100 to 200 crew and passengers. When possible the vessels tie up at the City Dock. The length of stay for each vessel averages a few days.

Table 5

KODIAK FISHERIES

SPECIES	OPENING DATE	LENGTH OF SEASON	TYPE OF GEAR	NUMBER OF VESSELS
Tanner Crab	January 15	3 weeks	Pots	200
Herring	April	3 weeks	Seine Nets	42
Herring	April	3 weeks	Gillnets	57
Salmon	June	September	Seine Nets Tenders	376 40
Dungeness Crab	May	December	Pots	45
Sablefish	April	July	Longline	250
Halibut	May, June & September	6 days	Longline	1,800
Groundfish	January	December	Trawl	40
Groundfish	January	December	Longline	30

ANTICIPATED MODIFICATIONS IN FUTURE VESSEL TRAFFIC PATTERNS IN THE PORT OF KODIAK

6.1 Commercial Fishing

Currently, 2,000 fishing vessels operate through Kodiak each year. Most of these vessels are home based in Kodiak and most of the fishery activity these vessels engage in are related to traditional species. Although the level of traditional species harvest fluctuates on a year by year basis, the size of the fleet in most cases is limited by law. In those traditional species fisheries which have open access, such as crab or halibut, the level of harvest is not expected to increase sufficiently during the next few years to generate any substantial change in the total number of participating fishing vessels. Therefore, in the area of traditional fisheries, we do not project any substantial change in the number of fishing vessels.

During the past few years, the bottomfish industry has begun to play an important role in Kodiak. There are currently 40 shore based trawlers operating out of Kodiak which focus on bottomfish species. Most of these are resident vessels. The shore based Kodiak trawl fleet primarily harvests pollock, Pacific cod and flatfish which are found in the waters near the City of Kodiak.

The status of the pollock resource in the Kodiak area is questionable. In the past there have been very large joint venture harvests of pollock (up to 400,000 MT) in Shelikof Straight. Harvests of that magnitude generated a fishing fleet of 56 U.S. trawlers and 43 foreign processing vessels. Shelikof pollock stocks have declined substantially the past few years. It is doubtful there will be a Shelikof fishery during 1989. However, the Shelikof resource has the ability to rebound rapidly and it is possible we could see substantial harvest levels again in 4 years. Until that time it is unlikely the level of Shelikof Straight pollock harvests, or pollock harvests in other areas adjacent to Kodiak, will support a trawl fleet in excess of the existing level.

The Kodiak trawl fleet does exploit pollock stocks on the east side of Kodiak Island. It is anticipated this harvest will continue, although the level of the harvest probably will not increase sufficiently to warrant an increase in the number of trawlers used.

There are substantial flatfish resources in the Gulf of Alaska. The development of that fishery is currently constrained due to a variety of factors.

Should those factors be resolved in the political arena, an additional 400,000 metric tons of harvest could take place. A great deal of this potential harvesting activity would originate from Kodiak. The likelihood of this occurring within the next few years, however, is poor.

Thus far, Kodiak has not seen much in the way of factory trawler traffic. As more and more factory trawlers come on line, and as Unalaska becomes increasingly congested, it is likely the number of factory trawler visits to Kodiak will increase. It is difficult, though, to project the increase given the number of variables.

In summation, we do not project substantial increases in the level of commercial fishing vessel traffic occurring in Kodiak during the next few years.

6.2 Freight Industry

We do not anticipate any substantial changes in the level of maritime freight activity in Kodiak during the next few years. It is possible some increases may result from feeder operations originating in other surrounding communities which experience increased landing of seafood due to the phase out of joint ventures. However, even in this instance, the overall level of maritime shipping activity should remain about constant, particularly given the existing capacity of the Sea-Land vessels.

6.3 Passenger Traffic

We do not anticipate any substantial change in the number of tour ship visits to either Kodiak during the next few years. However, since these vessels have the capacity to carry large numbers of passengers and crew, any increase in the number of visits has a potential impact under Annex V.

The Alaska Marine Highway System has no plans to alter their current schedule to Kodiak or Unalaska in the immediate future. Therefore, we anticipate no change in this area.

6.4 Other Maritime Users

This category contains government vessels, national and international research vessels, and foreign processing vessels. We expect no change from the current level of other maritime users in Kodiak.

HISTORICAL AND PRESENT VESSEL TRAFFIC PATTERNS IN UNALASKA

7.1 Commercial Fishing

There are many differences between the Kodiak and Unalaska commercial fishing fleets. Whereas the Kodiak fleet is primarily a resident fleet, the Unalaska fleet is largely transient and non-resident. Vessels operating in the Bering Sea may headquarter in Unalaska for their fishing operations, or may begin the fishing activity from Unalaska and deliver at another port, or begin their operations at another port and deliver at Unalaska. During various seasons, floating processing vessels may anchor in Unalaska for the duration of the season and then leave. Factory trawlers, which currently do not play a major role in Kodiak, are a major component of Unalaska's commercial fishing activity. Vessels engaged in joint ventures in the Bering Sea also rely upon Unalaska as a home port during their operations.

Joint Venture Seasons

Approximately 105 U.S. harvesting vessels participate in joint ventures in the Bering Sea and Bristol Bay. The number of crew for each vessel averages five. Most of these vessels operate out of Unalaska. Joint venture harvesting vessels typically stay at sea for most, if not all, of the season, returning to Unalaska for mechanical repairs or reprovisioning. The level of harvest for joint venture fisheries is declining. Commensurate with the decline in harvest levels is a decline in the length of the season.

There are two main joint venture fisheries which impact Unalaska: pollock and yellowfin sole.

The pollock joint venture fishery, through 1989, is managed under a "60/40 split": no more than 60% of the joint venture allocation for the year can be harvested before April 15, and the remainder can be harvested thereafter. Because of the level of effort in joint venture fisheries and the declining harvest allocation, the 60% is taken well in advance of April 15. Thus, there are two distinct pollock joint venture seasons. The length of the second season is also declining. In 1988, the second season ended in late June.

It is possible a third pollock joint venture season may occur as a result of a reapportionment of allocations between the fully utilized sector and the joint venture sector. The decision on a third season is made in late summer. A

third season, should it occur, would take place in early fall. Because the harvest level for a third season is substantially less than the levels earlier in the year, fewer joint venture harvesting vessels participate.

Approximately 80 U.S. harvesting vessels participate in the pollock joint venture fishery. Most, if not all, of these vessels pay at least one visit to Unalaska prior to the commencement, during, or at the end of the season.

The yellowfin sole joint venture commences in mid-January. The length of the season, for the same reasons as pollock, is declining. Approximately 25 U.S. harvesting vessels initially participate in the yellowfin sole joint venture fishery. Most, if not all, of these vessels pay at least one visit to Unalaska prior to the commencement, during, or at the end of the season. Following the closure of the first pollock joint venture fishery, the yellowfin sole joint venture fleet increases substantially as many of the pollock vessels then fish yellowfin sole.

Tanner Crab

There are two types of Tanner crab fisheries which impact Unalaska: C. bairdi and C. opilio. C. bairdi stocks have been depressed for several years and the fishery was closed in 1986 and 1987. A small C. bairdi fishery took place in 1988, however the harvest results were disappointing. Recent Bering Sea C. bairdi population surveys indicate the emergence of some strong year classes. Should these animals survive, this fishery could become important in 4 years.

The C. opilio fishery has experienced tremendous growth during the past few years and is now the major crab fishery in the Bering Sea. The fishery opens in mid January and extends into late June. Unalaska is a major staging area for this fishery and nearly all participating vessels operate out of Unalaska.

King Crab

The king crab fishery was once the dominant factor affecting Unalaska's harbor and economy. Since the collapse of king crab stocks in the early 1980's, the impact on the community has decreased substantially. King crab stocks are still depressed. A very short one to two week fishery does take place in Bristol Bay in late September.

Approximately 200 vessels have historically participated in the king and Tanner crab fisheries. The average crew size for the harvesting vessel component of this fleet is six and the average crew size for the

catcher/processor component of the fleet is twenty. There are approximately 20 catch/processors in the fleet.

Togiak Herring

The Togiak herring fishery is a roe herring fishery. The type of activity generated by this fishery in Unalaska consists of a few floating processors or tenders fueling up or waiting out the weather in advance of the season. Following the conclusion of the fishery, some vessels bring their harvest back to Unalaska for transshipment to the Far East. The Togiak fishery takes place in May.

Salmon

The main salmon fishery which impacts Unalaska is the Bristol Bay season. This season runs from June through August, with a peak in early July. During the month of June, floating processing ships and cargo vessels, including barges and domestic freighters, begin staging out of Unalaska in anticipation of the fishery. During the course of the fishery, tenders may occasionally run product to Unalaska for processing. At the conclusion of the season, product is also brought to Unalaska for transshipment.

Groundfish Species

Although joint ventures harvest groundfish species, this section deals only with those portions of groundfish harvests which are both harvested and processed by U.S. industry. These operations are referred to as Domestic Annual Production (DAP).

DAP groundfish harvests have increased dramatically during the past four years. In 1984, total Bering Sea DAP groundfish production was 34,824 MT; in 1988, DAP groundfish production is projected to reach 792,520 MT. Although DAP includes production for the entire Bering Sea/Aleutian Islands area, most of the participating vessels operate from or through Unalaska.

Factory trawlers are the fastest growing, major component of the DAP groundfish fleet. The average crew size varies with the size of the factory trawler. The Alaska Factory Trawlers Association estimates a total 1988 crew complement of 1,240 people actively employed on a fleet of 31 vessels. This equates to an average of 40 crew per vessel.

The groundfish species currently targeted by DAP operations include pollock, Pacific cod, rock sole, and yellowfin sole and other flatfish in descending order of volume.

Halibut

As in the Kodiak area, halibut production takes place in a series of very short openings which last up to three days through the spring and summer. Most of the landed production in Unalaska comes from transient vessels which leave from and/or return to Unalaska.

Sablefish

The occurrence of a sablefish fishery in the Bering Sea/Aleutian Islands area is a recent development. The fishery is prosecuted both by longline vessels and trawlers. Longline vessels may operate out of Unalaska and bring their catch back to port for sale and processing. Trawl vessels generally harvest and process at sea, returning to Unalaska for reprovisioning and/or offloading. This is not a sizable fishery in terms of pounds harvested or landed.

7.2 Freight Industry

The extent of maritime shipping operations in Unalaska has been tied directly to the amount of seafood processed in, or delivered to, Unalaska. In the years immediately following the collapse of the king crab resource, the level of maritime freight activity (particularly domestic activity) decreased substantially. However, since the advent of DAP groundfish processing activity in 1985, the level of freight related traffic has increased -- and continues to increase -- substantially.

There are currently six domestic maritime shipping companies which service Unalaska: one is oceangoing, two are tug and barge operations, and three are domestic freighters.

The use of foreign tramp freighters has been extensive in Unalaska during the past several years. Foreign trampers are the only means, exclusive of the foreign processing vessel itself, of transporting joint venture processed seafood to the market. The destination of this product is always international because it is unlawful to import that product directly into the United States. Foreign trampers will often enter Unalaska before or after visiting the foreign joint venture processing vessel, to top off or augment their loads.

Approximately 250 foreign trampers call in Unalaska each year. The crew size averages 10 to 20, although some vessels have crews as large as 25 personnel. Most of these vessels dock at some point in time.

Like Kodiak, Unalaska operates as a transportation hub for the region. Barges regularly transport fish products and other cargo from outlying regions into Unalaska for transshipment to the Pacific Northwest or the Far East. Therefore, as EEZ fishery resources become fully utilized, the level of freight activity in Unalaska will also show an increase due to seafood processing activities in other communities.

7.3 Passenger Traffic

There are two types of activity associated with passenger traffic: tour ships and Alaska Marine Highway System vessels. The level of this type of activity has remained constant during the past few years.

The level of tour ship traffic into Unalaska has been relatively low and constant during the past few years. In both 1987 and 1988, one tour ship called in Unalaska three times each year while the other tour ship called three times in 1987, but only twice during 1988. That same vessel, during 1988, carried no passengers and only stopped in Unalaska for fuel. The crew/passenger complement on both vessels was approximately 160 persons. When possible the vessels tie up at the Ballyhoo Dock, but on occasion tie up at the American President Lines Dock. The length of stay for each vessel varies, but normally doesn't exceed 12 hours.

The Alaska Marine Highway System provides service to Unalaska with the M/V Tustumena four or five times per year. The vessel ties up at the Ballyhoo Dock. The vessel normally stays in port approximately 2 1/2 hours.

7.4 Other Maritime Users

For many foreign processing vessels and research vessels, Unalaska is a convenient port call for reprovisioning and/or shore leave. On the average, about 90 foreign processing and research vessels visit Unalaska. The crew and passenger size varies with the vessel. Generally, the total crew/passenger complement averages 50 to 100 people. However, at least two vessels which call in Unalaska, the Japanese processing vessel Manishima Maru and the Soviet processing vessel Sulak, have total crew/passenger complements of 300 people. While many of these vessels anchor, most dock at some point during their visit. The length of time each vessel stays in port varies; however, on the average each vessel stays for 2 to 3 days.

United States government vessels, including NOAA research vessels and Coast Guard vessels, often visit Unalaska.

ANTICIPATED MODIFICATIONS IN FUTURE VESSEL TRAFFIC PATTERNS IN UNALASKA

8.1 Commercial Fishing

As joint ventures are phased out during the next 3 to 4 years, Unalaska will experience profound increases in the level of vessel traffic directly related to commercial fishing. The existing joint venture fleet consists of approximately 105 fishing vessels and will have a total harvest during 1988 of approximately 1,200,000 MT.

Conversely, the existing U.S. groundfish DAP fleet in the Bering Sea consists of approximately 31 factory trawlers, 4 mothership processing vessels, and 35 harvesting vessels. In 1988, this fleet will harvest and process 792,520 MT of groundfish. In 1989, the U.S. factory trawl fleet is expected to increase by another 10 vessels, and an additional 10 vessels in 1990. U.S. mothership processing vessels are also expected to increase by 3 vessels in 1989 and 7 vessels in 1990. It is estimated that each U.S. groundfish mothership processing vessel requires the use of 6 U.S. harvesting vessels. The number of U.S. harvesting vessels are likewise expected to increase.

The anticipated changes in vessel traffic patterns as a result of the phase out of joint ventures is important. Currently, not a single pound of the 1,200,000 MT harvested by joint ventures during 1988 is delivered to Unalaska. Instead, the entire harvest is delivered to foreign processing ships. Therefore, the vessel traffic patterns experienced in Unalaska related to the joint venture component of the groundfish industry will alter as joint ventures decline.

Although a substantial portion of a fully utilized DAP groundfish harvest will be processed at sea by factory trawlers and motherships, a portion of the harvest will be delivered as raw product directly to processing plants in Unalaska. A large amount of the product processed at sea will either be offloaded in Unalaska for reprocessing and/or transshipment, or will pass through Unalaska as the processing vessel itself pays a port call for reprovisioning and shore leave. Therefore, we estimate a substantial increase in the level of fishing vessel activity in Unalaska.

The fishing industry in the Bering Sea is becoming increasingly integrated in terms of species prosecuted. As harvest levels for different species change, as the length of a season for a particular fishery alters, or as the value of different species increases or decreases, there is a corresponding change in the number

of vessels which participate in those fisheries. Most vessels involved in Bering Sea fisheries now emphasize maximum flexibility in order to adapt to a rapidly changing set of biological and economic conditions. As a result, it is reasonable to expect many of the new vessels to participate in most, if not all, fisheries as the domestic fleet increases.

Since pollock represents the largest single component of Bering Sea groundfish harvests (60%), future changes in pollock stock abundance play an important role in determining future changes in vessel traffic patterns. The possibility exists for a decline in pollock stocks due to removals from the Donut Hole. Because the interrelationship between Donut Hole pollock stocks and U.S. EEZ pollock stocks is not understood, the level of decline, if any, is currently not predictable. A decrease in pollock stocks would have a measurable impact on the level of pollock harvests, but it is unlikely it would have much initial impact in terms of numbers of participating vessels. Therefore, due to the number of new vessels already under construction and scheduled to enter the fishery, we estimate an increase in fishing vessel traffic regardless of minor decreases in harvest levels. A major decrease in harvest levels would compress the length of the pollock season, increase the harvesting pressure and subsequently compress the length of the season on other species, thereby modifying vessel traffic patterns so that they become more intense and pulse-like.

Otherwise, the status of all major Bering Sea groundfish stocks appears to be stable or declining slightly for all major stocks.

The health of traditional species, particularly crab species, is important when anticipating future changes in fishing vessel traffic patterns. Currently, C. opilio Tanner crab stocks are very healthy and sustain a 200 boat fishery which lasts for 6 months. It is likely these stocks will continue to represent stable fishing operations for the next few years. C. bairdi Tanner crab stocks appear to be rebuilding and there are repeated signs of major year classes emerging. These year classes should be available for harvest in three to four years. Should they survive to reach legal size, it is likely a major C. bairdi fishery could take place at that time during the early winter months. Red king crab stocks continue to be depressed. We do not anticipate a major increase in red king crab stocks during the next few years.

Because of the value of crab and the increased flexibility of the fishing fleet overall, we anticipate increases in the number of vessels which participate in these fisheries regardless of harvest levels.

In conclusion, we estimate the level of fishing vessel traffic through Unalaska during the next few years will double -- and possibly triple. This increase will be most notable in the case of factory trawlers which will probably begin to homeport out of Unalaska. Additionally, there will be increases in the number of harvesting and processing vessels which either homeport or operate through Unalaska.

8.2 Freight Industry

The City of Unalaska is in the process of procuring funding for a 800 foot extension of the Ballyhoo Dock. Once the expansion is completed, the Ballyhoo dock is intended to function as a support base for Bering Sea factory trawler operations. When this facility is operational, a substantial amount of additional seafood product will be delivered to Unalaska for transshipment. This, of its own, will result in a substantial increase in the level of maritime shipping activity in Unalaska. We anticipate sizable increases in seafood landings in Unalaska during the next few years, regardless of whether the Ballyhoo Dock extension takes place or not. These landings will further serve to increase the level of maritime freight activity.

The North Pacific Fishery Management Council recently endorsed a proposal encouraging foreign processing and transportation companies operating in the U.S. EEZ to make greater use of U.S. port facilities in the Bering Sea. It is expected this endorsement will result in an immediate increase in the use of Unalaska for port calls and reprovisioning by foreign trampers and foreign processing vessels.

As joint venture operations are phased out during the next few years, the use of foreign tramp freighters to move domestically processed seafood may decline. If the market destination is the Far East, transportation choices are limited: you can ship to the Pacific Northwest on a U.S. shipping company and then to the Orient; you can ship directly to the Orient in freezer/container vans on American President Lines, or; you can use foreign tramp freighters. Conversely, if the market destination of the product is domestic, the use of foreign trampers to move the product from Unalaska to a U.S. port is unlawful under the Jones' Act and can only be transported by U.S. vessels with U.S. bottoms. Therefore, market destination will play a significant role in determining the extent to which foreign trampers will continue to operate through Unalaska. Because of the many variables associated with this choice it is difficult to project the changes. However, any decline in foreign tramper activity will be offset by an increase in domestic activity.

8.3 Passenger Traffic

We do not anticipate any substantial change in the number of tour ship visits to Unalaska during the next few years. However, since these vessels have the capacity to carry large numbers of passengers and crew, any increase in the number of visits has a potential impact under Annex V.

The Alaska Marine Highway System has no plans to alter their current schedule to Kodiak or Unalaska in the immediate future. Therefore, we anticipate no change in this area.

8.4 Other Maritime Users

During the past year, allegations of illegal fishing in the U.S. EEZ coupled with concern over Donut Hole activities have resulted in demands for substantial increases in the level of U.S. Coast Guard patrols in the Bering Sea. Although Coast Guard funding is dependent upon political winds in Washington, D.C., we expect there will be an increase in the level of patrols. Many of these vessels will pay port calls to Unalaska.

The environmental and economic concerns relating to the Bering Sea in general and the Donut Hole in particular should continue to foster national and international research projects. The recent International Symposium in Sitka to discuss Donut Hole pollock stocks resulted in a commitment by all participating countries to endorse and commit to expanded research projects. As a result, we anticipate a further increase in the number of visits to Unalaska by vessels conducting research in the Bering Sea.

The recent endorsement by the North Pacific Fishery Management Council of a program to encourage foreign processing and transportation operations to pay port calls and reprovision in U.S. ports is expected to result in an increase in the number of visits to Unalaska by foreign processing and transportation operations during the next two years. However, as joint ventures are phased out during the next 3 to 4 years the number of foreign processing and transportation vessels operating in the Bering Sea should decline. Therefore, any increase in this area should be of short duration.

ANTICIPATED VOLUME AND TYPES OF GENERATED GARBAGE IN THE PORT OF KODIAK

9.1 Garbage Type

"The garbage in Kodiak is different from most garbage elsewhere," states Fred Nass of Kodiak Sanitation, the company which picks up Kodiak's refuse. The composition of the garbage reflects the fishing industry base of Kodiak's economy.

According to Nass, Kodiak's garbage contains large percentages of metal products, wood products in large sizes, petroleum containers, net and web, wooden spools held by poly and line, batteries, and gasoline. Waste oil is deposited in holding tanks, but gasoline (drained from outboards, etc.) sometimes finds its way into the dumpsters.

9.2 Historic

In 1975, Kodiak Sanitation was able to service Kodiak's garbage needs utilizing a 25 cubic yard front loader. At that time, the company picked up two or three loads a day, six days a week. In January 1976 the company purchased a 31 cubic yard truck and picked up one load a day. The company now makes an average of three to four loads a day using 31 cubic yard trucks.

Much of the increase in garbage is the result of a change in the way the population treats their garbage: "In 1975 a lot of stuff used to go to Smokey's (a private dump and wrecking yard) and a lot of people, including some retail stores and processors, were burning their waste. Since 1975 we've also expanded the area we serve," Nass said.

9.3 Garbage Units

Each person in the garbage chain, garbage makers, the harbormaster, Kodiak Sanitation garbage truck drivers and baler employees, use a different reference unit to describe the amount of garbage handled.

The individuals making garbage refer to "bags" -- usually thirty gallon Hefty bags, although occasionally a "bag" means an 8-gallon "kitchen bag."

The harbormaster's office refers to dumpster loads. All harbor dumpsters will hold 5 yards.

Kodiak Sanitation employees refer to "truck loads." The trucks compact the garbage. Garbage trucks hold 31 yards, or 16,000 pounds, of compacted garbage. This amounts to between 20 and 50 dumpster loads. The equivalent factor is dependent upon the type of material in the dumpster: paper goods are very compressible, while wood and metals do not compress well.

At the land fill site, the reference is to "bales." A bale is about 2.2 yards and weighs roughly 2,000 pounds.

To properly calculate the impact of increased garbage on the Kodiak system, it is necessary to follow the garbage down the "garbage chain" and convert the volume of a fisherman's garbage to the actual volume of the garbage after it is baled.

To accomplish this, the following equivalents and conversions were used:

Equivalents

a.) One gallon equals 231 cubic inches.

b.) One yard equals 46,656 cubic inches which equals 202 gallons.

Bag To Dumpster To Truck To Baler Equivalents

a.) 34 full thirty gallon garbage bags equals 1 five-yard dumpster load.

b.) Twenty to fifty, five-yard dumpster loads equals one 31 yard Kodiak Sanitation garbage truck load (depending on compressibility).

c.) One 31-yard Kodiak Sanitation garbage truck load equals seven to eight 2.2-yard bales.

Weights (Rounded)

a.) One bale equals 2,000 to 2,286 pounds.

b.) One yard in a garbage truck equals 516 pounds.

c.) One yard in a dumpster equals 64 to 180 pounds.

d.) One Kodiak Sanitation garbage truck load equals 16,000 pounds.

e.) One, five-yard dumpster load equals 320 to 800 pounds.

f.) One full thirty gallon garbage bag equals 10 to 27 pounds.

Volumes

a.) One bale equals 2.2 yards.

b.) One garbage truck load equals 31 yards.

c.) One harbor dumpster equals 5 yards.

d.) One yard equals 202 gallons which equals 6.7 full thirty gallon (large) garbage bags.

Volume Conversions

a.) .124 to .31 times dumpster volume equals Kodiak Sanitation garbage truck volume.

b.) .5 to .6 times Kodiak Sanitation garbage truck volume equals baler volume.

9.4 Baseline Data

To assess the impact of additional garbage being brought back to town by vessels instead of being dumped at sea, it is first necessary to look at the current amount of garbage generated on land by the fishing, cargo and other fleets using the Kodiak harbor.

To do this, current garbage collection at the small boat harbors and cargo piers was evaluated. While we assumed that the dumpsters are full when picked up, in actuality there are times when the dumpsters are overflowing and times when the dumpsters are not actually full. These two events should balance out. The results of our calculations (Table 6) show that up to 826 yards of garbage are picked up on a weekly basis. Approximately 98% of this amount was generated at dumpster facilities which are located immediately adjacent to

areas heavily used by fishermen. The remainder was generated at the cargo docks, which reflects the statements by the maritime shipping companies that they generally do not dispose of their garbage in Kodiak.

9.5 Garbage Generated By The Commercial Fishing Industry

The amount of refuse in the harbor area dumpsters increases dramatically just prior to a season opening. The increase is a combination of old garbage cleaned off the vessels, debris from repairs and maintenance work, and packing material from supplies and equipment brought onboard the vessels in preparation for leaving town. According to Fred Nass, Kodiak Sanitation, the increase in garbage is experienced at the beginning of the season as opposed to the end. Part of this, Nass felt, was because the crews cleaned the vessels out before going out, not on returning. Of course, part of the reason could also be that the vessels are disposing their garbage at sea.

The increase in refuse is usually evidenced by a sharp, one-day overflowing of the dumpsters, which results in increased pickups. For example, on June 20, 1988, the day of a halibut opening, Kodiak Sanitation made five trips to empty harbor dumpsters instead of the normal three -- a 40 percent increase. This is considered about normal for a season opening. Table 7 outlines season opening dates for Kodiak area fisheries and their impact upon garbage.

In order to determine the amount of refuse generated by fishing vessels operating out of Kodiak, the Kodiak Fishermen's Wives Club conducted a series of fishing vessel surveys. The preliminary results of the surveys indicate the number of garbage bags generated per week, converted to 30 gallon bags, ranges from one to four. Approximately 50% of the vessels reported generating one bag per week while the other 50% reported generating three bags per week. One vessel reported generating four bags per week.

There did not appear to be any correlation between the size of a vessel and the amount of generated refuse. Since most vessels participating in Kodiak area fisheries, with the exception of large longliners, carry three to four crew members regardless of the vessel size or fishery, there is no reason to expect a correlation. This would not apply to factory trawlers; however, there are no factory trawlers which regularly call in, or operate out of, Kodiak.

The difference in estimates may be a result in differences in the amount of goods taken aboard the vessels, errors in estimates, or confusion over the size of the garbage "bag." Some vessels specified "large Hefty Bags" while others specified "kitchen bags". Many simply said bags.

The larger pot and trawl vessels reported discarding at least some of their refuse at sea. Most of the salmon fleet reported burning much of their garbage on the beach. One salmon vessel reported giving his garbage to his tender. One vessel reported sorting out the plastics and bringing an eight gallon bag of plastics back to port every week, however it is not known if the bag was full.

Since trip times vary considerably, depending on vessel size, season opening length, area fished, and the price differential between tendered and over-the-dock purchases, it is not feasible to chart refuse at-sea any closer than seasonally.

For the purpose of our calculations, we assumed 2 thirty gallon bags per week are generated by all vessels. This equates to slightly less than 1/3 yard of garbage and is similar to that generated by a residence with three occupants. Table 8 calculates the amount of garbage generated by each fishery during the course of a year. According to our calculations, a total of 26,495 thirty gallon bags of garbage, or 3,955 yards, are estimated to be produced annually on the grounds by fishing vessels operating out of Kodiak. This figure represents the upper range of our estimate.

For the purpose of determining a lower range estimate of at sea garbage generated by the Kodiak fleet, we recognize that our calculations assume a full thirty gallon bag, which often may not be the case. The calculations also assume each vessel will participate in each fishery for the maximum number of days the fishery could be open. This, also, is not realistic. The total number of vessels we assumed to participate in Kodiak area fisheries for the upper estimate was 2,880. This figure is 30.5% greater than the 2,000 vessels which operate through Kodiak. Therefore, if we reduce the total of 3,955 yards by 30.5%, we arrive at a figure of 2,749 yards which can serve as a realistic lower range estimate of at sea garbage generated by the Kodiak fleet.

Our calculations establish the amount of at-sea refuse generated by the Kodiak fleet to be less than 4,000 yards per year. That amount is less than 10% of the garbage now deposited in the harbor, and less than 1% to 3% of the total garbage now handled in Kodiak. When viewing the difference between the amount of refuse generated by the fleet while in port versus the amount of refuse we assume is generated by the fleet while at sea, it must be remembered that the sharpest increase in refuse generation occurs on shore just prior to fishery openings. Even if our calculations are off by 100%, the amount of refuse generated at sea by the existing Kodiak fleet does not pose a substantial increase when viewed against aggregate refuse generation by the fleet when in port or when viewed against aggregate garbage generation in Kodiak overall.

9.6 Garbage Generated By Maritime Shipping Companies

None of the domestic common carriers which provide service to Kodiak offload their refuse in the community. The vessels involved either retain their refuse on board, burn or dump the refuse at sea, or return it to their home port in the Pacific Northwest. None of the companies interviewed plans to bring refuse ashore in Kodiak once Annex V goes into effect. They will either install incinerators on board or return their refuse to their home port.

It is difficult to ascertain what foreign tramp freighters currently do with their refuse and what they plan to do with it in the future. However, for the purpose of anticipating a reasonable worst case scenario, we can assume all of the foreign tramp freighters that visit Kodiak will offload their refuse. The number of foreign tramp freighter visits to Kodiak averages between 12 and 15 per year. We assume an average crew size of 20 members per vessel. If each vessel is two weeks en route to Unalaska, then each vessel generates approximately 20 Hefty garbage bags, or 3 yards, en route. That figure multiplied by 15 vessels per year equates to 300 Hefty garbage bags or 45 yards of additional refuse per year.

9.7 Garbage Generated by Passenger Vessels

It is unknown how much refuse is generated by each tour ship which stops in Kodiak. The Coast Guard estimates that each person generates 1 kilo, or 2.5 pounds, of garbage per day.

The largest tour ship which visits Kodiak has a combined crew/passenger complement of 1,000 people. If the vessel is en route for five days since its last stop and generates 2.5 pounds of refuse per person per day, a total of 12,500 pounds of refuse is generated. This equates to 24.2 "garbage truck" yards of refuse, or 15 to 39 yards of refuse.

The other tour ship which has visited Kodiak, has a crew/passenger complement of 125 people. If that vessel is in route for five days since its last stop and generates 2.5 pounds of refuse per person per day, a total of 1,563 pounds of refuse is generated. This equates to 3 "garbage truck" yards of refuse, or 2 to 5 yards of refuse.

If we assume, 1.) no change in the passenger traffic, 2.) each vessel offloads its refuse in Kodiak for disposal, 3.) the smaller vessel visits twice and the larger vessel visits twice, or 4.) the large vessel visits four times,

then it is reasonable to assume an additional 88 to 156 yards of refuse could be generated each year.

9.8 Garbage Generated by Other Maritime Users

This spring a Japanese research vessel visited Kodiak. During its trip from Japan it made no stops until it reached Kodiak. In Kodiak, the vessel unloaded all its garbage. Nass estimated he picked up 10 to 11 "garbage truck" yards of refuse, or 9 to 22 yards of refuse.

Not all research vessels stopping in Kodiak unload their garbage. NOAA vessels which visit Kodiak always dock at the Coast Guard base and dispose of their garbage at that location.

If we assume no change in the level of this type of maritime traffic (3 to 4 vessels each year), and each vessel offloads its refuse in Kodiak for disposal, it is reasonable to assume an additional 27 to 88 yards of refuse could be generated each year.

Table 6

NORMAL KODIAK PORT AND HARBOR REFUSE PICK UP IN FIVE-YARD DUMPSTER LOADS

Location	Number of Dumpsters	Times Dumped/Wk.	Dumpster Loads/Wk.	Total Yds/Wk.	Total Yds/Day
Shelikof Street	3	21	63	315	45
Harbor Area	2	21	42	210	30
Harbor Office	1	21	21	105	15
Grid Area	1	21	21	105	15
St. Herman Harbor	1	10	10	50	7
Transient Float	1	2-3	2-3	10 to 15	1.4 to 2.1
Dock II	1	3-4	3-4	15 to 20	2.1 to 2.9
Launching Ramp	1	2-3	2-3	10 to 15	1.4 to 2.1
City Dock	1	1	1	5	.7
		Total		826 to 642	118 to 106

Source: Kodiak Sanitation, Fred Nass

Table 7

FREQUENCY OF KODIAK AREA SEASON OPENINGS RESULTING IN INCREASED REFUSE

	Season	Date	Comments
Tanner Crab	Jan. 15		Increase is spread over several weeks as vessels start moving pots well before the season.
Herring boats	April		Increase spread over week or more as not all the leave at the same time.
Salmon refuse. If closures, then a major increase in This may occur anywhere during a summer.	June - Sept.		First June opening results in major increase in the season has any major dumpster use is experienced. from 0 to 4-6 times
Dungeness period. salmon openings. No refuse.	May-Dec.		Vessels wander out to the grounds over a long time Many pull Dungeness pots between major increase in
Black Cod time, earlier in the year and there is increase in refuse.	April		Though longline vessels leave at about the same major work has been done little noticeable
Halibut year, three days a year.	Varies		The entire fleet leaves at the same time, 2 to 3 times a resulting in a refuse increase two or
Trawl forms part	Jan-Dec.		The trawl fleet works fairly steady and its refuse of the general daily accumulation.
Miscellaneous increase and their refuse routine daily accumulation.	Jan-Dec.		This includes skiffs, pleasure and charter boats, etc. There is no discernable seasonal forms part of the
Cargo Vessels unloading	Jan-Dec.		Domestic cargo carriers serving Kodiak are not refuse in the port.

Table 8

DOCUMENTABLE VESSEL TRIP TIMES, SEASONS LENGTHS AND ESTIMATED AT-SEA REFUSE IN KODIAK

Type of Fishery	Number of Crew	Number of Vessels	Length of Season (Days)	Yards of Refuse Generated Per Day[1]	Total Yards of Refuse Generated Per Year[2]
Tanner Crab[3]	4	200	21	0.90	18.8
Herring Seine	3	42	54	1.73	93.3
Herring Gillnet	2	57	54	1.15	62.2
Salmon Seine	4	376	119	5.07	603.9
Salmon Tenders	2	40	119	2.54	301.9
Dungeness Crab	4	45	119	5.07	603.9
Sablefish	6	250	63	4.03	253.9
Halibut[4]	6	1,800	4	0.26	1.0
Longline Groundfish	4	30	175	7.46	1,306.0
Shorebased Trawl	4	40	129	5.50	709.6
UPPER ESTIMATE TOTAL			2,880	33.71	3,954.5
LOWER ESTIMATE TOTAL[5]			2,000	23.42	2,748.4

[1] Calculated by converting season length to weeks, times the number of crew, times .5 (the amount of garbage bags generated per person per week, divided by 6.7 (the conversion factor for garbage bags to garbage yards.

[2] Calculated by multiplying Yards of Refuse Generated Per Day times the length of the season.

[3] Average crew size is smaller in the Gulf of Alaska than in the Bering Sea.

[4] Crew size varies wildly. This reflects assumed overall average.

[5] The Lower Estimate is based on a reduction of 30.5%, which reflects the difference between aggregate participating vessels of 2,880 used in these calculations and the 2,000 vessels total vessels which operate through Kodiak.

ANTICIPATED VOLUME AND TYPES OF GENERATED GARBAGE IN UNALASKA

10.1 Garbage Type

There are two dumpsters located at the city's public docks. Other dumpsters are located in various areas throughout the community, but these reflect a combination of various users such as processing plants, etc. As a result, it is difficult to determine the specific types of refuse being generated by the fishing fleet since many of them offload at the processing plants and their refuse is subsequently intermingled with the processing plant's garbage. It can reasonably be assumed the composition of garbage in Unalaska reflects the same composition found in Kodiak.

10.2 Historic

Unalaska's refuse is deposited in the municipal landfill. The landfill is located next to the ocean, approximately one mile from town and one mile from any development. Prior to 1988, a D-6 cat was used to push the garbage into heaps and to cover the garbage. This year the municipality added a compactor (like a large roller). When the compactor was initially applied to sections of the landfill which were already covered, the height of the landfill dropped as much as five feet in some areas.

The Unalaska landfill was initially expected to last until the year 2000. That estimate was subsequently revised and, prior to Annex V, the landfill was expected to last until sometime between 1993 and 1998 at current use rates. Any increase in garbage will shorten the life span of the landfill.

The amount of garbage coming into the landfill recently has been increasing "at an alarming rate," according to Public Works Director Dean Day. He was unable to identify the cause of the garbage increase, but noted that activity in Unalaska's processing plants has been picking up steadily.

According to Day there do not appear to be any other sites on the island suitable for a landfill. The City of Unalaska may have to burn its waste, providing it can afford an incineration system which complies with state and federal regulations.

10.3 Garbage Units

Although there are some handling differences between Kodiak and Unalaska, we assume the same equivalent factors developed for Kodiak in Section 9.3 apply to Unalaska for the purpose of our calculations.

10.4 Baseline Data

According to Holmes, his firm carries 3,000 to 3,800 yards of garbage to the landfill monthly. About 3,000 yards are carried in open top trucks and the remaining 180 yards is carried in a compactor. The compaction ratio is 4:1; therefore, the compactor load equates to about 720 yards of uncompacted refuse. Thus, the total amount of refuse carried by Williwaw Sanitation each month is 3,720 yards to 4,520 yards, or 44,640 yards to 54,240 yards per year.

Approximately 152 yards of the total garbage carried each month by Williwaw Sanitation is refuse generated by the two dumpsters located at the small boat harbor and the Ballyhoo Dock.

One 55-yard dumpster is located by the municipal ship dock and a second 55-yard dumpster is located by the municipal small boat harbor. There are also dumpsters at the processing plants and by the private docks. Some are emptied by the municipal garbage service and others by the private owners.

Because the docks in Unalaska are spread out and the fleet is basically non-resident, fishing vessels delivering to local processors often moor at the processing plant docks and use the plant dumpsters. (This is in contrast to the Port of Kodiak where vessels tend to unload product at the processing dock, move to the boat harbor for moorage and perform vessel clean up while in the boat harbor.) Each vessel is responsible for moving its refuse from the boat to a receptacle on shore.

At the two municipal docks, the dumpsters are emptied on a regular schedule by Williwaw Sanitation, although they may be emptied more frequently if requested by the Harbormaster. The same is true of the processing plants and private docks which have contracted for garbage pickup service.

Since Unalaska has a number of private docks and does not have mandatory garbage pick up, baseline data on the current amount of refuse generated at the port and within the town is difficult to assess with any degree of accuracy. It should be noted that the 3,720 to 4,520 total yards of garbage carried to the landfill monthly by Williwaw Sanitation does not include garbage carried to the landfill by private users who dispose of their garbage themselves.

10.5 Garbage Generated By The Commercial Fishing Industry

Unlike Kodiak, where most of the refuse is generated by resident fishing vessels making short trips to the fishing grounds and back to the harbor, Unalaska serves a non-resident fishing fleet. Many of these vessels only use the port at the beginning and at the end of a fishing season. This includes a number of large vessels with a dozen or more people onboard, such as catcher/processors, floating processors, and factory trawlers.

A rough estimate of the potential refuse from the harvesting and catcher/processor component of the crab fleet can be made as follows:

a.) Assume that none of the fishing fleet is currently bringing refuse onshore.

b.) Assume all fishing vessels will bring their refuse onshore in the future.

c.) Estimate two weeks en route to Unalaska and six weeks on the fishing grounds for the 180 harvesting vessels and 20 catcher/ processors which make up the fleet. (This covers C. bairdi and red king crab -- the time on the C. opilio grounds is considerably longer, but most vessels deliver to motherships.)

d.) Assume 2 thirty gallon bags per week per harvesting vessel and 6 thirty gallon bags per week per catcher/processor.

e.) Eight weeks times 180 vessels times two bags equals 2,880 thirty gallon bags plus eight weeks times 20 catcher/processors times six bags equals 960 thirty gallon bags, or an additional 573 yards combined over a two month period or 287 yards per month.

This would represent a 6 to 8% increase in the amount of total Unalaska garbage hauled by Williwaw Sanitation during a one month period.

The longline fleet which operates in the Bering Sea is smaller overall than the crab fleet, although some segments of the crab fleet also participate in longline fisheries on occasion. The crew size of the longline fleet is very similar to the crew size of the crab fleet, except that most longline catcher/processors use approximately the same size crew as a harvesting-only vessel.

Bob Alverson, Executive Director of the Fishing Vessel Owners Association, a longline industry association, estimates that there will be 15 to 17 longline

catcher/processors which will operate in the Bering Sea during 1989. Although the longline fleet consists of harvesting-only vessels as well, we have chosen to calculate the amount of anticipated refuse from the catcher/processor segment of the industry because of the short halibut seasons and the logistical requirements necessary for vessels to regularly participate in longline fisheries in the Bering Sea.

A rough estimate of the potential refuse from the catcher/processor component of the longline fleet can be made as follows:

a.) Assume that none of the fleet is currently bringing refuse onshore.

b.) Assume all vessels will bring their refuse onshore in the future.

c.) Estimate two weeks en route to Unalaska and 26 weeks on the fishing grounds for the 17 catcher/processors which make up the fleet

d.) Assume 2 thirty gallon bags per week per vessel.

e.) Twenty eight weeks times 17 vessels times two bags equals 952 thirty gallon bags, or an additional 142 yards over a seven month period or 20 yards per month.

This would represent a nominal increase in the amount of total Unalaska garbage hauled by Williwaw Sanitation on a monthly basis. However, the total amount of refuse generated by the longline fleet will certainly be greater than the above estimate since the harvesting-only component of the longline fleet will generate and deliver refuse to Unalaska. Nevertheless, the amount of total refuse generated by the longline segment of the industry should not be substantially greater than that calculated above.

However, the U.S. harvesting fleet, in terms of refuse generation, is the least significant component of the fishing industry fleet utilizing Unalaska's dock private and municipal port facilities. Factory trawlers and motherships have the potential to generate considerable garbage which, if not burned at sea, would be returned to Unalaska for disposal.

The crew size for a factory trawler varies considerably based upon the size of the vessel, but currently averages 40 people. The length of time a factory trawler stays at sea also varies, but averages 6 weeks. We can then assume that the average vessel generates 20 thirty gallon bags of refuse per week (not including packing or other material related to processing) for a total of 120

thirty gallon bags per voyage, or 18 yards per factory trawler per voyage. In June of 1988, 11 factory trawlers used the Ballyhoo Dock. Under this formula they would have generated 190 yards of refuse which would have been deposited at the dock for disposal. This would have amounted to an 4 to 5% increase in the monthly amount of refuse handled by Williwaw Sanitation during that month.

The Alaska Factory Trawler Association estimates the factory trawler fleet will number 50 vessels by 1990, an increase of 19 vessels since 1988. Many of the new vessels will be larger than the existing fleet and carry crews of 75 or more personnel. Because of the close proximity of Unalaska to the fishing grounds and infrastructure support facilities availability, we expect 30% of the factory trawler fleet will visit once per year to Unalaska, and at least 70% of the fleet will pay between two and six visits per year.

By using the above assumptions regarding length of voyage and slightly increasing the average crew size to 50 personnel to reflect the larger vessels, a fleet of 50 factory trawlers would generate between 1,903 yards (if 70% of the vessels only visit twice) and 5,037 yards (if 70% of the vessels visit six times) of refuse for disposal in Unalaska each year (See Table 9).

If factory trawler activity was evenly distributed throughout the year, a range of 159 yards to 420 yards of refuse would be generated for disposal each month. This would represent an increase of 4% to 11% in the amount of refuse handled by Williwaw Sanitation each month. However, factory trawler activity is not evenly distributed throughout the year. Vessel traffic patterns are changing and fisheries are becoming more intense in terms of length of a particular fishery. Therefore, it is reasonable to assume periods of low factory trawler refuse generation followed by periods of high factory trawler refuse generation.

The factory trawler estimate above **does not** include any accounting for packaging and other processing materials, or any factory waste. Unless the vessels are equipped to burn their refuse, these estimates are low.

The mothership processing fleet is another fleet component which could impact Unalaska as a result of Annex V. It is estimated there will be 10 groundfish mothership vessels operating by 1990. The crew size for these vessels varies, but averages approximately 125 personnel. At least 4 of these vessels will be homeported in Kodiak and Homer; therefore, we do not expect they will visit Unalaska more frequently than once per year. It is unknown where the other vessels will homeport, or the frequency of their potential visits to Unalaska.

In addition to the ten groundfish mothership vessels, there are numerous other motherships which service the crab fleet (particularly the C. opilio fleet) and the Bristol Bay salmon fleet. Many of these vessels, particularly those providing service to the C. opilio fleet, will stop in Unalaska for reprovisioning, shore leave and/or transshipment.

If we assume 20 mothership vessels with an average crew of 125 personnel will visit Unalaska at least once during the year in 1990, and each vessel spends 10 weeks at sea, the total refuse generated for disposal in Unalaska would be 1,870 yards per year.

As was the case with the factory trawler estimate, the mothership estimate **does not** include any accounting for packaging and other processing materials, or any factory waste. Additionally, the average groundfish mothership uses 6 harvesting-only vessels when on the fishing grounds. It is reasonable to assume the mothership would receive the refuse generated by these vessels. Unless the motherships are equipped to burn their refuse, the above estimates are low.

10.6 Garbage Generated By Maritime Shipping Companies

None of the domestic common carriers which provide service to Unalaska offload their refuse in the community. The vessels involved either retain their refuse on board, burn or dump it at sea, return it to their home port in the Pacific Northwest or, in the case of American President Lines oceangoing container vessels, carry it with them to the Far East. None of the companies interviewed plans to bring refuse ashore in Unalaska once Annex V goes into effect. They will either install incinerators on board or return their refuse to their home port.

It is difficult to ascertain what foreign tramp freighters currently do with their refuse and what they plan to do with it in the future. Clearly, not all of the foreign tramp freighters currently paying port calls to Unalaska offload their refuse in the community. The Japanese and the Soviets, for instance, reportedly have incinerators on board and burn their refuse.

For the purpose of anticipating a reasonable worst case scenario, we have made the following calculations:

a.) Assume 50% of the foreign tramp freighter fleet will offload their refuse in Unalaska.

b.) The number of visits by this component to Unalaska has averaged approximately 250 vessels per year for the past few years.

c.) Average crew size is 20 members per vessel.

d.) Each vessel is two weeks en route to Unalaska.

e.) Each vessel will generate approximately 20 Hefty garbage bags, or 3 yards, en route, times 125 vessels equals 2,500 Hefty garbage bags or 373 yards of refuse per year.

10.7 Garbage Generated by Passenger Vessels

The Alaska Marine Highway System reports they retain their refuse on board and do not offload it in Unalaska. The AMHS anticipates no change in their procedures.

Based upon comments from the AMHS that they do not unload their refuse in Unalaska, it can safely be assumed that the 55 yards of refuse generated at the time of the tour ship visit to and the AMHS stop in Unalaska earlier this year was generated by the tour ship. We do not anticipate any substantial change in the number of tour ship visits to Unalaska in the near future. Therefore, we assume approximately 55 yards per year may be generated by this component of the maritime industry.

10.8 Garbage Generated by Other Maritime Users

The fleet components of this segment of the industry include foreign and domestic government research vessels, foreign processing vessels, and foreign fishing vessels. We will assume that none of them have incinerators. The following chart outlines the number of vessels by type, nationality, crew size, and frequency of call to Unalaska:

Nationality	Type	Crew Size	Number of Visits
American	Research	20 to 50	4
Japanese	Research	25 to 50	15
Soviet	Research	50 to 100	12
British	Research	20	1
Korean	Processing	100	15
Japanese	Processing	100 to 200	15
Soviet	Processing	300	3

If we assume the number of visits remains constant, and the average length of time at sea prior to arriving in Unalaska is six weeks, then an average of 2,229 to 3,426 yards of refuse could be generated by this fleet for disposal in Unalaska (see Table 10).

Table 9

LOW ETIMATE OF POTENTIAL FACTORY TRAWLER ANNUAL GENERATED REFUSE IN UNALASKA AS A RESULT OF ANNEX V

Number of Factory Trawlers	Average Number of Employees	Length of Voyage (Weeks)	Number of Visits to Unalaska	Yards of Refuse Generated Per Week	Yards of Refuse Generated Per Voyage	Total Yards of Refuse Generated Per Year
15	50	6	1	56	336	336
35	50	6	2	131	784	1,567
				TOTAL[1]	1,119	1,903

HIGH ESTIMATE OF POTENTIAL FACTORY TRAWLER ANNUAL GENERATED REFUSE IN UNALASKA AS A RESULT OF ANNEX V

Number of Factory Trawlers	Average Number of Employees	Length of Voyage (Weeks)	Number of Visits to Unalaska	Yards of Refuse Generated Per Week	Yards of Refuse Generated Per Voyage	Total Yards of Refuse Generated Per Year
15	50	6	1	56	336	336
35	50	6	6	131	784	4,701
				TOTAL[1]	1,119	5,037

[1] The estimate above **does not** include any accounting for packaging and other processing materials, or any factory waste. Unless the vessels are equipped to burn their refuse, this is an underestimate.

Table 10

LOW ESTIMATE OF POTENTIAL REFUSE GENERATED BY OTHER MARITIME USERS IN UNALASKA AS A RESULT OF ANNEX V

Type of Vessel	Number of Employees	Average Length of Voyage (Weeks)	Number of Visits to Unalaska	Yards of Refuse Generated Per Week	Yards of Refuse of Generated Per Voyage	Total Yards Refuse Generated Per Year
Research						
American	20	6	4	1.49	9	36
Japanese	25	6	15	1.87	11	168
Soviet	50	6	12	3.73	22	269
British	20	6	1	1.49	9	9
Processing						
Korean	100	6	15	7.46	45	672
Japanese	100	6	15	7.46	45	672
Soviet	300	6	3	22.39	134	403
				TOTAL	275	2,228

HIGH ESTIMATE OF POTENTIAL REFUSE GENERATED BY OTHER MARITIME USERS IN UNALASKA AS A RESULT OF ANNEX V

Type of Vessel	Number of Employees	Average Length of Voyage (Weeks)	Number of Visits to Unalaska	Yards of Refuse Generated Per Week	Yards of Refuse of Generated Per Voyage	Total Yards Refuse Generated Per Year
Research						
American	50	6	4	3.73	22	90
Japanese	50	6	15	3.73	22	336
Soviet	100	6	12	7.46	45	537
British	20	6	1	1.49	9	9
Processing						
Korean	100	6	15	7.46	45	672
apanese	200	6	15	14.93	90	1,343
Soviet	300	6	3	22.39	134	403
				TOTAL	367	3,390

CONCLUSIONS

11.1 Kodiak

We estimate the total annual amount of refuse, which could reasonably be expected to result from the implementation of Annex V, to range between 2,749 yards on the low end to 4,424 yards on the high end (see Table 11).

We do not expect substantial modifications in the composition or operation of the Kodiak fishing fleet, the maritime freight companies which service Kodiak, or the passenger and other maritime user groups. Therefore, based upon our calculations of the total amount of garbage generated at sea by the maritime industry operating from or through Kodiak, we estimate the impact of Annex V to reflect a nominal increase overall in total garbage generation in Kodiak.

Kodiak's landfill has an estimated lifetime of 20 to 30 years. The anticipated increase in volume as a result of the implementation of MARPOL, Annex V, appears negligible when compared to existing solid waste volumes, and when examined in light of Kodiak's resident-type fishing fleet.

11.2 Unalaska

We estimate the total annual amount of refuse, which could reasonably be expected to result from the implementation of Annex V, to range between 7,114 yards on the low end to 11,440 yards on the high end (see Table 12). This represents a possible increase of 13% to 26% in the amount of garbage hauled annually (44,640 to 54,240 yards) by Williwaw Sanitation.

The largest portion of the refuse increase comes from the U.S. seafood industry, particularly the factory trawler component of the fleet. The potential generated refuse figures could easily be low. There are a number of variables involved, such as the absence in our calculations of packaging and other processing materials, which could increase the amount of generated refuse substantially beyond our estimates.

There are other factors, aside from the amount of potential refuse generated, which will prove to be of great importance in the future, such as vessel traffic patterns. If the industry experiences increasingly compressed seasons, vessel traffic will periodically intensify. This could strain refuse removal and handling services to the breaking point.

When first designed, Unalaska's landfill had a projected lifetime of 16 years (until the year 2000). This projection assumed good operating procedures and a yearly waste impact of 3,700 tons, which was the city's waste generation rates during the period 1981 through 1983. Recent estimates place that waste generation rate at greater than 9,000 tons per year.

The implementation of MARPOL will increase that rate substantially.

Unalaska's landfill, without MARPOL, has recently been estimated to have a life span of three to five years. With the advent of Annex V and the tremendous growth being experience in Unalaska as a result of the Americanization of the seafood industry, Unalaska's landfill may be completely full by mid-1990. Therefore, Unalaska appears to be incapable of handling MARPOL generated wastes when one considers the time necessary to design, fund, and construct a future solid waste disposal facility.

The nature of any future solid waste disposal facility also raises questions. Suitable locations for another sanitary landfill simply may not be available in the area. Incineration or compacting for hauling to another area certainly warrants additional detailed study.

Table 11

TOTAL AMOUNT OF ADDITIONAL REFUSE ANTICIPATED TO BE GENERATED ANNUALLY IN THE PORT OF KODIAK AS A RESULT OF ANNEX V

	Anticipated Additional Annual Refuse	
Maritime Component	Number of Yards Low	Number of Yards High
Commercial Fishing	2,749	3,955
Domestic Shipping Companies	0	0
Foreign Trampers	45	45
Tour Ships	88	156
Other Maritime Users	27	88
TOTAL	2,909	4,244

Table 12

TOTAL AMOUNT OF ADDITIONAL REFUSE ANTICIPATED TO BE GENERATED ANNUALLY IN THE PORT OF UNALASKA AS A RESULT OF ANNEX V

Maritime Component	Anticipated Additional Annual Refuse: Number of Yards Low	Anticipated Additional Annual Refuse: Number of Yards High
Domestic Crab Fleet	573	573
Domestic Longline Fleet	142	142
Domestic Factory Trawl Fleet	1,903	5,037
Domestic Mother Ships	1,870	1,870
Domestic Shiiping Companies	0	0
Foreign Trampers	373	373
Tour Ships	55	55
Other Maritime Users	2,228	3,390
TOTAL	7,144	11,440

RECOMMENDATIONS

12.1 KODIAK

- The Kodiak fishing fleet should encourage use of on-board garbage compactors. Fishing organizations should promote compactor use, seek bulk discounts for quantity purchases, and generate public interest in other boat user groups.

- The Borough should monitor the quantity and type of solid waste disposed at dockside and record any problems in handling or disposal of MARPOL generated waste.

- The City should consider user fees for MARPOL generated waste that reflects actual costs of handling and disposal.

12.2 UNALASKA

- The City landfill operators should begin immediate measures to compact and place solid waste in the greatest possible efficiency.

- The City should begin immediately engineering and feasibility studies for future solid waste disposal facilities.

- After these studies have defined the capital and operational costs, the City can pursue funding for the needed improvements. Two possible alternatives for funding are the Department of Environmental Conservation's 50 percent matching grants program and the Alaska Clean Water Fund. (If the statute is amended to allow funding of solid waste projects.)

- The City should begin to closely examine the volume and type of solid waste disposal at dockside for all those using the municipal landfill. Specifically, the BTU and moisture contents of solid waste should be evaluated for the feasibility of incinerator use. Also, the compactability of solid waste should be evaluated.

- The City should request a state municipal grant if funding is needed to improve the solid waste facility.

12.3 SOUTHEAST ALASKA

- The Southeast Mayor's Conference should consider requesting funding for a regional feasibility study to examine approaches to solid waste disposal issues on a regional basis.

12.4 STATE OF ALASKA

- The Alaska Department of Environmental Conservation should give appropriate priority to municipal requests for funding for solid waste disposal engineering studies and construction projects necessary to meet the needs generated by the MARPOL initiative, through grant or loan programs.

- The Alaska Department of Environmental Conservation should encourage the communities in Southwestern and Southeastern Alaska whose solid waste facilities would be impacted by MARPOL restrictions to explore regional solutions.

- The State should consider seeking legislative authority to provide loans for solid waste facilities from the Alaska revolving loan fund for water and sewer projects, to provide a funding mechanism that is ultimately paid through user fees.

12.4 GENERAL

Further MARPOL studies should concentrate on:

- Impacts to other Southwestern and Southeast Alaska communities from MARPOL generated waste.

- Alternative solid waste disposal systems for Unalaska, including incinerator with heat recovery.

- Regionally based, solid waste disposal facilities which could serve many Southwestern and Southeast Alaska coastal communities.

Vessels should be encouraged to increase efforts in waste reduction, recycling; reuse, source separation, compacting and incineration at sea so shorebased disposal operations will be simplified.