



Resources, Community, and  
Economic Development Division

B-278017

April 22, 1998

The Honorable Rod Blagojevich  
The Honorable William O. Lipinski  
The Honorable Peter J. Visclosky  
House of Representatives

Subject: Coast Guard: Relocation of Air Facility on Southern Lake Michigan

The U.S. Coast Guard plays a major role in saving lives and property endangered as a result of accidents and other distress situations off the nation's coastlines and in the Great Lakes. In the Great Lakes, the agency maintains year round and seasonal small boat stations and air stations and facilities from which boats and helicopters are dispatched. In southern Lake Michigan, the Coast Guard's helicopters and small boats respond mainly to incidents involving recreational boats, although larger barges and cargo vessels may occasionally request assistance. The Coast Guard's rescue personnel share search and rescue responsibility with many state and local agencies that also have emergency response capability.

On April 1, 1997, the Coast Guard relocated its air facility on southern Lake Michigan from Glenview, Illinois, to the county airport near Muskegon, Michigan, about 113 miles across the lake. This move came after community leaders in the village of Glenview asked the Coast Guard to relocate because the Naval Air Station the Coast Guard was using in Glenview was closed, and the village wanted to use the land for other purposes.<sup>1</sup> The Coast Guard evaluated six alternative sites for relocating its air facility in southern Lake Michigan—Southwest Michigan Regional Airport, Benton Harbor, Michigan;

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<sup>1</sup>The Coast Guard had considered closing the air facility in the area, but in 1995 the conferees for the fiscal year 1996 Department of Transportation Appropriations Act (H. Conf. Rep. No. 104-286) said that they included funds for the Coast Guard to maintain an air facility in southern Lake Michigan.

Muskegon County Airport, Muskegon, Michigan; Tulip City Airport, Holland, Michigan; Waukegan Regional Airport, Waukegan, Illinois; Michigan City Municipal Airport, Michigan City, Indiana; and Gary Regional Airport, Gary, Indiana. After studying operational factors (such as the response time to incidents; distance to Lake Michigan; and availability of crash, fire, and rescue services) and cost factors (such as facility lease, maintenance, operating, and security costs) at each location, the Coast Guard chose Muskegon.

In your June 27, 1997, letter, you asked us to evaluate the Coast Guard's decision to relocate the Glenview facility to Muskegon. Our review addressed the following questions:

- From 1994 through 1997, what were the number, severity, and location of incidents requiring Coast Guard search and rescue response in southern Lake Michigan, and what resources has the Coast Guard used for such responses?
- In evaluating alternative sites for relocating its air facility in southern Lake Michigan, what factors did the Coast Guard consider, and were the data and methodology used for the evaluation accurate, complete, and consistently applied to all sites under consideration?

#### RESULTS IN BRIEF

From 1994 through 1997, the Coast Guard responded to 3,710 search and rescue (SAR) incidents in southern Lake Michigan, an average of 928 responses each year, and state and local agencies responded to thousands of additional calls for assistance. According to Coast Guard officials, the vast majority of these cases were located a few miles from shore. About 63 percent of the incidents occurred on the western side of the lake where boating activity is the greatest. The Coast Guard's small boats responded to 3,581 incidents, or about 97 percent of all incidents during the 4-year period. Of the 129 responses the Coast Guard's helicopters made during this period, 80 responses, or an average of 20 responses each year, involved a threat to life or property or the actual rescue of persons or property from imminent danger. State and local agencies often assisted the Coast Guard in its search and rescue activities.

After considering operational and cost factors, the Coast Guard determined that Benton Harbor and Muskegon were the two most preferred sites. Ultimately, the Coast Guard chose Muskegon because its cost benefits far

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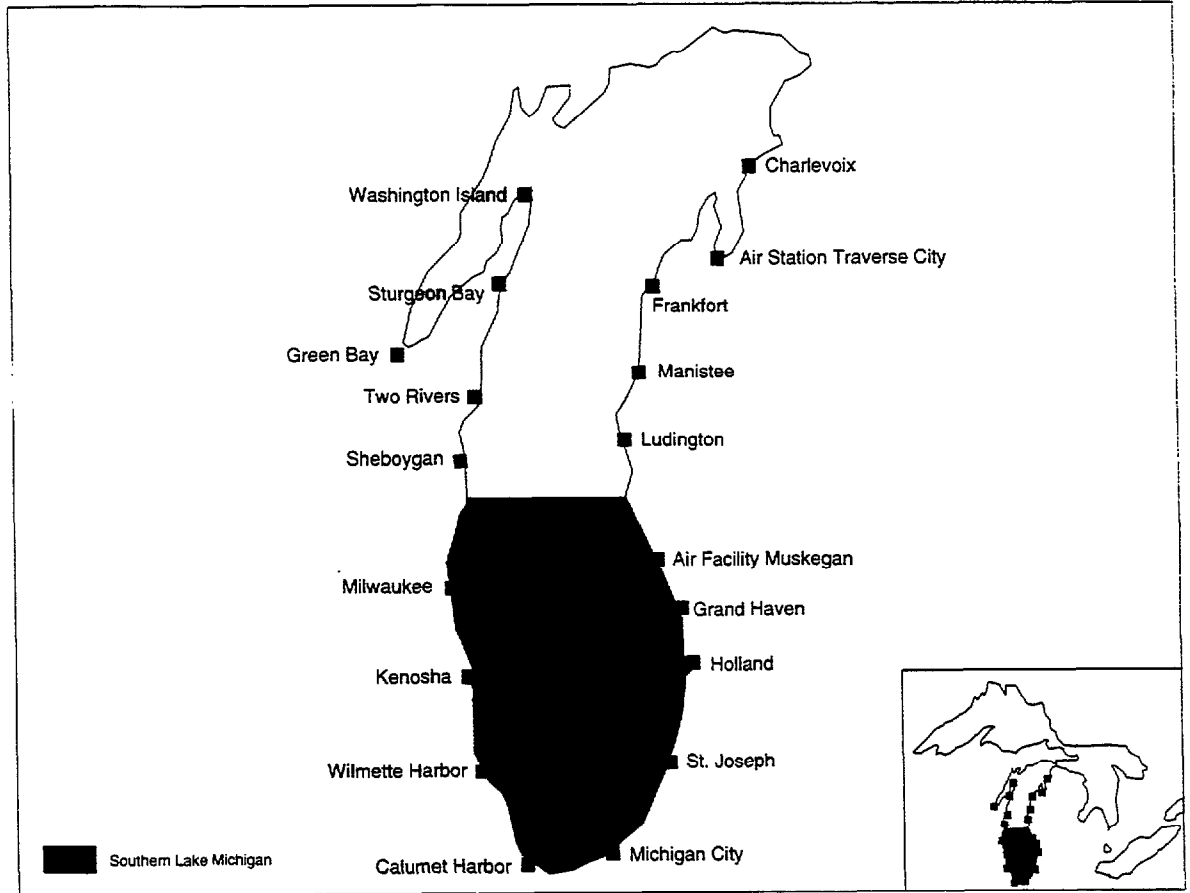
outweighed all other sites', according to the Coast Guard's calculations. Muskegon ranked second to Benton Harbor on operational factors, due in large part to the shorter response time to the average incident location from Benton Harbor. But on the basis of our analysis of moderate and severe cases to which Coast Guard helicopters responded on southern Lake Michigan, we believe that the differences in response times among all the sites would have had little, if any, impact on the number of lives saved or lost in southern Lake Michigan. While the operational factors the Coast Guard used in its relocation study were reasonable, consistently applied, and based on accurate and complete data, we found that the Coast Guard omitted significant costs in determining the cost of operating at Muskegon; including these costs would have made Benton Harbor, not Muskegon, the least costly site by \$10,000 over a 25-year life cycle.

### BACKGROUND

The Coast Guard maintains a sizable presence in southern Lake Michigan, providing mainly SAR services through nine small boat stations located on the Lake Michigan shoreline in Illinois, Indiana, Wisconsin, and Michigan and an air facility located in Michigan. The Coast Guard has defined southern Lake Michigan as roughly the area south of a line from above Muskegon, Michigan, on the eastern shore to below Sheboygan, Wisconsin, on the western shore. (See fig. 1.)

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Figure 1: Locations of Coast Guard Small Boat Stations and Air Facility in Southern Lake Michigan



Source: Ninth Coast Guard District.

The Coast Guard maintained an air station throughout the year in the area from 1969 through 1994. Beginning in 1995, the air station became a "seasonal" facility, open from April 1 to November 15, during the height of the recreational boating season. Before relocating it in 1997, the Coast Guard operated its air facility at the Naval Air Station at Glenview, Illinois. Operationally, the air facility was a detachment of the Coast Guard's air station in Traverse City, Michigan, located about 222 miles away.

After the 1993 Base Closure and Realignment Commission (BRAC) recommended that the Naval Air Station in Glenview be closed, Glenview officials sought to obtain the land for alternative uses and asked the Coast Guard to relocate elsewhere. Glenview and Coast Guard officials agreed to continue operating the air facility through November 15, 1996, while the Coast Guard evaluated alternative sites.

Initially, the Ninth Coast Guard District, which is operationally responsible for the Coast Guard's search and rescue and other activities in the Great Lakes region, studied 19 potential sites for relocating the air facility. Later, with guidance from Coast Guard headquarters, the Ninth District conducted another study, narrowing the sites to six. The Ninth District completed the latter study in March 1996, recommending that the air facility be relocated to Benton Harbor, Michigan; Muskegon was a close second choice. Upon reviewing the study results and further analyzing the data, Coast Guard headquarters officials determined that the Muskegon site would provide the most cost-effective SAR coverage for the southern Lake Michigan area while still meeting the established response standard.<sup>2</sup> In July 1996, the Coast Guard approved the air facility relocation to Muskegon.<sup>3</sup>

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<sup>2</sup>The Coast Guard has established a 2-hour response standard. The standard includes an allowance of 30 minutes to get a surface asset under way or an aviation asset airborne after the unit is notified of a case and 90 minutes to arrive on the scene.

<sup>3</sup>The Coast Guard established an air facility in Muskegon as a temporary site and is currently evaluating the seasonal requirements for Air Facility-Muskegon before committing to a permanent site. The evaluation is expected to be completed in early 1998.

THE NUMBER OF SERIOUS SAR INCIDENTS IN SOUTHERN LAKE MICHIGAN IS RELATIVELY SMALL, AND COAST GUARD HELICOPTERS ARE USED SPARINGLY

SAR incidents in southern Lake Michigan are concentrated more along the western shore and tend to occur within 2 or 3 miles offshore, making them readily accessible to nearby small boats. About 21 percent of all SAR incidents to which the Coast Guard responded in southern Lake Michigan from 1994 through 1997 were considered moderate or severe, involving potential loss of life or property.<sup>4</sup> The Coast Guard uses its small boats to respond to the vast majority of SAR incidents on southern Lake Michigan; helicopters are used in only a small number of instances. In many cases, the Coast Guard receives assistance from local and state agencies that also collectively maintain boats and helicopters available for SAR responses in southern Lake Michigan.

Number, Severity, and Location of Incidents in Southern Lake Michigan

The Coast Guard's Search and Rescue Management Information System (SARMIS) shows that the Coast Guard responded to 969 SAR incidents in southern Lake Michigan in 1994, 988 in 1995, 954 in 1996, and 799 in 1997. There were 21 responses by helicopter to moderate or severe incidents in southern Lake Michigan in 1994, 23 in 1995, 24 in 1996, and 12 in 1997. (See table 1.) A Ninth Coast Guard District official told us that SAR incidents in the entire Great Lakes area, including southern Lake Michigan, decreased in 1997. The official said that part of the decrease may be attributable to weather conditions—the 1997 boating season started late and ended early because of bad weather. In addition, there were no sudden or severe weather outbreaks in the summer, which often cause SAR incidents. The official also said that some of the decrease may also be attributable to increased safety awareness of the boating population.

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<sup>4</sup>The severity of SAR incidents is categorized as "0-none, no foreseeable threat to life or property; 1-slight, no threat to life or property upon arrival on scene—however, had action not been taken the situation may have resulted in a threat to life or property; 2-moderate, a threat to life and/or property existed; reasonable to assume that personnel and/or property would have been seriously injured, lost, or damaged had action not been taken; and 3-severe, personnel and/or property (including cargo) were either physically rescued/recovered from imminent danger or were actually lost."

**Table 1: Number of Coast Guard's Boat and Helicopter Responses and Severity of Incidents in Southern Lake Michigan, 1994 Through 1997**

Type of asset responding and severity of incident	Number of responses				
	1994	1995	1996	1997	Total
<b>Boat</b>					
0-none	278	310	324	250	1,162
1-slight	465	444	428	395	1,732
2-moderate	93	97	87	79	356
3-severe	98	107	77	49	331
<b>Total, boat</b>	<b>934</b>	<b>958</b>	<b>916</b>	<b>773</b>	<b>3,581</b>
<b>Helicopter</b>					
0-none	6	4	5	4	19
1-slight	8	3	9	10	30
2-moderate	5	5	10	7	27
3-severe	16	18	14	5	53
<b>Total, helicopter</b>	<b>35</b>	<b>30</b>	<b>38</b>	<b>26</b>	<b>129</b>
<b>Total responses<sup>a</sup></b>	<b>969</b>	<b>988</b>	<b>954</b>	<b>799</b>	<b>3,710</b>

<sup>a</sup>The figures for total responses may be slightly overstated. Helicopters may respond to incidents along with boats. However, the Coast Guard's SARMIS cannot identify whether the helicopter responses were in conjunction with boats or whether they were responses by helicopters alone.

Source: Coast Guard's SARMIS.

From 1994 through 1997, the majority of all of the Coast Guard's responses to incidents, 63 percent, were concentrated in the western half of southern

Lake Michigan, where the boating population is the greatest.<sup>5</sup> Within southern Lake Michigan, the Coast Guard also responded to almost twice the number of SAR incidents in the southern half than the northern half. (See table 2.)

Table 2: Locations of Coast Guard's Responses to All Incidents in Southern Lake Michigan, 1994 Through 1997

Part of southern Lake Michigan	1994	1995	1996	1997	Total
Northwest	193	210	157	181	741
Northeast	132	149	183	122	586
Southwest	398	408	422	356	1,584
Southeast	246	221	192	140	799
Eastern	378	370	375	262	1,385
Western	591	618	579	537	2,325
Northern	325	359	340	303	1,327
Southern	644	629	614	496	2,383

Source: Coast Guard's SARMIS.

According to SARMIS data, helicopter responses to moderate or severe SAR incidents totaled 32 for the eastern half and 48 for the western half of southern Lake Michigan. The lower half of southern Lake Michigan had 58 responses to moderate or severe incidents, and the northern half had 22. (See table 3.)

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<sup>5</sup>We were unable to obtain boating density information for all of the states bordering southern Lake Michigan because, according to the Coast Guard, it was not computerized, although Coast Guard and local officials generally agree that boating density is higher on the western side of the lake.



Table 3: Locations of Helicopter Responses to Moderate and Severe Incidents in Southern Lake Michigan, 1994 Through 1997

Part of southern Lake Michigan	1994	1995	1996	1997	Total
Northwest	1	4	1	1	7
Northeast	4	4	4	3	15
Southwest	13	10	12	6	41
Southeast	3	5	7	2	17
Eastern	7	9	11	5	32
Western	14	14	13	7	48
Northern	5	8	5	4	22
Southern	16	15	19	8	58

Source: Coast Guard's SARMIS.

The average location of Coast Guard helicopter responses to moderate or severe incidents in each year from 1994 through 1997 was about the same.<sup>6</sup> (See enc. I.)

Small Boats Are the Coast Guard's Primary Resource in Responding to Most SAR Incidents in Southern Lake Michigan

The Coast Guard has 25 small boats and one helicopter available for SAR responses on southern Lake Michigan during the height of the recreational boating season. In addition, if needed, Coast Guard helicopters from air stations in Traverse City or Detroit are available.

On average, during the period 1994 through 1997, the Coast Guard's small boats responded to about 97 percent of the total number of incidents, while

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<sup>6</sup>For each year, the position (longitude and latitude) of each incident was plotted, and these positions were averaged to determine one average location.

helicopters responded to about 3 percent. (See table 1.) Helicopters generally were needed to respond to only more serious incidents, categorized as severe or moderately severe, or incidents that involved a large search area that could be covered much faster with helicopters than small boats. According to Ninth Coast Guard District officials, however, helicopters responded to some incidents that were not moderate or severe. Generally, these incidents involved the launching of the helicopter only to find out later that the incident was not moderate or severe. For almost all of the incidents to which helicopters responded, Coast Guard small boats were also there, and in most cases, the boats were the primary response resource on the scene.

#### Considerable Local SAR Resources Exist in Southern Lake Michigan

In addition to the Coast Guard's response resources, many local resources are available near the lakeshore. According to Coast Guard officials, there are 59 boats and 9 helicopters operated by various state and local agencies and private groups in southern Lake Michigan, and these resources are available and often used for SAR activities. Because the boating population is greatest on the western side of the lake, resources available there are also greater than on the eastern side. On the western side—from Sheboygan, Wisconsin, in the north to Gary, Indiana, in the south—46 locally owned vessels and 6 helicopters are available for SAR. In contrast, the eastern side of the lake—from Muskegon in the north to Michigan City, Indiana, in the south—has fewer resources, as one might expect given the lower number of boaters. Resources on the eastern side include 13 small boats and 3 helicopters. (See enc. II for a complete list of resources on southern Lake Michigan.)

The city of Chicago and the state of Illinois are actively involved in SAR near the Chicago waterfront. The Chicago Marine Police, the Chicago Fire Department, and the Illinois Conservation Police have nine boats and three helicopters that are routinely involved in SAR cases. The Marine Police, which has boats based near Chicago's Navy Pier in the heart of the waterfront area, is tasked with being the first responder to SAR incidents in the Chicago area and work closely with the Coast Guard in responding to SAR incidents. In 1997, the Marine Police responded to about 250 SAR incidents in the Chicago area, many without the Coast Guard's involvement. The Marine Police unit also participates with the Coast Guard in conducting periodic maritime disaster training exercises, which typically involve many local and state agencies around the lake.

ANALYSIS OF THE COAST GUARD'S RELOCATION EVALUATION—  
OPERATIONAL FACTORS WERE REASONABLE, BUT COST ESTIMATES  
WERE UNDERSTATED, WHICH CHANGED THE SITE RANKINGS

The Coast Guard evaluated and ranked the six alternative sites on operational and cost factors.<sup>7</sup> The operational factors evaluated by the Coast Guard appeared reasonable, and site rankings were made on the basis of accurate and complete data. In addition, in conjunction with the Coast Guard, we reviewed case files on helicopter responses to moderate and severe incidents and found that differences in the time to respond to incidents from each site would likely have had minimal impact on the number of lives lost or saved. However, we found that annual and life-cycle cost estimates for the sites were understated.<sup>8</sup> Our recomputation using new cost estimates affected the rankings of the two highest ranked sites.

Operational Factors Were Accurate, and the Relocation  
to Muskegon Had Minimal Impact on the Number of Lives Lost or Saved

For each site, the Coast Guard evaluated eight factors that it considered important to the operational viability of the air facility. The factors were (1) the road miles to the Traverse City Air Station; (2) navigation aids available at the airports; (3) air congestion at each location; (4) the availability of crash, fire, and rescue services at the airports; (5) airfield stability (likelihood of the airfield's remaining in service for the foreseeable future); (6) the distance to Lake Michigan; (7) the response time for a helicopter to travel from each location to the average location of all moderate or severe incidents for 1994 and 1995; and (8) the response time to the average location of all incidents, regardless of severity, for 1995. The factors were weighted equally, and the relative ranking for each factor was determined by

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<sup>7</sup>The Coast Guard's March 1996 study evaluated seven work-life factors for each site; but the Coast Guard headquarters decision about relocation did not consider these factors because crews would be rotated in and out either daily or biweekly rather than being permanently stationed at the site.

<sup>8</sup>Life-cycle cost estimates reflect the current value of a series of costs discounted at 7 percent over a 25-year period.

assigning a score of 1 to 9, with 1 being the best.<sup>9</sup> The scores for all eight factors were then totaled and the sites ranked, with the sites with the lowest scores receiving the highest ranking. Benton Harbor had the best operational ranking, followed by Muskegon, Tulip City, Waukegan, Gary, and Michigan City. (See enc. III for a summary of the Coast Guard's ranking of the six sites.)

We met with airport officials at each of the six sites to discuss their operational capabilities. We discussed the data the Coast Guard used to rate each site at the time of its evaluation and found that these data were generally accurate and complete. We did note, however, that the airport at Gary, Indiana, now has on-site crash, fire, and rescue capabilities that it did not have when the Coast Guard completed its study in 1996. Having this capability would have made the Gary Airport more viable operationally under the Coast Guard's rating system.

Of the eight factors in this category, response time is probably one of the most visible. In this regard, of the six sites, Muskegon is the farthest away from the average location of incidents and from the Chicago waterfront, where boating activity is the heaviest. We tried to determine if the SAR locations correlated to boating density in southern Lake Michigan but were able to obtain boating density information only from Illinois and Michigan. Illinois had about 141,000 boats registered in counties bordering southern Lake Michigan, and Michigan had about 83,000. Wisconsin and Indiana did not have figures readily available because, according to the Coast Guard, their boating population data were not computerized. Therefore, we could not make a correlation between boating density and locations of SAR incidents.

The Coast Guard study shows that the flying time from Muskegon to the average location for severe and moderately severe cases (in 1994 and 1995) is the longest—almost 15 minutes longer than response times for four of the other sites. We updated this information by including response times for 1996 and 1997 and found that Muskegon still had the longest average response time. Muskegon's average response time was about 1 minute longer than the next longest time and about 14 minutes longer than the shortest

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<sup>9</sup>The Coast Guard officials weighted operational factors equally because they believed that assigning weights would have been subjective and open to much interpretation. However, the officials recognized that some factors carry more emphasis than others.

response time. The response times from all of the sites considered by the Coast Guard would meet its current 2-hour response time standard. Aircraft from the Coast Guard air station at Traverse City, Michigan, are also able to reach the southern area of Lake Michigan within this 2-hour standard. (See enc. IV for the projected helicopter response times from Traverse City, Glenview, and the six sites to the average location for moderate or severe incidents that occurred from 1994 through 1997.)

To determine the potential impact of this longer flying time from Muskegon on the number of lives lost or saved, we identified all moderate or severe cases (33) involving lives saved or lost from 1995 through 1997. We evaluated 30 cases in all.<sup>10</sup> In consultation with Ninth Coast Guard District SAR officials, we determined that for almost all cases, either the Coast Guard's small boats or other nearby assets made the rescue, or death occurred very quickly, making the helicopter response time unimportant. However, in two cases the helicopter response time could have made a difference. In one case, a 1997 incident, the shorter response time could have been a factor in saving four lives because Muskegon was closer to the incident. In a 1996 case, the longer response time could have been a factor in the loss of a life if the air facility had been located in Muskegon.

Of the six sites considered for relocation, the Coast Guard air facility in Muskegon is the farthest from the Chicago waterfront, near where hundreds of jet aircraft takeoff and land and boat excursions and casino boats travel each day. In looking at the potential impact prospectively, we have no way of measuring what the potential impact of one helicopter located about 15 minutes farther away might be if a catastrophic event occurred in the southern part of the lake. However, according to Coast Guard officials, Federal Aviation Administration data show that there has not been a major plane crash in the southern Lake Michigan area since the early 1950s. In addition, according to Coast Guard officials, commercial vessels like excursion and gambling boats have extensive lifesaving equipment on board in the event of an emergency. Also, according to the Coast Guard and other law enforcement officials, excursion and gambling boats travel relatively close to the shoreline, where Coast Guard small boats—as well as local resources—would be the primary means of a SAR response, mitigating the immediate need for a Coast Guard helicopter.

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<sup>10</sup>Coast Guard officials were not able to locate the files on one case in 1995 and two cases in 1996.

Cost Estimates Were Understated

The Coast Guard's relocation cost estimates for the six sites were understated mainly because they did not include the cost of flying a helicopter to and from the Traverse City Air Station for daily crew changes at the Muskegon site and for periodic maintenance at the other sites. We also noted several computational errors in the Coast Guard's estimates, but these minor errors did not affect the rankings of the sites.

In evaluating each of the six sites, the Coast Guard developed two options for operating the relocated air facility. One option, "the 2-crew concept," involves the use of two air crews of four persons each (two pilots, one flight mechanic, and one rescue swimmer) and two ground support personnel. The two crews, alternating 24-hour shifts, would remain on duty at the site for 2 weeks. A replacement crew (one air crew and a ground support person) would be rotated in from the Traverse City Air Station each week by ground transportation. Helicopter swaps would be conducted as maintenance needs dictated, typically about 15 times during the SAR season. The 2-crew concept would work from any of the six sites evaluated.

A second option, "the 1-crew concept," involves the use of one helicopter and one air crew that fly to and from the Traverse City Air Station each day. The Ninth District study concluded that the 1-crew concept would be viable only for the northern sites on the eastern shore of Lake Michigan—Muskegon, Benton Harbor, and Tulip City. However, the study rejected this concept because it would have diminished the Traverse City Air Station's ability to perform other missions, such as marine environmental protection activities, because programmed flight hours are limited.

Coast Guard headquarters officials disagreed with the Ninth District study's conclusion about not using the 1-crew concept. The headquarters officials believed that the 1-crew concept would be viable at Muskegon because of its close proximity to Traverse City; an air facility at Muskegon could be established with reduced crew requirements (six people fewer than under the 2-crew concept) and corresponding smaller facility requirements. In finalizing cost estimates for the six sites, the officials included cost estimates for the Muskegon site using the 1-crew concept, as well as cost estimates for all six sites using the 2-crew concept. Furthermore, the officials concluded that Benton Harbor, the most preferred site in the Ninth District study, would cost over \$4.4 million more over the discounted life-cycle period than the Muskegon site using the 1-crew concept. The primary difference in life-cycle

cost is the result of reduced crew requirements and corresponding smaller facility requirements at Muskegon.

Coast Guard headquarters officials excluded the transit cost associated with (1) daily helicopter and crew changes at Muskegon and (2) periodic rotation of helicopters for maintenance at the other sites. Transit costs amount to about \$1,300 per flight hour. Headquarters reasoned that the transit time to and from the air facility was a cost of doing business to attain certain minimal training requirements for the crew. Traverse City Air Station and Ninth District officials, however, believe that there is little training involved in transiting between the air station and the air facility. In fact, for the 1997 SAR season, the Traverse City Air Station accounted for transit time and training separately and recorded most of the flying time between the two sites as transit time (having little training value). We reviewed the air station training reports for 1997 and, on the basis of discussions with Coast Guard officials, found that all pilots met their mandatory training requirements through normal operations, without including transit time to and from Muskegon.

According to Traverse City Air Station officials, the increased transit time diminished the air station's ability to perform other missions. We reviewed air station flight records for calendar years 1996 and 1997 and found that transit time increased from 111 hours in 1996 to 477 hours in 1997, or over 300 percent. Since programmed flight hours are fixed at 645 hours per helicopter, the increased time for transit would tend to reduce the time available for other missions (see enc. V). In addition, for fiscal year 1997, the Traverse City Air Station requested an additional 200 program hours to meet its mission responsibilities.

On the basis of our record reviews and discussions with Coast Guard officials, we believe that the daily costs to transit to and from Muskegon under the 1-crew concept and periodic cost to transit to and from the other sites under the 2-crew concept should have been included in the Coast Guard's study results. Table 4 compares the Coast Guard's cost estimates (see enc. VI) for each site without transit costs and our revised estimates (see enc. VII) that include transit costs. We also noted several relatively minor computational errors—amounting to about \$8,000 annually—in the Coast Guard's original estimates, which we corrected in our revised estimates.

Table 4: Comparison of Original and Revised Cost Estimates for Sites Under Consideration

Dollars in thousands

Location	Concept of operation	Coast Guard's original cost estimates			GAO's revised cost estimates		
		One-time cost	Annual cost	Life-cycle cost <sup>a</sup>	One-time cost	Annual cost	Life-cycle cost <sup>a</sup>
Muskegon <sup>b</sup>	1-crew	\$70	(\$73)	(\$789)	\$70	\$359 <sup>c</sup>	\$4,250
Benton Harbor	2-crew	\$95	\$304	\$3,640	\$95	\$355	\$4,240
Tulip City	2-crew	\$70	\$331	\$3,940	\$70	\$372	\$4,410
Michigan City	2-crew	\$70	\$336	\$3,979	\$70	\$399	\$4,717
Gary	2-crew	\$70	\$346	\$4,099	\$70	\$413	\$4,884
Waukegan	2-crew	\$70	\$383	\$4,526	\$70	\$440	\$5,186

<sup>a</sup>Current value of a series of future costs over a 25-year period discounted at 7 percent.

<sup>b</sup>Annual and life-cycle cost figures include a cost-savings adjustment of \$327,000 per year for billet reductions of six personnel, which would result from using the 1-crew concept.

<sup>c</sup>This figure includes \$437,000 for transit costs offset by a \$5,000 adjustment for a computational error by the Coast Guard.

Sources: The Coast Guard's March 1996 planning proposal and June 1996 decision memorandum on relocating the air facility in southern Lake Michigan and our analyses.

With the transit costs included in the total cost estimate for Muskegon, Benton Harbor, not Muskegon, is actually the least costly site, but only by \$10,000 over the 25-year life-cycle cost period. In comparisons of costs among sites, the differences are relatively small, especially when viewed on an annual basis. The difference between the highest-cost location (Waukegan) and the lowest (Benton Harbor) is about \$946,000 over 25 years, or about \$83,000 annually.



COAST GUARD'S OPERATIONAL FACTOR RATINGS AND RANKINGS  
FOR RELOCATION SITES

The Coast Guard evaluated six alternative sites for relocating its air facility in southern Lake Michigan. For each site, the Coast Guard evaluated eight factors that it considered important to the operational viability. The factors were weighted equally, and the relative ranking for each factor was determined by assigning a score of 1 to 9, with 1 being the best. The scores for all eight factors were then totaled and the sites ranked, with the sites with the lowest scores receiving the highest ranking.

Factor rated	Benton Harbor	Muskegon	Tulip City	Waukegan	Gary	Michigan City
Road miles to Traverse City	3	1	2	7	5	4
IFR capabilities <sup>a</sup>	3	1	3	2	3	8
Air congestion	2	6	2	5	5	2
Crash, fire, and rescue abilities	1	1	9	9	9	9
Airfield stability	2	2	2	3	5	5
Distance to Lake Michigan	1	2	4	4	1	3
Response time--severity 2 & 3	4	7	6	3	4	4
Response time--all	2	6	5	1	4	3
<b>Total rating</b>	<b>18</b>	<b>26</b>	<b>33</b>	<b>34</b>	<b>36</b>	<b>38</b>
<b>Ranking</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

<sup>a</sup>Instrument flight rule (IFR) refers to the capabilities to launch and recover aircraft in inclement weather.

Source: The Coast Guard's March 1996 study on the relocation of Glenview Air Facility.

HELICOPTER RESPONSE TIMES TO THE AVERAGE LOCATION  
FOR MODERATE OR SEVERE INCIDENTS OCCURRING IN  
SOUTHERN LAKE MICHIGAN FROM 1994 THROUGH 1997

These are the average times that it would have taken the Coast Guard to respond to the average incident location for each year from the six sites considered for relocating the air facility. As a basis for comparison, we also include the average response times for the Traverse City Air Station and Glenview Air Facility but recognize that the Glenview Air Facility closed after the 1996 season. The responses for Glenview for 1997 are projections if the facility had remained open. The average response time from each location does not include the 30-minute allowance in the search and rescue (SAR) response standard to get the helicopter airborne after the unit is notified of an incident.

Response time in minutes

Site	1994	1995	1996	1997	4-year average
Benton Harbor	18	17	17	19	17.8
Muskegon	29	28	28	32	29.3
Tulip City	26	36	24	28	28.5
Waukegan	14	16	19	14	15.8
Michigan City	20	20	17	19	19.0
Gary	22	23	22	19	21.5
Glenview Air Facility	16	17	19	13	16.3
Traverse City Air Station	77	76	77	80	77.5

Source: The Coast Guard's SARMIS.

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Factor rated	Benton Harbor	Muskegon	Tulip City	Waukegan	Gary	Michigan City
Road miles to Traverse City	3	1	2	7	5	4
IFR capabilities <sup>a</sup>	3	1	3	2	3	8
Air congestion	2	6	2	5	5	2
Crash, fire, and rescue abilities	1	1	9	9	9	9
Airfield stability	2	2	2	3	5	5
Distance to Lake Michigan	1	2	4	4	1	3
Response time--severity 2 & 3	4	7	6	3	4	4
Response time--all	2	6	5	1	4	3
<b>Total rating</b>	<b>18</b>	<b>26</b>	<b>33</b>	<b>34</b>	<b>36</b>	<b>38</b>
<b>Ranking</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

<sup>a</sup>Instrument flight rule (IFR) refers to the capabilities to launch and recover aircraft in inclement weather.

Source: The Coast Guard's March 1996 study on the relocation of Glenview Air Facility.

HELICOPTER RESPONSE TIMES TO THE AVERAGE LOCATION  
FOR MODERATE OR SEVERE INCIDENTS OCCURRING IN  
SOUTHERN LAKE MICHIGAN FROM 1994 THROUGH 1997

These are the average times that it would have taken the Coast Guard to respond to the average incident location for each year from the six sites considered for relocating the air facility. As a basis for comparison, we also include the average response times for the Traverse City Air Station and Glenview Air Facility but recognize that the Glenview Air Facility closed after the 1996 season. The responses for Glenview for 1997 are projections if the facility had remained open. The average response time from each location does not include the 30-minute allowance in the search and rescue (SAR) response standard to get the helicopter airborne after the unit is notified of an incident.

Response time in minutes

Site	1994	1995	1996	1997	4-year average
Benton Harbor	18	17	17	19	17.8
Muskegon	29	28	28	32	29.3
Tulip City	26	36	24	28	28.5
Waukegan	14	16	19	14	15.8
Michigan City	20	20	17	19	19.0
Gary	22	23	22	19	21.5
Glenview Air Facility	16	17	19	13	16.3
Traverse City Air Station	77	76	77	80	77.5

Source: The Coast Guard's SARMIS.

TRAVERSE CITY AIR STATION'S AND ITS AIR FACILITY'S  
FLIGHT-HOUR DISTRIBUTION FOR CALENDAR YEARS 1996 AND 1997

Most Coast Guard aircraft are multimission resources, capable of accomplishing more than one program or task. This table compares the number of flight-hours used in 1996 and 1997 by the Traverse City Air Station and its air facility for the various mission categories.

Mission category	1996			1997		
	Traverse City Air Station	Glenview Air Facility	1996 total	Traverse City Air Station	Muskegon Air Facility	1997 total
Marine inspection	9.2	0.0	9.2	0.0	0.0	0.0
Recreational boat safety	2.9	3.2	6.1	0.0	0.0	0.0
Search and rescue	535.2	151.9	687.1	415.4	190.2	605.6
Domestic icebreaking	328.7	3.0	331.7	204.8	0.0	204.8
Marine science activities	0.0	1.3	1.3	0.0	0.0	0.0
Enforcement of laws and treaties	315.1	9.2	324.3	426.6	0.0	426.6
Military exchange	0.0	0.0	0.0	23.9	0.0	23.9
Aids to navigation	147.6	2.4	150.0	138.1	4.7	142.8
Marine environment protection	239.1	136.3	375.4	54.0	23.1	77.1
Port security	0.4	0.0	0.4	0.0	0.0	0.0
Special data collection	1.4	0.0	1.4	0.0	0.0	0.0
Cooperation with other agencies	119.9	19.4	139.3	142.9	20.5	163.4
Public affairs	156.3	70.9	227.2	74.9	46.0	120.9
International affairs	6.2	0.0	6.2	0.0	0.0	0.0
Miscellaneous	3.9	0.0	3.9	0.0	0.0	0.0
Test	85.3	1.2	86.5	89.3	1.9	91.2
Ferry between facilities	21.6	0.0	21.6	35.9	0.0	35.9
Operational training	766.2	219.1	985.3	729.7	137.7	867.4
SAR support (includes transit time)	38.3	72.4	110.7	21.5	456.0	477.5
<b>Total</b>	<b>2,777.3</b>	<b>690.3</b>	<b>3,467.6</b>	<b>2,357.0</b>	<b>880.1</b>	<b>3,237.1</b>

Source: The Coast Guard's Traverse City Air Station Abstract of Operations reports, 1996 and 1997.

COAST GUARD'S COST ESTIMATES FOR RELOCATING AIR FACILITY

Dollars in thousands

Location	Muskegon		Benton Harbor		Tulip City	
Concept of operation <sup>a</sup>	1-crew		2-crew		2-crew	
	Cost estimate	Life-cycle cost <sup>b</sup>	Cost estimate	Life-cycle cost <sup>b</sup>	Cost estimate	Life-cycle cost <sup>b</sup>
One-time cost						
Hangar space modification <sup>c</sup>	0	0	\$25	\$23	0	0
Moving/miscellaneous <sup>d</sup>	\$35	\$35	35	35	\$35	\$35
Outfitting <sup>e</sup>	10	10	10	10	10	10
Secure vacated facility <sup>f</sup>	25	23	25	23	25	23
<b>Total one-time cost</b>	<b>\$70</b>	<b>\$68</b>	<b>\$95</b>	<b>\$91</b>	<b>\$70</b>	<b>\$68</b>
Annual recurring cost						
Lease - new facility <sup>g</sup>	\$186	\$2,167	\$148	\$1,728	\$43	\$503
Lease - existing facility <sup>h</sup>	0	0	30	353	171	1,993
Maintenance <sup>i</sup>	17	193	22	254	23	271
Utility <sup>j</sup>	17	202	23	266	24	285
Operating <sup>k</sup>	31	357	78	913	67	785
Security <sup>l</sup>	3	35	3	35	3	35
Transit <sup>m</sup>	0	0	0	0	0	0
Billet savings <sup>n</sup>	(327)	(3,811)	0	0	0	0
<b>Total annual cost</b>	<b>(\$73)</b>	<b>(\$857)</b>	<b>\$304</b>	<b>\$3,549</b>	<b>\$331</b>	<b>\$3,872</b>
<b>Total net life-cycle cost</b>		<b>(\$789)</b>		<b>\$3,640</b>		<b>\$3,940</b>
Ranking		1		2		3

Michigan City		Gary		Waukegan	
2-crew		2-crew		2-crew	
Cost estimate	Life-cycle cost <sup>b</sup>	Cost estimate	Life-cycle cost <sup>b</sup>	Cost estimate	Life-cycle cost <sup>b</sup>
0	0	0	0	0	0
\$35	\$35	\$35	\$35	\$35	\$35
10	10	10	10	10	10
25	23	25	23	25	23
\$70	\$68	\$70	\$68	\$70	\$68
\$219	\$2,551	\$219	\$2,551	\$236	\$2,746
0	0	0	0	0	0
22	254	22	254	21	242
23	266	23	266	22	254
69	805	79	925	101	1,181
3	35	3	35	3	35
0	0	0	0	0	0
0	0	0	0	0	0
\$336	\$3,911	\$346	\$4,031	\$383	\$4,458
	\$3,979		\$4,099		\$4,526
	4		5		6

<sup>a</sup>The Coast Guard developed two viable concepts of operation. The 2-crew concept consists of one helicopter, two air crews, and two ground support personnel. The crews would be deployed for 2 weeks, alternating 24-hour shifts. Crew change-outs would be every week (one crew per week) via ground transportation. Helicopter swaps would be conducted as maintenance needs dictate. The 1-crew concept consists of one helicopter and one air crew. Crew and helicopter change-outs would be made daily via helicopter.

<sup>b</sup>The current value of a series of future costs over a 25-year life-cycle period discounted at 7 percent.

<sup>c</sup>Estimate includes modification to leased hangar space to accommodate minor maintenance and storage requirements. Figure is based on charging \$50 per square foot for 500 square feet.

<sup>d</sup>Estimate includes computer and telephone relocations/upgrades and commercial moving of large equipment.

<sup>e</sup>The Coast Guard plans to reuse existing Glenview Air Facility's equipment and furnishings when possible. Estimate is based on minor outfitting to accommodate new facilities.

<sup>f</sup>Cost incurred to secure vacated Glenview Air Facility from vandals, unwelcome visitors, and the elements/weather.

<sup>g</sup>Assumes total gross square footage of 15,228, including new and existing facilities, except for the Tulip City 2-crew alternative, which has an existing facility of 16,290 gross square footage, and the Muskegon 1-crew alternative, which requires only 11,576 total square footage. Construction cost per gross square footage is based on the 1993 construction cost of the Coast Guard's Charleston, South Carolina, air facility escalated to fiscal year 1997 at 3 percent per year and adjusted for the geographic area of each site. Design and construction management costs are assumed to be 10 percent of the construction cost. Total costs for new facilities are amortized at 4.5 percent interest for 20 years.

<sup>h</sup>Assumes total gross square footage of 15,228, including new and existing facilities, except for the Tulip City 2-crew alternative, which has an existing facility of 16,290 gross square footage, and the Muskegon 1-crew alternative, which requires only 11,576 total square footage. The cost per gross square footage is based on the Coast Guard's discussions with city/airport officials at each site.

<sup>i</sup>Maintenance costs per gross square footage are \$1.43 per year based on the Ninth Coast Guard District's budget model.

<sup>j</sup>Utility costs are estimated at \$1.50 per gross square footage of facility per year.

<sup>k</sup>Operating cost is based on fiscal year 1995 per diem rates for meals and incidental expenses (lodging is already provided at facility) by locale times the number of personnel assigned on a given day (including weekly overlaps for crew rotations under the 2-crew concept) plus vehicle mileage (round-trip) for crew transportation.



<sup>l</sup>Estimate represents average of cost developed informally through the Coast Guard's discussions with various airport officials.

<sup>m</sup>Coast Guard's cost estimates did not include transit costs.

<sup>n</sup>Under the Muskegon 1-crew concept alternative, the air facility can be established with six fewer people than under the 2-crew concept alternatives. Coast Guard estimates that the savings of six billets equate to approximately \$327,000 annually.

Source: Prepared by GAO from the Coast Guard's March 1996 study and its June 1996 decision memorandum.

GAO'S COST ESTIMATES FOR RELOCATING AIR FACILITY

Dollars in thousands

Location	Benton Harbor		Muskegon		Tulip City	
Concept of operation <sup>a</sup>	2-crew		1-crew		2-crew	
	Cost estimate	Life-cycle cost <sup>b</sup>	Cost estimate	Life-cycle cost <sup>b</sup>	Cost estimate	Life-cycle cost <sup>b</sup>
<b>One-time cost</b>						
Hangar space modification <sup>c</sup>	\$25	\$23	0	0	0	0
Moving/miscellaneous <sup>d</sup>	35	35	\$35	\$35	\$35	\$35
Outfitting <sup>e</sup>	10	10	10	10	10	10
Secure vacated facility <sup>f</sup>	25	23	25	23	25	23
<b>Total one-time cost</b>	<b>\$95</b>	<b>\$91</b>	<b>\$70</b>	<b>\$68</b>	<b>\$70</b>	<b>\$68</b>
<b>Annual recurring cost</b>						
Lease - new facility <sup>g</sup>	\$148	\$1,728	\$186	\$2,167	\$44 <sup>p</sup>	\$512
Lease - existing facility <sup>h</sup>	30	353	0	0	171 <sup>p</sup>	1,993
Maintenance <sup>i</sup>	22	254	17	193	23	271
Utility <sup>j</sup>	23	266	17	202	24	285
Operating <sup>k</sup>	78	913	26 <sup>o</sup>	301	67	785
Security <sup>l</sup>	3	35	3	35	3	35
Transit <sup>m</sup>	51	600	437	5,095	40	461
Billet savings <sup>n</sup>	0	0	(327)	(3,811)	0	0
<b>Total annual cost</b>	<b>\$355</b>	<b>\$4,149</b>	<b>\$359</b>	<b>\$4,182</b>	<b>\$372</b>	<b>\$4,342</b>
<b>Total net life-cycle cost</b>		<b>\$4,240</b>		<b>\$4,250</b>		<b>\$4,410</b>
<b>Ranking</b>		<b>1</b>		<b>2</b>		<b>3</b>

Michigan City		Gary		Waukegan	
2-crew		2-crew		2-crew	
Cost estimate	Life-cycle cost <sup>b</sup>	Cost estimate	Life-cycle cost <sup>b</sup>	Cost estimate	Life-cycle cost <sup>b</sup>
0	0	0	0	0	0
\$35	\$35	\$35	\$35	\$35	\$35
10	10	10	10	10	10
25	23	25	23	25	23
\$70	\$68	\$70	\$68	\$70	\$68
\$219	\$2,551	\$219	\$2,551	\$236	\$2,746
0	0	0	0	0	0
22	254	22	254	22 <sup>a</sup>	254
23	266	23	266	23 <sup>a</sup>	266
69	805	79	925	101	1,171
3	35	3	35	3	35
63	738	67	785	55	646
0	0	0	0	0	0
\$399	\$4,649	\$413	\$4,816	\$440	\$5,118
	\$4,717		\$4,884		\$5,186
	4		5		6

<sup>a</sup>The Coast Guard developed two viable concepts of operation. The 2-crew concept consists of one helicopter, two air crews, and two ground support personnel. The crews would be deployed for 2 weeks, alternating 24-hour shifts. Crew change-outs would be every week (one crew per week) via ground transportation. Helicopter swaps would be conducted as maintenance needs dictate. The 1-crew concept consists of one helicopter and one air crew. Crew and helicopter change-outs would be made daily via helicopter.

<sup>b</sup>The current value of a series of future costs over a 25-year life-cycle period discounted at 7 percent.

<sup>c</sup>Estimate includes modification to leased hangar space to accommodate minor maintenance and storage requirements. Figure is based on charging \$50 per square foot for 500 square feet.

<sup>d</sup>Estimate includes computer and telephone relocations/upgrades and commercial moving of large equipment.

<sup>e</sup>The Coast Guard plans to reuse existing Glenview Air Facility's equipment and furnishings when possible. Estimate is based on minor outfitting to accommodate new facilities.

<sup>f</sup>Cost incurred to secure vacated Glenview Air Facility from vandals, unwelcome visitors, and the elements/weather.

<sup>g</sup>Assumes total gross square footage of 15,228, including new and existing facilities, except for the Tulip City 2-crew alternative, which has an existing facility of 16,290 gross square footage, and the Muskegon 1-crew alternative, which requires only 11,576 total square footage. Construction cost per gross square footage is based on the 1993 construction cost of the Coast Guard's Charleston, South Carolina, air facility escalated to fiscal year 1997 at 3 percent per year and adjusted for the geographic area of each site. Design and construction management costs are assumed to be 10 percent of construction cost. Total costs for new facilities are amortized at 4.5 percent interest for 20 years.

<sup>h</sup>Assumes total gross square footage of 15,228, including new and existing facilities, except for the Tulip City 2-crew alternative, which has an existing facility of 16,290 gross square footage, and the Muskegon 1-crew alternative, which requires only 11,576 total square footage. The cost per gross square footage is based on the Coast Guard's discussions with city/airport officials at each site.

<sup>i</sup>Maintenance costs per gross square footage are \$1.43 per year based on the Ninth Coast Guard District's budget model.

<sup>j</sup>Utility costs are estimated at \$1.50 per gross square footage of facility per year.

<sup>k</sup>Operating cost is based on fiscal year 1995 per diem rates for meals and incidental expenses (lodging is already provided at facility) by locale times the number of personnel assigned on a given day (including weekly overlaps for crew rotations under the 2-crew concept) plus vehicle mileage (round-trip) for crew transportation.

<sup>l</sup>Estimate represents average of cost developed informally through the Coast Guard's discussions with various airport officials.

<sup>m</sup>Expenditures related to flight-hours to and from the operating site for (1) daily crew change-outs under the 1-crew concept and (2) needed helicopter maintenance under the 2-crew concept. Flight-hours are based on nautical miles between the operating site and Traverse City Air Station divided by 120 miles per flight-hour, the typical airspeed for the HH-65A helicopter. For the HH-65A helicopter, the cost for fuel and maintenance is about \$1,320 per flight-hour. Under the 1-crew concept, transit trips would total 414 per year. Under the 2-crew concept, transit trips would total 30 per year.

<sup>n</sup>Under the Muskegon 1-crew concept alternative, the air facility can be established with six fewer people than under the 2-crew concept alternatives. Coast Guard estimates that the savings of six billets equate to approximately \$327,000 annually.

<sup>o</sup>The Coast Guard's estimate was about \$31,000.

<sup>p</sup>Existing facility does not have a foam deluge system, which the Coast Guard estimates will cost \$572,000. This figure is amortized for 20 years at 4.5 percent interest.

<sup>q</sup>The Coast Guard's estimate was about \$21,000.

<sup>r</sup>The Coast Guard's estimate was about \$22,000.

Source: GAO's calculations based on analyses of the Coast Guard's cost estimates.

REVISED RANKINGS BASED ON DATA AVAILABLE IN 1996  
AND REVISED RANKINGS BASED ON CURRENT DATA

Coast Guard's Rankings and GAO's Revised Rankings Based on 1996 Data

Site	Cost ranking		Operational ranking		Total overall ranking	
	CG study	GAO revised	CG study	GAO revised	CG study	GAO revised
Benton Harbor	2	1	1	1	3	2
Muskegon	1	2	2	2	3	4
Tulip City	3	3	3	3	6	6
Gary	5	5	5	5	10	10
Michigan City	4	4	6	6	10	10
Waukegan	6	6	4	4	10	10

GAO's Revised Ranking Based on Current Data

Site	Cost ranking		Operational ranking		Overall ranking	
	CG study	GAO revised	CG study	GAO revised	CG study	GAO revised
Benton Harbor	2	1	1	1	3	2
Muskegon	1	2	2	2	3	4
Tulip City	3	3	3	4	6	7
Gary	5	5	5	3	10	8
Michigan City	4	4	6	6	10	10
Waukegan	6	6	4	5	10	11

Note: Work-life factors were not considered in ranking the sites.

Source: The Coast Guard's March 1996 study and its June 1996 decision memorandum and GAO's analyses of operational, cost, and work-life factors.

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