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7/5/77



**REPORT OF THE
COMPTROLLER GENERAL
OF THE UNITED STATES**

**Total Costs Resulting
From Two Major Oil Spills**

**U.S. Coast Guard
Department of Transportation**

In February 1976 a barge sank in the lower Chesapeake Bay spilling 250,000 gallons of oil. This spill caused about \$1.3 million in damages, losses, and cleanup expenses. In December 1976 the Argo Merchant ran aground and later sank off the coast of Massachusetts spilling 7.5 million gallons of oil. Estimated total cost of this spill was \$5.2 million, including an estimated \$2.4 million of oil spilled.

Monetary value could not be placed on certain aspects of the environment affected by the spills. In addition, the long-term environmental effects have not been determined.



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-146333

The Honorable Leo J. Ryan
Chairman, Subcommittee on Environment,
Energy, and Natural Resources
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

We have reviewed the costs associated with two oil spills that occurred during 1976 resulting from the sinking of a Steuart Transportation Company barge (STC-101) in the lower Chesapeake Bay in February and the sinking of the Argo Merchant off the coast of Massachusetts in December. We made our review pursuant to your request of February 8, 1977.

For both spills, we reviewed costs incurred for clean-up, containment, and disposal operations and damages to the environment resulting from the spills. The monetary value could not be determined for some environmental damages. We have included comments on such damages, where possible, even though the total costs have not been determined.

The spills were alike in only two ways: both vessels had a cargo of No. 6 industrial oil and both vessels sank during inclement weather. The magnitude of the spills, environmental effects, and total cost per gallon spilled differed. The impact of the spills upon marine life and long-term environmental effects have not been determined. The following schedule compares the spills.

<u>Area of comparison</u>	<u>Argo Merchant</u>	<u>STC-101</u>
Cargo	No. 6 oil	No. 6 oil
Size of spill	7,500,000 gals.	250,000 gals.
Shoreline contaminated	-	27 miles
Waterfowl killed	540 (estimated)	31,000 (estimated)
Cost (note a) per gallon of spill	\$0.37	\$4.96
Location of spill	Atlantic Ocean	Chesapeake Bay

a/The cost includes identifiable costs relating to oil spill cleanup and the oil's effect on the environment.

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The difference in the cost per gallon for these spills is primarily due to the area where the spills occurred. The Chesapeake Bay spill occurred in a relatively land-locked area with a large population of migratory waterfowl. The majority of the costs attributed to this spill was for shoreline cleanup and for the estimated value of the birds killed by the oil. The Argo Merchant spill occurred on the open sea; the oil drifted away from coastal areas, and virtually no cleanup costs were incurred. The majority of the costs resulting from this spill was for contractor standby for (1) salvage or potential beach cleanup, (2) surveillance and monitoring of the spill, and (3) analyses of the spill's effect on the environment.

The Federal Water Pollution Control Act, as amended in 1972 (Public Law 92-500), established an oil pollution fund which is administered by the Coast Guard. The fund provides a source of financing for the Government (or its agent) to contain and remove oil from the navigable waters and the contiguous zone of the United States when the discharger is unknown or does not take proper removal action. Expenditures from the fund are to be reimbursed within certain limits by the responsible party, if the party can be identified. Costs which may be reimbursed from the fund include those associated with removal activities, such as travel costs for responding personnel, overtime costs, costs for contractors hired to clean up the pollutant, and supplies and equipment used in cleanup operations. Other costs, such as scientific research and analysis, waterfowl losses, and environmental damages cannot be reimbursed from the fund.

The following sections summarize the total costs associated with both spills and the amount allocated and disbursed from the pollution fund. Details of the cost data are shown in appendixes I, III, IV, V, and VII.

STC-101 (CHESAPEAKE BAY) SPILL

The STC-101 barge sank about 4 miles offshore in the Chesapeake Bay near the mouth of the Potomac River on February 2, 1976. Costs associated with this spill were estimated at over \$1.3 million as shown in the following schedule and in more detail in appendix I.

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	<u>Amount</u>
Costs incurred by:	
Coast Guard	\$ 490,959
Other Federal agencies	18,916
State agencies	36,465
Local government	7,071
Private organizations	10,409
Cleanup costs incurred by spiller	39,916
Individual damage claims	<u>4,804</u>
	608,540
Estimated value of waterfowl killed by oil	<u>635,325</u>
	1,243,865
Estimated value of oil spilled	<u>78,750</u>
Total	<u>a/\$1,322,615</u>

a/Appendix II discusses the oil spill effects for which no monetary value can be estimated.

The value of the waterfowl killed in the spill was an estimate made by the Commonwealth of Virginia based on a combination of the fair market value and the replacement costs of the birds killed by oil. The number and species of the waterfowl were based on a count of the dead birds factored to compensate for birds which were killed but could not be counted (i.e., birds that did not wash ashore, birds eaten by predators, and birds that washed or crawled into inaccessible areas). Details of the bird kill are included as appendix III.

The estimated costs incurred by the Coast Guard and others totaled \$608,540 and were for (1) cleanup and disposal of the oil--\$524,229; (2) surveillance of the spill--\$30,741; (3) evaluation of the impact of the spill on the environment--\$18,978; (4) waterfowl rehabilitation, bird cleanup, and counting birds killed by the oil--\$29,388; and (5) laboratory tests and damage claims--\$5,204.

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A study by the University of Georgia and Louisiana State University estimated the societal value ^{1/} of coastal wetlands in general at \$50,000 to \$80,000 per acre. However, the full extent of environmental impact on the wetlands of the Chesapeake Bay shore contaminated by oil is unknown. A possibility exists that damage has been done to smaller life forms and oyster populations. The long-term effect on bird and fish populations will not be known for several years. The Fish and Wildlife Service, Department of the Interior, and the Virginia Institute of Marine Sciences did not believe any loss of fish or damage to the fisheries in the Bay occurred because of the spill.

Costs of \$401,191 for containment and cleanup have been reimbursed from the pollution fund as a result of this spill. Appendix IV provides details of the amounts and the agencies which received reimbursement.

During our review no recovery had been made of costs incurred as a result of this spill; Steuart Transportation has denied any responsibility. The Department of Justice has filed a lawsuit against Steuart Transportation to recover about \$487,000 for costs incurred in the Federal cleanup operations and \$1 million for loss of waterfowl. In addition, the Commonwealth of Virginia has a suit pending against Steuart Transportation for \$731,500 which includes the estimated value of the waterfowl killed by the oil spill. The merits of these cases have not yet been determined.

ARGO MERCHANT SPILL

The Argo Merchant ran aground 27 miles offshore of Nantucket Island on December 15, 1976. On December 21 the ship broke up, eventually spilling its entire cargo into the Atlantic Ocean. Our estimate of the total cost of this spill is about \$5 million as shown in the following schedule and in more detail in appendix V.

^{1/}The amount required to replace all of the functions that a wetland performs.

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	<u>Amount</u>
Cost incurred by:	
Coast Guard	\$ 1,755,273
Military services	130,262
Other Federal agencies	635,248
State agencies	63,018
Universities	160,551
Scientific organizations	28,893
Private organizations	19,382
Cleanup costs incurred by spiller	<u>-</u>
	2,792,627
Estimated value of waterfowl killed by the oil spill	<u>5,535</u>
	2,798,162
Estimated value of oil spilled	<u>2,362,500</u>
Total	<u>a/\$ 5,160,662</u>

* a/Appendix VI discusses the oil spill effects for which no monetary value can be determined.

Because the spill occurred recently, final cost figures are not available, in most cases, and had to be estimated. More costs may be incurred if the agencies involved make decisions to proceed with additional sampling, laboratory analyses, and assessment projects.

The estimated costs incurred by the Coast Guard and others totaled \$2,792,627 and were for (1) potential salvage and cleanup operations--\$1,755,273; (2) surveillance--\$28,293; (3) waterfowl rehabilitation, cleanup and counting--\$64,470; (4) scientific research and analysis--\$784,204; (5) airlift of personnel and equipment--\$130,262; and (6) miscellaneous expenses--\$30,125.

Our valuation of the 540 waterfowl believed killed by the oil is \$5,535, using the values given to specific waterfowl by the Commonwealth of Virginia. Several species affected by the Argo Merchant spill were not included in the Virginia data. For these species, we used the least amount for which a fair market value and/or replacement cost was determined.

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In addition to the costs discussed above, environmental damage may have occurred. Such damage is extremely difficult to identify and assess, and may be impossible to quantify. Virtually none of the 7.5 million gallons of the oil spilled has been recovered. Recent surveys indicate the possibility that 27,000 square miles of the Atlantic Ocean, including parts of the rich Georges Bank fishing grounds, may have been affected by the Argo Merchant spill. Quantities of microscopic plants and animal life--a primary food source in the marine food chain--may have been damaged by oil as were fish eggs and larvae. The effects of such damage have not been determined and may not be known for several years, if at all.

As of February 28, 1977, a total of \$352,153 had been reimbursed from the pollution fund, and the Coast Guard expects additional costs of about \$1.5 million to be reimbursed from the fund. Appendix VII provides details on the amounts and the agencies which received reimbursement.

At the time of our review, no recovery of costs had been obtained from the spiller. The owners of the Argo Merchant have filed a limitation action in U.S. District Court, New York City, asking the court to limit their liability for this spill. The Department of Justice, on behalf of the Coast Guard, filed a protective claim in the limitation action on February 9, 1977. The Court has not ruled on whether the owners are liable and, if so, for what amount.

The Coast Guard filed an administrative claim for its removal costs against the Tankers Owners Voluntary Agreement Concerning Liability For Oil Pollution (TOVALOP) and the Contract Regarding An Interim Supplement To Tanker Liability For Oil Pollution (CRISTAL) on January 14, 1977, and January 17, 1977, respectively. TOVALOP and CRISTAL are voluntary international industry agreements designed to provide compensation to national governments for reasonable costs of removal activities. Negotiations are presently underway to effect collection from these two groups.

A coalition of Cape Cod fishermen has sued the owners of the vessel for more than \$60 million for shoreline, fisheries, and personal damages.

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CONCLUSION

We estimate the combined cost of these spills, excluding the cost of the oil spilled, will exceed \$4 million. These are the short-term costs. Long-term effects will not be known for several years. If serious damage to fishing grounds, breeding areas, and food sources for fish and shellfish has occurred, the costs will be much greater. Also, the damage to the Chesapeake Bay wetlands resulting from the STC-101 spill are unknown.

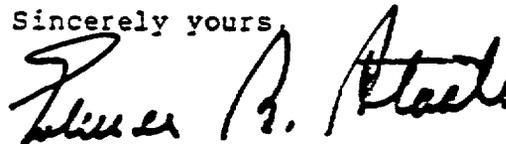
SCOPE OF REVIEW

Appendix VIII lists the Federal, State, and local agencies, and private organizations contacted during our review. We obtained the information in this report from discussions with agency and other organization representatives, and from review of agency records.

The costs summarized in the report and appendixes represent data given to us by the agencies and organizations, and individuals involved in the oil spill cleanup and related activities. Although we verified agency involvement and the extent of their activities, time constraints prevented our verifying the accuracy of costs for each organization.

We did not obtain formal comments from the agencies on the contents of this report. We did, however, discuss the contents with officials of the Coast Guard, and have incorporated their comments in the report. We hope this information will satisfy your needs.

Sincerely yours,



Comptroller General
of the United States

APPENDIX I

APPENDIX I

SUMMARY OF TOTAL COSTS ASSOCIATED WITH
THE CHESAPEAKE BAY OIL SPILL OF FEBRUARY 2, 1976

<u>Agency</u>	<u>Actual costs</u>	<u>Estimated costs</u>	<u>Total</u>
Coast Guard:			
Contractor costs (note a):			
Industrial Marine Service	\$135,888	-	\$ 135,888
Clear Water, Inc.	252,453	-	252,453
Parks Marine Service	300	-	300
Personnel:			
Regular Salaries	18,387	-	18,387
Travel and per diem	9,052	-	9,052
Other:			
Vehicle, vessel, small boat, and aircraft operating costs	49,554	-	49,554
Equipment, supplies and administrative costs	4,398	-	4,398
Surveillance flights after major cleanup operations were completed	<u>20,927</u>	<u>-</u>	<u>20,927</u>
Total (Coast Guard)	<u>490,959</u>	<u>-</u>	<u>490,959</u>
Other Federal agencies:			
Environmental Protection Agency (note b):			
Personnel (note c)	8,187	-	8,187
Other (note d)	9,237	-	9,237
Fish and Wildlife Service, Department of the Interior (note e):			
Personnel (note c)	1,134	-	1,134
Other (note d)	<u>358</u>	<u>-</u>	<u>358</u>
Total (other Federal agencies)	<u>18,916</u>	<u>-</u>	<u>18,916</u>
State agencies--Virginia (note f):			
Bureau of Solid Wastes:			
Personnel (note c)	738	-	738
Virginia Port Authority:			
Personnel (note c)	277	-	277
Other (note d)	73	-	73
Bureau of Shellfish Sanitation:			
Personnel (note c)	1,024	-	1,024
Other (note d)	83	-	83
Air Pollution Control Board:			
Personnel (note c)	615	-	615
State Water Control Board:			
Personnel (note c)	11,607	-	11,607
Other (note d)	883	-	883
Commission of Game and Inland Fisheries:			
Personnel (note c)	4,418	-	4,418
Other (note d)	580	-	580
Marine Resources Commission:			
Personnel (note c)	682	-	682
Other (note d)	400	-	400
Virginia Institute of Marine Science:			
Personnel (note c)	11,237	-	11,237
Other (note d)	<u>3,848</u>	<u>-</u>	<u>3,848</u>
Total (State agencies)	<u>36,465</u>	<u>-</u>	<u>36,465</u>

APPENDIX I

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<u>Agency</u>	<u>Actual costs</u>	<u>Estimated costs</u>	<u>Total</u>
Local government agencies:			
Accomack County, Virginia (note g):			
Personnel (note c)	1,457	-	1,457
Other (note d)	<u>5,614</u>	<u>-</u>	<u>5,614</u>
Total (local government agencies)	<u>7,071</u>	<u>-</u>	<u>7,071</u>
Private organizations (note h):			
Accomack Society for the Prevention of Cruelty to Animals (SPCA):			
Personnel (volunteers) (note i)	-	2,190	2,190
Other (note d)	290	-	290
Norfolk SPCA:			
Personnel (volunteers) (note i)	-	7,728	7,728
Newport News Shipbuilding and Drydock Co.:			
Personnel (note c)	115	-	115
Other (note d)	<u>86</u>	<u>-</u>	<u>86</u>
Total (private organizations)	<u>491</u>	<u>9,918</u>	<u>10,409</u>
Miscellaneous:			
Private citizens' damage claims (note j)	794	4,010	4,804
Costs incurred by spiller before declaration of Federal spill	-	39,916	39,916
Estimated value of waterfowl killed (note k)	-	<u>635,325</u>	<u>635,325</u>
Total (miscellaneous)	<u>794</u>	<u>679,251</u>	<u>680,045</u>
Total	<u>\$554,696</u>	<u>\$689,169</u>	<u>\$1,243,866</u>

a/Charges by private contractors the Coast Guard hired.

b/Costs incurred as a member of the Regional Response Team in control of oil pollution.

c/Includes regular salaries, overtime, per diem, and travel.

d/Includes equipment, supplies, and administrative costs.

e/Costs incurred for determination of damage to waterfowl as a result of the spill.

f/State agencies were involved in surveillance of the spill, determination of waterfowl losses, and monitoring the removal and disposal of oil which washed ashore.

g/Costs were incurred for disposal of oil removed from various beaches.

h/Costs were incurred for bird collection, cleanup, and rehabilitation.

i/These costs would have been incurred if volunteers were compensated for their cleanup efforts at the minimum wage rate of \$2.30 per hour.

j/Claims are for alleged Government damage to personal property during cleanup operations.

k/The estimated cost for lost waterfowl is being used by Commonwealth of Virginia for its suit against the Steuart Transportation Company. Valuation is based on a combination of the fair market value and the replacement cost of each species identified by actual count.

EFFECTS OF THE CHESAPEAKE BAY OIL SPILL FOR WHICHNO MONETARY VALUE HAS BEEN DETERMINED (note a)

<u>Environmental entity</u>	<u>How affected</u>
Oyster beds	An extensive population of oysters exists in the affected area, and many were heavily oiled. A significant mortality rate was noted in the oiled marsh areas in May 1976. The exact cause of death has not been determined.
Snails	A study of affected and unaffected areas showed that the snail population of marshes was adversely affected by cleanup operations. The snail population was decimated due to physical removal with oil-soaked grass; about four-fifths of the snails were removed. Almost normal populations were reestablished during the first year after the spill.
Saltmarsh cordgrass	The oil coated the marshes while they were relatively dormant. Thus, the initial impact was caused by cutting and removing the grass. Grass in the marsh areas where oil was cleaned up grew back with more stems, which uniformly grew to a shorter mean height and produced more seed heads. The result was an increase in net productivity.
Waterfowl	The Commonwealth of Virginia estimated that 30,936 birds were killed by the oil spill. The long-term effect on the breeding of various species is not known at this time.

a/This information was compiled from various knowledgeable sources.

ESTIMATED COST FOR LOST WATERFOWL
AS A RESULT OF THE CHESAPEAKE BAY OIL SPILL

<u>Species</u>	<u>Number of birds counted (note a)</u>	<u>Estimated cost per bird (note b)</u>	<u>Total cost</u>
Grebe (note c)	4,686	\$ 10	\$ 46,860
Loon (note c)	216	10	2,160
Oyster Catcher (note c)	1	10	10
Ringbill Gull (note c)	3	10	30
Herring Gull (note c)	43	10	430
Cormorant (note c)	10	10	100
Great Blue Heron	2	25	50
Sea Gulls (note c)	2	10	20
Old Squaw Duck	4,079	25	101,975
Ruddy Duck	117	40	4,680
Bufflehead Duck	177	75	13,275
Goldeneye Duck	111	75	8,325
Coot	1	20	20
Surf Scoter	586	25	14,650
Whitewing Scoter	8	75	600
American Scoter	20	75	1,500
Widgeon	2	25	50
Canvasback Duck	12	75	900
A. Merganser	16	25	400
Red Breasted Merganser	2	25	50
Whistling Swan	63	200	12,600

APPENDIX III

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<u>Species</u>	<u>Number of birds counted (note a)</u>	<u>Estimated cost per bird (note b)</u>	<u>Total cost</u>
Black Duck	12	\$ 25	\$ 300
Bluewing Teal	3	15	45
Pintail Duck	1	10	10
Canada Geese	8	25	200
Black Brant	2	50	100
Red Head Duck	40	25	1,000
Greater Scaup	24	35	840
Greenwing Teal	1	15	15
Rail	2	25	50
Mallard Duck	1	10	10
Unknown (note c)	<u>61</u>	10	<u>610</u>
Total	10,312	-	\$211,865
Using weight factor (note d)	<u>x 3</u>	-	<u>x 3</u>
	<u>30,936</u>	-	<u>\$635,595</u>

a/Bird count by Water Control Board, Commonwealth of Virginia.

b/Estimated cost by Fish and Wildlife Service, Department of the Interior.

c/For species which did not have a fair market value or cost of replacement, we used the least amount for which a fair market value and/or replacement cost was determined.

d/Wildlife experts from the National Audubon Society and the Fish and Wildlife Service estimated birds killed by the spill would be three times the actual count; i.e., for every bird counted, two birds would (1) die or not be washed ashore, (2) be eaten by predators before they could be counted, or (3) wash or crawl into inaccessible areas.

SUMMARY OF COSTS REIMBURSED FROM THE
POLLUTION FUND--CHESAPEAKE BAY SPILL

<u>Agencies or contractors</u> <u>reimbursed from pollution fund</u>	<u>Amount</u> <u>reimbursed</u>
Environmental Protection Agency, Region III-- for overtime, travel and per diem	\$4,573
Society for the Prevention of Cruelty to Animals, Olney, Virginia--for cleanup of waterfowl	290
County of Accomack, Virginia--for disposal of oil	7,070
Chesapeake and Potomac Telephone Company--for special communications equipment	617
Contractors employed by the Coast Guard--for shoreline cleanup and dredging	<u>388,641</u>
	<u>\$401,191</u>

SUMMARY OF TOTAL COSTS ASSOCIATED WITH
THE ARGO MERCHANT OIL SPILL OF DECEMBER 15, 1976

<u>Agency</u>	<u>Actual costs</u>	<u>Estimated costs</u>	<u>Total</u>
Coast Guard:			
Contractor costs (note a):			
Marine Towing Co.	\$ -	\$ 65,200	\$ 65,200
Moran Towing Co.	-	102,000	102,000
Cannon Engineering Co.	-	6,233	6,233
White Foot Towing and Salvage Co.	-	5,540	5,540
Murphy Pacific Salvage Co.	-	670,000	670,000
Coastal Services	-	25,000	25,000
Jet Line Services	-	70,000	70,000
Personnel:			
Regular salaries	-	143,771	143,771
Travel and per diem	-	13,937	13,937
Other:			
Aircraft and ship operating costs	-	392,217	392,217
Equipment, supplies, and administrative costs	-	25,564	25,564
Lost equipment	-	235,811	235,811
Total (Coast Guard)	-	1,755,273	1,755,273
Military Services:			
Air Force (notes b and c)	3,214		3,214
Army (notes b and c)	32,804		32,804
Navy:			
Personnel (notes d and e)	-	3,794	3,794
Other (notes f and g)	-	90,450	90,450
Total (military services)	36,018	94,244	130,262
Other Federal agencies:			
Environmental Protection Agency (note h):			
Personnel (note d)	-	33,736	33,736
Aerial surveys	-	4,256	4,256
Other (note f)	-	3,500	3,500
Fish and Wildlife Services, Department of the Interior (note i):			
Personnel (note d)	12,780	123	12,903
Aerial survey	440	-	440
Other (note f)	1,792	-	1,792
National Oceanic and Atmospheric Administration, Department of Commerce (notes h and j):			
Personnel (note d)	-	154,307	154,307
Contracts	-	55,000	55,000
Research	-	190,164	190,164
Equipment and ship operating costs	-	81,000	81,000
Aerial survey	-	22,000	22,000
Other (note f)	-	40,909	40,909
Geological Survey (note h):			
Personnel (note d)	-	15,441	15,441
Aerial survey	-	1,597	1,597
Other (note f)	-	18,203	18,203
Total (other Federal agencies)	15,012	620,236	635,248

APPENDIX V

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<u>Agency</u>	<u>Actual costs</u>	<u>Estimated costs</u>	<u>Total</u>
State agencies--Massachusetts:			
Office of Coastal Zone Management:			
Personnel (note d)	-	11,865	11,865
Fish and Wildlife Service (note i):			
Personnel (note d)	-	13,490	13,490
Other (note f)	-	1,950	1,950
Forest and Park Service (note i):			
Personnel (note d)	-	1,000	1,000
Volunteers (note k):	-	11,758	11,758
Water Pollution Control Service (note h):			
Personnel (note d)	-	5,697	5,697
Contractor	-	10,696	10,696
Other (note f)	-	4,302	4,302
Air National Guard (notes b and c)	-	2,260	2,260
Total (State agencies)	-	<u>63,018</u>	<u>63,018</u>
Universities:			
University of Rhode Island (notes e and l)	-	159,851	159,851
University of California (note m)	-	700	700
Total (Universities)	-	<u>160,551</u>	<u>160,551</u>
Scientific Organizations (note h):			
Marine Biology Lab	-	5,000	5,000
Woods Hole Oceanographic Institution	-	10,170	10,170
National Science Foundation	-	13,723	13,723
Total (scientific organiza- tions)	-	<u>28,893</u>	<u>28,893</u>
Private Organizations:			
Felix Neck Bird Sanctuary (notes b and i)	-	1,100	1,100
Vineyard Conservation Society (note i):			
Personnel (note d)	-	500	500
Other (note f)	-	282	282
Office of Technical Assessment/Ocean Division (note n):	15,000	-	15,000
Energy Research Corp. (note h):	<u>2,500</u>	-	<u>2,500</u>
Total (private organizations)	<u>17,500</u>	<u>1,882</u>	<u>19,382</u>
Estimated value of waterfowl killed	-	<u>5,535</u>	<u>5,535</u>
	68,530	2,729,632	2,798,162
Estimated value of oil spilled	-	<u>2,362,500</u>	<u>2,362,500</u>
Total	<u>\$68,530</u>	<u>\$5,092,132</u>	<u>\$5,160,662</u>

APPENDIX V

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- a/Charges by private contractors hired by the Coast Guard or other organizations.
- b/A breakdown of costs for personnel and other expenses could not be determined.
- c/These costs were for personnel, airlift services, and equipment supplied by the military service and the National Guard.
- d/Includes regular salaries, overtime, per diem and travel.
- e/Costs were incurred for ships, personnel, and equipment.
- f/Includes equipment, supplies, and administrative costs.
- g/Includes some personnel costs.
- h/Costs were incurred for scientific research conducted to study the impact of the oil spill on shoreline, fishing grounds, and other marine life.
- i/Costs were incurred for collection, cleanup, and rehabilitation of birds.
- j/The National Oceanic and Atmospheric Administration received \$192,200 from the Bureau of Land Management, Department of the Interior, to do research in connection with the oil spill.
- k/These costs would have been incurred if volunteers were compensated for their cleanup efforts at the minimum wage rate of \$2.30 per hour.
- l/The University of Rhode Island used State, Federal, and its own funds to cover costs.
- m/This amount was paid to a Woods Hole Oceanographic Institution researcher as salary for research work conducted during the spill.
- n/Provided funding for survey of fishermen to assess oil damages on fishing grounds.

EFFECTS OR POTENTIAL EFFECTS OF THE ARGO MERCHANTOIL SPILL FOR WHICH NO MONETARY VALUEHAS BEEN DETERMINED (note a)

<u>Environmental entity</u>	<u>How affected</u>
Fish:	
Blackback and yellow tail flounder	Adverse physiological effects in these species' respiration systems are believed to have been caused by oil contamination.
Cod and pollock embryos	Cod and pollock eggs contaminated by oil showed increased mortality of developing embryos.
Shellfish:	
Mussels, scallops, and quahogs	Adverse physiological effects have been observed in the respiration systems of these species as a result of oil contamination.
Plankton and Larvae:	
Plankton	Plankton, an important food of larvae and adult fish, has been found to be contaminated with petroleum hydrocarbon. This indicated that the Nantucket Shoals-Georges Bank ecosystems were affected.
Sand lance larvae	Large decreases in numbers of this specie have been observed in the spill area. This is an important food of fish, including cod, haddock, pollock, and hake. The effect of this reduction is being studied.

a/The information in this appendix was obtained from a National Oceanic and Atmospheric draft report summarizing the data obtained evaluating the effects of the Argo Merchant spill.

SUMMARY OF COSTS REIMBURSED FROM THEPOLLUTION FUND--ARGO MERCHANT SPILL (note a)

Agencies reimbursed from <u>pollution fund</u>	<u>Amount</u>
Coast Guard:	
For payments to commercial vendors	\$266,970
For travel and per diem	15,500
For personnel and equipment furnished by the Coast Guard's Atlantic Strike Team	12,516
For aircraft operating costs	<u>51,948</u>
	\$346,934
Army--for personnel, airlift services and equipment	304
Air Force, Scott Air Force Base--for personnel, airlift services, and equipment	3,214
General Services Administration--for supplies	78
Defense Construction Supply Center--for supplies and equipment	<u>1,623</u>
Total	<u>\$352,153</u>

a/As of February 28, 1977. (Note: most claims had not been submitted as of February 28, 1977.)

LIST OF AGENCIES CONTACTEDU.S. Coast Guard, Department of Transportation

Headquarters, Washington, D.C.

First District, Boston, Massachusetts

Fifth District, Portsmouth, Virginia

Coast Guard R&D Center, Groton, Connecticut

Coast Guard Air Station, Elizabeth City, North Carolina

Other Federal agenciesNational Oceanic and Atmospheric Administration,
Department of Commerce

Regional Office, Gloucester, Massachusetts

Spilled Oil Research Team, Boulder, Colorado

Regional Office, Norfolk, Virginia

National Marine Fisheries Service, Department of Commerce

Narragansett Laboratory, Narragansett, Rhode Island

Woods Hole Marine Fishery Laboratory, Woods Hole, Massachusetts

Environmental Protection Agency

Headquarters, Washington, D.C.

Region 3, Philadelphia, Pennsylvania

Environmental Research Laboratory, Narragansett, Rhode Island

Environmental Protection Agency Laboratory, Annapolis, Maryland

Environmental Protection Agency Laboratory, Lexington, Massachusetts

U.S. Fish and Wildlife Service, Department of the Interior

Headquarters, Washington, D.C.

Regional Office, Newton Corner, Massachusetts

Back Bay Wildlife Refuge, Virginia Beach, Virginia

Division of Wildlife Assistance, Annapolis, Maryland

Geological Survey, Department of the Interior

Research Laboratory, Woods Hole, Massachusetts

Department of Justice

Admiralty and Shipping Section, Washington, D.C.

Department of Labor

Wage and Hour Division, Washington, D.C.

Army

Corps of Engineers, Fort Eustis, Virginia

Navy

Naval Underwater Systems Center, Newport, Rhode Island

Air Force

Financial Office, Scott Air Force Base, Illinois

State Governments

Commonwealth of Massachusetts

Division of Fisheries and Game, Boston, Massachusetts

Environmental Quality Engineering Division, Water Pollution Control Services, Boston, Massachusetts

Division of Food and Drugs, Boston, Massachusetts

Coastal Zone Management, Boston, Massachusetts

Division of Forests and Parks, Boston, Massachusetts

Commonwealth of Virginia

Office of the Attorney General, Richmond, Virginia

Assistant Secretary of Commerce and Resources,
Richmond, Virginia

Virginia State Water Control Board, Virginia Beach,
Virginia

Virginia Commission of Game and Inland Fisheries,
Tappahanock, Virginia

Virginia Air Pollution Control Board, Portsmouth,
Virginia

Virginia Marine Resources Commission, Portsmouth,
Virginia

Virginia Port Authority, Norfolk, Virginia

Virginia Bureau of Shellfish Sanitation, Richmond,
Virginia

Virginia Institute of Marine Sciences, Gloucester
Point, Virginia

State of Maryland

Maryland Water Resources Administration, Annapolis,
Maryland

Local governments

Department of Public Works, Accomack County, Virginia

Private organizations

Chesapeake Bay Foundation, Yorktown, Virginia

Virginia Society for the Prevention of Cruelty to Ani-
mals, Norfolk, Virginia

Woods Hole Oceanographic Institution, Woods Hole,
Massachusetts

Marine Biological Laboratory, Woods Hole, Massachusetts

University of Rhode Island, Narragansett Bay, Rhode
Island

APPENDIX VIII

APPENDIX VIII

Nantucket Conservation Foundation, Nantucket Island,
Massachusetts

Felix Neck Bird Sanctuary, Martha's Vineyard, Massachu-
setts

Vineyard Conservation Society, Martha's Vineyard, Mas-
sachusetts

Martha's Vineyard Commission, Martha's Vineyard, Mas-
sachusetts

Association for the Preservation of Cape Cod, Falmouth,
Massachusetts

Energy Research Corporation, Cape Cod, Massachusetts