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Report to the Secretary of Defense

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ARMY NATIONAL GUARD

Sharing Unit Training Equipment Would Help Avoid Maintenance Costs

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National Security and
International Affairs Division

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September 29, 1997

The Honorable William S. Cohen
The Secretary of Defense

Dear Mr. Secretary:

We initiated this review to identify opportunities for Army National Guard units to share training equipment and store unused equipment in preserved environments, which would help avoid some maintenance costs and reduce the existing maintenance backlog. Specifically, we determined the (1) feasibility of Guard units that annually train at the same site to pool and share equipment, (2) maintenance costs that the Guard would avoid by pooling and sharing equipment, and (3) ways the Guard can maximize equipment sharing at annual training sites.

Background

The Army National Guard has approximately $38 billion worth of equipment assigned to its 54 separate state and territorial military commands. The equipment is mostly used during peacetime to train units in the event that they are needed to reinforce or replace active force components during wartime. Equipment predominantly used for units' 2-week annual training is located at Mobilization and Training Equipment Sites (MATES). There are 24 MATES located throughout the United States, and almost half of them will have equipment that belongs to more than one unit.

During the last several years, the Guard has spent over $756 million annually to maintain its equipment. However, this amount has not been enough to fund required scheduled maintenance and repairs on equipment that has deteriorated. As a result, the Guard had a maintenance backlog of 2.3 million labor hours as of September 1996. To help reduce this backlog, the Guard developed the Controlled Humidity Preservation Program. The goal of the program is to preserve up to 25 percent of the Guard's combat-ready ground equipment, including tanks, Bradley Fighting Vehicles, self-propelled howitzers, and recovery vehicles, in a controlled humidity environment for up to 5 years. The program will eliminate the need to perform scheduled and unscheduled maintenance on the preserved equipment, which will permit the Guard to concentrate its limited maintenance resources on the remaining equipment and gradually reduce the maintenance backlog.

The Guard has selected 890 equipment items for preservation under the Controlled Humidity Preservation Program. Equipment preserved under the program will meet all technical and mission capability requirements and will be available when needed for mobilization or training rotation purposes. The Guard is testing program techniques at several locations throughout the United States and is focusing on equipment that has high maintenance costs and humidity-sensitive electronic components, such as the M1A1 tank. Preliminary test results have been positive. Even though final results are not anticipated until January 1998, the Guard is moving forward with implementation. Currently, 17 states have taken actions to implement controlled humidity techniques, and 16 more states plan to do so before the end of fiscal year 1997. Appendix I contains a more detailed discussion of the Controlled Humidity Preservation Program.

Results in Brief

According to our analysis of nine equipment items with high annual scheduled maintenance costs[1] and eight Army National Guard units, it is feasible for units that annually train at the same site to pool and share equipment. For the eight units we reviewed, more than enough equipment is already located at Mobilization and Training Equipment Sites to create a pool of equipment for unit training needs. The equipment not needed for the pool could be preserved in a controlled humidity environment. In fact, more equipment than the Guard's 25-percent goal can be preserved. Further, other than during the 2-week annual training period, the unit equipment located at some training sites is used little. Because units train at different times during the summer, this equipment could be made available to other units for use during their 2-week training period or put in preserved storage.

Our analysis of the nine equipment items also showed that the Guard could avoid up to $10.3 million annually in maintenance costs if it preserved 25 percent of these items in a controlled humidity environment. Further, our analysis indicated that the Guard could avoid up to $20 million annually in maintenance costs if three units at one training site and two units at another training site pooled and shared their equipment and preserved their unused equipment. The cost avoidance we identified is the minimum that the Guard can achieve because many equipment items

[1]The nine items selected for review were the Abrams Combat Tank, Bradley Infantry Fighting Vehicle, Bradley Cavalry Fighting Vehicle, Self-Propelled Howitzer, Recovery Vehicle, Armored Vehicle Launch Bridge, Armored Fire Support Personnel Carrier, Armored Personnel Carrier, and Command Post Carrier.

other than the ones used in our analysis, could be pooled and shared.[2] Also, our analysis included only eight Guard units, and additional maintenance costs could be avoided if other state and territorial Guard military commands pooled and shared training equipment.

Changing the annual training site of as few as three units will maximize equipment sharing, cause more equipment to be available for preservation, and allow the Guard to more efficiently use scarce maintenance resources. Under this scenario, Guard units could place as much as 49 percent[3] of their equipment in preserved storage and reduce maintenance costs by $38.1 million in the first year[4] and $39.2 million each year thereafter, which is $18 million more than the $21.2 million cost avoidance using the Guard's 25-percent goal. Although the Guard would incur additional facility costs to preserve more than 25 percent of its equipment, the benefits of avoiding annual maintenance costs for this equipment would more than offset the facility costs.

Pooling and Sharing Training Equipment Are Feasible

Guard units generally do not share their equipment and would only use equipment from another unit when they do not have sufficient quantities of their own to meet training needs. Our analysis of equipment usage at the Fort Stewart, Georgia, and Camp Shelby, Mississippi, MATES confirmed that the five units that train at these locations share very little equipment. However, it would be feasible for these units, as well as other units that use the same training site, to pool and share equipment. More than enough equipment is already located at these MATES to create a pool of equipment to meet unit training needs. The equipment not needed for the pool could be put in preserved storage. Further, the unit equipment located at the Fort Stewart and Camp Shelby MATES is predominately used during the units' 2-week annual training period.[5] Because units train at different times during the summer, this equipment could be made available to other units for use during their 2-week training period or put in preserved storage. In fact, more equipment than the Guard's 25-percent goal can be preserved.

[2]Cost avoidance, as used in this report, includes costs associated with repair parts; depot-level repairable equipment; petroleum, oil, and lubricants; and personnel time and effort to maintain equipment.

[3]This percentage was calculated based on the collective percent of the nine equipment items that can be preserved at the three MATES. The quantities of individual equipment items that may be preserved differ; therefore, this percentage cannot be applied to individual equipment items throughout the Guard.

[4]First-year net savings is the amount realized after deducting equipment relocation expenses.

[5]This equipment is also used during the year for weekend training.

Units Do Not Currently Share Equipment at Training Sites

National Guard Regulation 750-2 (Oct. 1, 1996) requires that units draw and train with their own equipment, if possible, during their annual 2-week training period. Units generally do not share their equipment with another unit and only use equipment from another unit when they do not have sufficient quantities of their own to meet training needs. Concerns about equipment sharing have been expressed because all units do not have the same types of equipment and personnel believe they need to train with their own equipment.

Guard units train about 39 days each year, but the equipment located at MATES is used mostly during the 2-week annual training period, which is normally conducted during the summer months. For the remaining 50 weeks, the equipment is used little and generally sits outside exposed to the weather elements. The Guard requires units to place 50 percent of selected equipment items, such as M1A1 Abrams tanks and Bradley Fighting Vehicles, at MATES, since such equipment is generally needed and used only when units conduct their 2-week annual training.

Our analysis of equipment usage at the Fort Stewart and Camp Shelby MATES showed that the five units that train at these locations share very little equipment. For example, in 1996 the three brigades from Fort Stewart withdrew equipment 31 times, but in only 6 instances (19 percent) did any of the equipment belong to another brigade. At the Camp Shelby MATES, officials stated that units use only their own equipment during their annual 2-week training period and do not share equipment with other units.

In addition, the tanks stored at the Fort Stewart, Camp Shelby, and Fort Hood, Texas, MATES are used very little. We analyzed the engine hour usage data for 246 M1A1 and M1IP tanks and found that engines were running an average of about 52 hours, or 6-1/2 days, per year (assuming an 8-hour training day).[6]

Sharing Will Allow More Equipment to Be Preserved

Establishing equipment pools and requiring units that train at the same site to share the minimum quantities of equipment needed for training would enable the Guard to preserve more equipment in controlled environments. Although concerns about equipment sharing have been expressed, Guard officials at the Army National Guard Bureau, state, MATES, and unit levels believe that units can share equipment and use the controlled humidity

[6]Engine hours include actual training time as well as time used in performing maintenance during the 2-week annual training period and weekend training.

concept for preserving equipment. Generally, the officials agreed that units do not have to use their own equipment in training, equipment can be shared to a greater extent, and a paradigm change is necessary. According to officials, equipment ownership and sharing are leadership issues that can be managed. Further, according to the Guard's modernization plans, high-priority units will generally have the same equipment by the end of 1999.

Several factors have a significant impact on determining the size of equipment pools. These factors include a unit's assigned personnel, number of unit personnel that actually attend annual training with their unit, the quantities of equipment items drawn from a MATES and the quantities actually needed to accomplish training tasks, and annual training scheduling intervals. The number of individual equipment items required in a pool will vary by type and size of units training at a particular location.

MATES officials stated that the size of the equipment pool would also need to reflect their ability to repair nonmission-capable (NMC) equipment after units complete training.[7] Equipment turnaround time and the amount of time a MATES has to fix NMC equipment between unit training periods are key to determining the equipment pool size and the quantity of equipment that can be placed in long-term preservation. With the exception of major problems, such as a blown engine for a M1A1 tank or equipment awaiting parts availability, most equipment items can be fixed and returned to the pool within 2 weeks, the officials said. Scheduling annual training with the greatest interval between unit training periods would allow MATES personnel more time to repair equipment for reissuance and thus allow greater equipment quantities to be preserved. Appendix II contains information on how we determined the size of the pools used in our analysis.

Several MATES officials stated that unit commanders draw more equipment than they need for annual training. More equipment could be preserved if unit commanders would draw only the equipment quantities needed to accomplish training tasks. For example, officials at one MATES said unit commanders generally draw one M1A1 tank and one Bradley Fighting Vehicle for each of the tank and Bradley crews that show up for an annual training event. The officials said that the commanders wanted to have each crew experience some driving time and therefore had extra tanks and

[7]Equipment is considered NMC if it cannot perform one or more of its combat missions.

Bradleys available so that training would not be delayed or interrupted because of maintenance.

MATES officials understood this rationale but pointed out that a unit generally has only two training ranges available at any one time and that only two crews can train on a range. Therefore, a typical M1A1 tank or a Bradley unit trying to qualify in gunnery operations can train only four crews at the same time. The officials believe that these units can achieve their training tasks with about one-half of the tank and Bradley vehicles drawn from MATES and still have enough extra equipment in case of maintenance losses. A Bradley Fighting Vehicle battalion commander stated that his battalion could achieve training goals with about one-half the Bradleys drawn for annual training. The commander also stated that other commanders could achieve their training goals with the same amount of equipment but that this method of operating would require a change in the way training is currently done.

MATES officials had other suggestions to reduce the amount of equipment needed to accomplish training goals and increase preservation of equipment. These suggestions include (1) minimizing home station assets, (2) improving maintenance operations in units by making maintenance a priority, (3) splitting annual training by having half of the brigade rotate in and out of annual training, and (4) scheduling training over a longer period of time to better utilize equipment availability at MATES.

Maintenance Costs Can Be Avoided by Pooling and Sharing Training Equipment

The Guard's training equipment is costly to maintain. In fact, the Guard spent over $756 million during fiscal years 1995 and 1996 to maintain equipment, but this amount was insufficient to perform all required maintenance. Our analysis of the nine equipment items showed that the Guard could avoid up to $10.3 million annually in maintenance costs if it preserved 25 percent of this equipment in a controlled humidity environment. Our analysis also showed that the Guard could avoid an additional $4.4 million to $9.7 million each year in maintenance costs if it required the three units that train at the Fort Stewart MATES and the two units that train at the Camp Shelby MATES to pool and share equipment. The portion of each unit's training equipment that is not pooled could then be preserved.

The cost avoidance we identified is the minimum that the Guard can achieve because many equipment items other than the ones used in our analysis could be pooled and shared. Also, our analysis included only eight

Guard units, and additional maintenance costs could be avoided if other state and territorial Guard military commands pooled and shared training equipment. In fact, in May 1997, the U.S. Army Cost and Economic Analysis Center endorsed the Guard's Controlled Humidity Preservation Economic Analysis and stated that similar benefits were likely in the Army Reserves, active component, and other services.

Equipment Is Costly to Maintain

According to the economic analysis of the Controlled Humidity Preservation Program, the required scheduled maintenance for the 890 ground equipment items in the program would cost the Guard about $1.1 billion annually. Much of this required maintenance, however, is not funded, which has forced trade-off decisions. During fiscal years 1995 and 1996, the Guard spent over $756 million to maintain equipment. This amount was focused on maintaining priority equipment items rather than performing other required maintenance.

Scheduled periodic maintenance accounts for much of the annual maintenance expense.[8] For example, annual scheduled maintenance for one M1A1 Abrams tank costs $61,555 and takes 995 hours to complete. For the Guard's 472 M1A1 tanks, these figures translate to an annual expense of over $29 million and about 470,000 labor hours. The annual scheduled maintenance cost for the Guard's tracked vehicles alone is $363 million.

More Costs Could Be Avoided Than Currently Anticipated

The Guard anticipates that annual scheduled maintenance costs of $277 million could be deferred by placing 25 percent of the 890 equipment items in long-term preservation. However, more maintenance costs can be deferred than the Guard anticipates because additional equipment can be preserved. For example, if the Guard preserved 25 percent of the equipment used in our analysis, it could avoid up to $10.3 million annually in maintenance costs. However, if the Guard established equipment pools and required units training at the same site to share this equipment, it could avoid $4.4 million to $9.7 million more each year. As a result, the Guard could preserve more equipment in controlled environments and avoid spending up to $20 million annually. More details on how we estimated the potential cost avoidance by pooling and sharing equipment is in appendix II.

[8]The annual cost of scheduled maintenance, as used in this report, includes the Guard's compilation of the costs for labor, parts, petroleum, oils, and lubricants.

The additional cost avoidance would occur if the 48th and 218th Infantry Brigades and the 278th Armored Cavalry Regiment were to share the equipment they have located at the Fort Stewart MATES and the 155th Armor and 31st Armored Brigades were to share the equipment at the Camp Shelby MATES. The additional cost avoidance is attainable because the five units that conduct annual training at the Fort Stewart and Camp Shelby MATES train at different times during the summer. Therefore, a portion of each unit's training equipment could be pooled and designated as common use equipment, and the remaining equipment could be preserved in a controlled humidity environment.

Units reporting for training would draw the necessary equipment to complete their 2-week training cycle from the pool of common use equipment. The equipment would then be returned to the pool and be made ready for the next unit. Equipment could be rotated in and out of the pool to equalize use so that the equipment in the pool is not subjected to overuse. Table 1 shows the incremental maintenance cost avoidance if the three units at the Fort Stewart MATES and the two units at the Camp Shelby MATES were to share the nine equipment items for training purposes and place their remaining equipment in long-term preservation. More details concerning NMC rates and training intervals are on page 31 in appendix II.

Table 1: Cost Avoidance Possible If Equipment Were Shared at the Fort Stewart and Camp Shelby Mobilization and Training Equipment Sites

Dollars in millions

Selected NMC rates and training intervals	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
30% NMC rate with no interval between training periods	345	$10.2	209	$4.4	554	$14.6
15% NMC rate with no interval between training periods	350	$10.3	302	$7.3	652	$17.6
30% NMC rate with a 2-week interval between training periods	350	$10.3	330	$7.9	680	$18.2
15% NMC rate with a 2-week interval between training periods	350	$10.3	386	$9.7	736	$20.0

Additional maintenance costs could be avoided if unit commanders used only the minimum quantities of equipment needed for annual training. According to MATES officials, unit commanders draw whatever equipment quantities they deem necessary to accomplish annual training because they are not responsible for the maintenance costs of this equipment. If

unit commanders used the minimum equipment required, the potential size of an equipment pool could be smaller, enabling more equipment to be preserved.

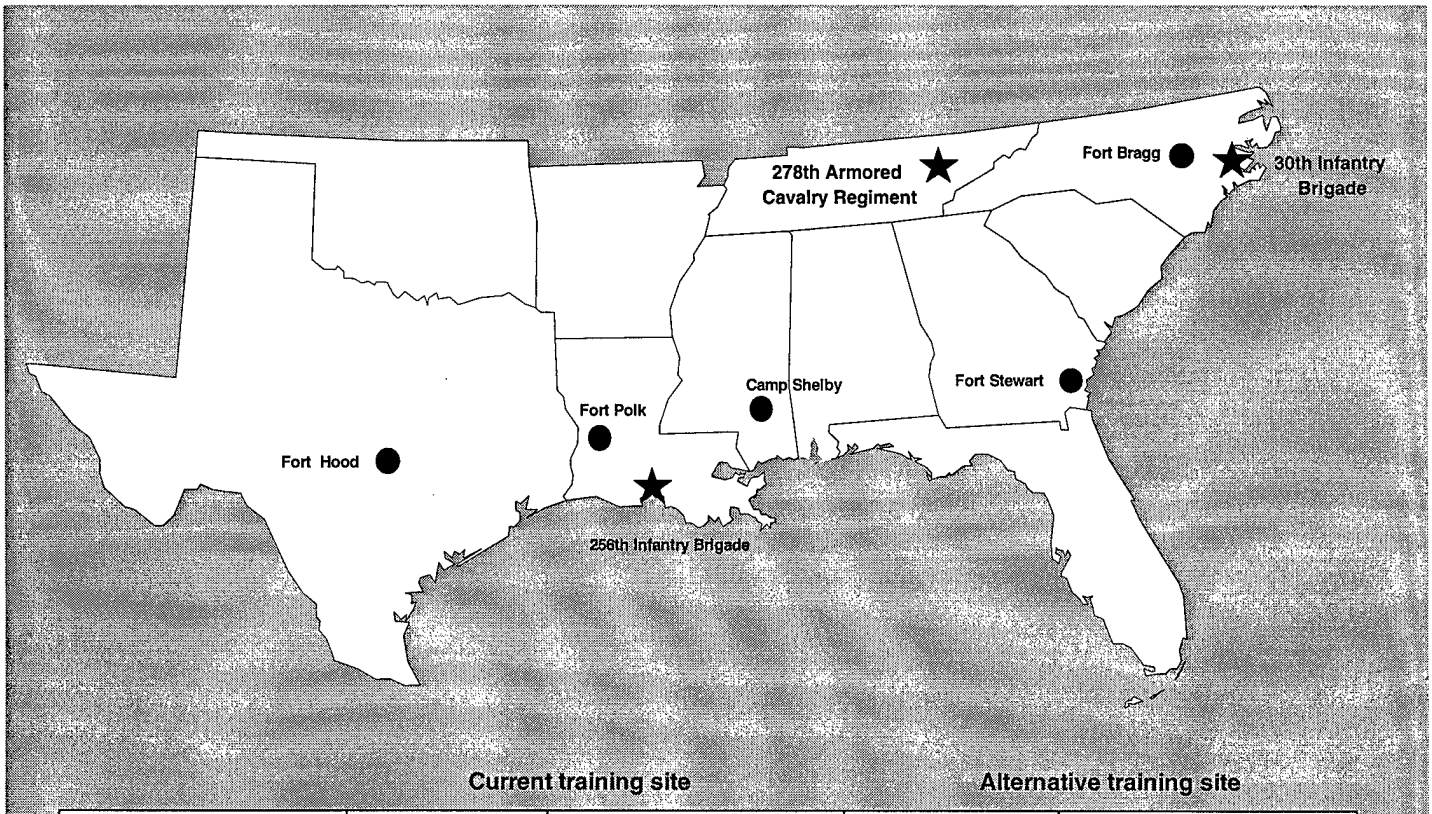
Changes in Annual Training Sites Would Maximize Equipment Sharing and Cost Avoidance

Changing the annual training sites of some units to allow multiple units with like or comparable equipment to train at the same site would facilitate greater equipment sharing. If sharing were optimized, maximum maintenance cost avoidance could be achieved. Various scenarios exist to achieve optimum equipment sharing and training goals. Additional travel time, costs to transport equipment to another training site, and the impact of equipment density reductions on maintenance personnel requirements are concerns associated with changing annual training sites.

We developed three scenarios to demonstrate how equipment sharing could result in an avoidance of greater maintenance costs. The scenarios we present may not necessarily reflect the optimum combinations of units and annual training sites to achieve the greatest benefits to the Guard. However, all three scenarios reflect greater potential benefits to the Guard than those that are presently being achieved or anticipated through the implementation of the Guard's Controlled Humidity Preservation Program.

According to our analysis of nine equipment items and eight Guard units, we determined that the Guard could reduce scheduled annual maintenance cost by an additional $23.1 million to $39.2 million annually if as few as three units changed their annual training location and share equipment. These figures are $5.3 million to $18 million more than the Guard's current program could achieve. Our scenarios for changing annual training sites are detailed in figure 1.

Figure 1: Distances to Units' Training Sites



Unit	Location	Distance from home unit	Location	Distance from home unit
278th Armored Cavalry Regiment	Fort Stewart, Ga.	390 miles	Fort Hood, Tex.	960 miles
30th Infantry Brigade	Fort Bragg, N.C.	30 miles	Fort Stewart, Ga.	230 miles
256th Infantry Brigade	Fort Polk, La.	120 miles	Camp Shelby, Miss. or Fort Hood, Tex.	197 or 400 miles

We recognize that the scenarios presented will require units to travel farther to train and therefore incur more transportation costs. Also, there would be one-time equipment relocation costs in each scenario. However,

the annual maintenance cost avoidance to be achieved through sharing and preserving equipment is greater than these additional costs. For example, under scenario 2, transportation to annual training would cost approximately $4.2 million and equipment relocation would cost $888,000, for a total of $5.1 million. The minimum cost avoidance the Guard could achieve by pooling and sharing equipment under this scenario would be $25.6 million, as shown in table 3. Even though maintenance personnel requirements are based on the quantities of equipment located at MATES, changes in equipment quantities would be offset from one annual training site to another. We recognize the economic impact such changes would have, but the maintenance cost avoidance to be realized would be greater to the Guard as a whole.

Scenario 1

This scenario involves seven Guard units and maximizes equipment sharing among the 48th and 218th Infantry Brigades and the 278th Armored Cavalry Regiment, which train at Fort Stewart, and the 155th Armor Brigade and 31st Armored Brigade, which train at Camp Shelby. The annual training site of the 256th Infantry Brigade is changed from Fort Polk to Fort Hood to maximize equipment sharing with the 49th Armored Division, which is located there. The 256th Infantry Brigade stores much of its equipment at the Fort Polk MATES, and units accomplish their weekend training at Fort Polk. Fort Hood is the infantry brigade's mobilization training site, and the 49th Armored Division provides the opposing forces for the brigade's annual training.

This scenario allows the Guard to preserve up to an additional 488 pieces of equipment over its current goal. Even though an estimated one-time cost of about $269,000 would be incurred to move equipment, an additional $5.3 million to $11.3 million in costs would be avoided annually, as shown in table 2. According to III Corps officials at Fort Hood, from a training and logistical support standpoint, Fort Hood can accommodate an additional brigade for annual training. Also, according to Fort Hood MATES officials, facilities are adequate to accommodate and maintain the equipment of another brigade-size unit.

Table 2: Cost Avoidance Possible If Equipment Were Shared at the Forts Stewart and Hood and Camp Shelby Mobilization and Training Equipment Sites (Scenario 1)

Dollars in millions

Selected NMC rates and training intervals	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
30% NMC rate with no interval between training periods	626	$17.8	270	$5.3	896	$23.1
15% NMC rate with no interval between training periods	660	$18.9	378	$8.4	1,038	$27.3
30% NMC rate with a 2-week interval between training periods	653	$18.5	392	$7.7	1,045	$26.2
15% NMC rate with a 2-week interval between training periods	675	$19.6	488	$11.3	1,163	$30.9

Louisiana State Area Command and 256th Infantry Brigade officials were not in favor of having the brigade change annual training sites. The concerns expressed by these officials primarily focused on the additional transportation and equipment movement costs and potential loss of training time associated with changing the brigade's annual training site to Fort Hood. Brigade officials were also concerned with their units' inability to conduct weekend training, especially gunnery, at Fort Polk if 50 percent of their tanks and Bradleys were moved to Fort Hood and the Fort Polk MATES were to lose maintenance personnel. However, the officials recognized the benefits of pooling and sharing equipment.

Scenario 2

This scenario involves seven Guard units and changes the annual training site of the 30th Infantry Brigade from Fort Bragg to Fort Stewart and the 278th Armored Cavalry Regiment's training site from Fort Stewart to Fort Hood. These changes allow for optimum equipment sharing among the 48th, 218th, and 30th Infantry Brigades at Fort Stewart; the 49th Armored Division and the 278th Armored Cavalry Regiment at Fort Hood; and the 155th Armor and 31st Armored Brigades at Camp Shelby.

This scenario allows the Guard to preserve up to an additional 572 pieces of equipment over its current goal. Even though the Guard would incur a one-time transportation cost estimated at $888,000 to relocate equipment, the changes enhance sharing and preservation of equipment and achieve an annual maintenance cost avoidance ranging from $7.4 million to $15 million more than currently anticipated, as shown in table 3. In addition, this scenario provides the 278th Armored Cavalry Regiment with

larger range facilities for its tanks, and the 30th Infantry Brigade would join two other infantry brigades at Fort Stewart that train with the same equipment.

Table 3: Cost Avoidance Possible If Equipment Were Shared at the Forts Stewart and Hood and Camp Shelby Mobilization and Training Equipment Sites (Scenario 2)

Dollars in millions

Selected NMC rates and training intervals	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
30% NMC rate with no interval between training periods	627	$18.2	317	$7.4	944	$25.6
15% NMC rate with no interval between training periods	644	$18.7	458	$11.6	1,102	$30.3
30% NMC rate with a 2-week interval between training periods	649	$18.8	487	$12.1	1,136	$30.9
15% NMC rate with a 2-week interval between training periods	649	$18.8	572	$15.0	1,221	$33.8

Officials from the North Carolina State Area Command, 30th Infantry Brigade, and Fort Stewart MATES indicated that changing the infantry brigade's annual training site from Fort Bragg to Fort Stewart would be feasible. The infantry brigade has previously trained at Fort Stewart and is scheduled to conduct annual training there in 1998. Although both locations have similar maneuver areas, Fort Stewart has better gunnery ranges than Fort Bragg. According to the officials, Fort Bragg does not have the gunnery ranges to qualify tank and Bradley crews to the required proficiency level (gunnery table VIII). Fort Stewart MATES officials stated that it would be easier to support three infantry brigades than the current two infantry brigades and one armored cavalry regiment because the three brigades have the same types and quantities of equipment.

Concerns were expressed over the increased annual training travel costs to Fort Stewart and the initial costs to move 50 percent of certain equipment from Fort Bragg to Fort Stewart. The Commander of the 30th Infantry Brigade said that all of the brigade's equipment was needed at Fort Bragg for weekend training requirements. The Commander thought that, without the equipment, the unit would not be able to train to standards and, as a result, unit readiness would suffer. Further, the Commander believed that retention would also suffer because personnel like to use the equipment currently available. In addition, the Fort Bragg MATES General Foreman was concerned about losing maintenance

personnel if the equipment were moved to Fort Stewart because less equipment would be at Fort Bragg. The official suggested, as an alternative, preserving 50 percent of the equipment at Fort Bragg, which would save the movement costs and provide equipment needed for weekend training. The 30th Infantry Brigade could then use the equipment already located at Fort Stewart for annual training needs.

Officials from Fort Hood, the 278th Armored Cavalry Regiment, and the Tennessee State Area Command stated that changing the regiment's annual training site to Fort Hood would be feasible. III Corps officials at Fort Hood stated that, from a training and logistics support standpoint, Fort Hood could accommodate the regiment for annual training. The Commander of the 278th Armored Cavalry Regiment pointed out that Fort Hood has excellent training ranges and MATES facilities. Officials raised concerns about the additional travel time to Fort Hood; however, the 278th Armored Cavalry Regiment has trained at Fort Hood in the past and would be amenable to training there in the future. The Commander also recognized that the regiment would have to move a portion of its equipment to Fort Hood to receive priority for range use.

Scenario 3

This scenario involves eight Guard units and changes the annual training site of three units. The 278th Armored Cavalry Regiment would train with the 49th Armored Division at Fort Hood, and the 256th Infantry Brigade would train with the 155th Armor and 31st Armored Brigades at Camp Shelby. As in scenario 2, the 30th Infantry Brigade would train at Fort Stewart with the 48th and 218th Infantry Brigades.

The one-time transportation cost to relocate equipment under this scenario is estimated at $1,134,000. However, this scenario is the most beneficial in avoiding maintenance cost. The three annual training site changes would enhance sharing and preservation of equipment and result in an annual maintenance cost avoidance ranging from $11 million to $18 million more than currently anticipated, as shown in table 4. This scenario also shows the added benefits of having as many as three units training and sharing equipment at the same annual training site.

Table 4: Cost Avoidance Possible If Equipment Were Shared at the Forts Stewart and Hood and Camp Shelby Mobilization and Training Equipment Sites (Scenario 3)

Dollars in millions

Selected NMC rates and training intervals	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
30% NMC rate with no interval between training periods	697	$19.6	446	$11.0	1,143	$30.6
15% NMC rate with no interval between training periods	725	$20.6	590	$14.9	1,315	$35.5
30% NMC rate with a 2-week interval between training periods	728	$20.7	627	$15.8	1,355	$36.5
15% NMC rate with a 2-week interval between training periods	739	$21.2	706	$18.0	1,445	$39.2

Officials from the 256th and 30th Infantry Brigades were concerned about the reduction in maintenance personnel that would be required at their respective MATES because of the changes in training locations. About 50 percent of each brigade's tracked equipment would be moved to the new training locations. An official from the Guard's Personnel Directorate confirmed that the amount of equipment determines maintenance personnel requirements and authorizations. However, the official also said that a loss in equipment at a MATES would not necessarily result in a loss of assigned personnel.

The Guard develops personnel requirements to accomplish all of the work that Guard members in a particular state are required to do and prioritizes authorizations against those requirements. These requirements and authorizations, along with funds to support the authorizations, are allotted to the state. However, according to one Personnel Directorate official, the Army National Guard Bureau does not provide the adjutants general sufficient funds or authorizations to meet all the requirements, and as a result, they have flexibility within certain limits to use the authorizations and funds for those activities that are most needed to accomplish the state's mission.

Because maintenance personnel requirements at MATES are based on the amount of equipment, the Fort Polk and Fort Bragg MATES would lose personnel authorizations, but the adjutants general would ultimately decide whether the MATES would actually lose people. A Personnel Directorate official said that the Guard would probably offer affected personnel any unfilled positions elsewhere in those states or that it would

allow attrition to occur to preclude personnel from losing their jobs. The requirements and authorizations would not be lost because the Guard redistributes requirements and authorizations every year. The authorizations lost by one state are gained by another. The Guard's personnel system is expected to adjust to the movement of equipment with minimal confusion and turbulence. According to the personnel official, the Guard already makes such adjustments when a force structure change occurs.

Conclusions

The Army National Guard's Controlled Humidity Preservation Program can result in a more effective maintenance workforce, and the Guard should be commended for its work thus far. However, the Guard could avoid even greater maintenance costs and achieve greater workforce efficiencies if it developed a strategy to pool and share more equipment than the current 25-percent goal and changed the training sites of some units. The cost avoidance amounts presented in this report are substantial; however, they reflect the minimum amounts the Guard can avoid because many more equipment items can be pooled and shared and many other state and territorial Guard commands can pool and share equipment.

Recommendations

To optimize the avoidance of annual equipment maintenance costs and achieve the resulting benefits of having a more effective maintenance workforce and increased equipment availability for mobilization, we recommend that the Secretary of Defense direct the Director of the Army National Guard Bureau to

- develop and implement a strategy, along with the modernization of Guard units, to provide controlled humidity facilities at the training sites that will achieve the greatest cost avoidance benefit;
- incorporate the concept of equipment sharing as the way of doing business in the Guard; and
- change the annual training locations of Guard units where feasible to achieve maximum cost avoidance benefits through greater equipment sharing while achieving training objectives.

Agency Comments

In written comments on a draft of this report, the Department of Defense concurred with our recommendation. The Department said that, based on the results of the Army National Guard's study (due in January 1998), and

our recommendations, the Army National Guard will develop and present its strategy and an implementation plan to meet the recommendations.

Scope and Methodology

To determine the feasibility for sharing equipment and changing the annual training sites for some units, we interviewed cognizant officials and obtained and analyzed documents from the Army National Guard in Washington, D.C.; U.S. Army Forces Command, Fort McPherson, Georgia; and state area commands in Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and Tennessee. The units included in our review were the 48th Infantry Brigade, Georgia; 218th Infantry Brigade, South Carolina; 278th Armored Cavalry Regiment, Tennessee; 155th Armor Brigade, Mississippi; 256th Infantry Brigade, Louisiana; 30th Infantry Brigade, North Carolina; 49th Armored Division, Texas; and 31st Armored Brigade, Alabama.

To determine the extent of equipment sharing and the likelihood that an additional unit could train at a MATES, we visited the MATES at Fort Stewart, Georgia; Fort Hood, Texas; and Camp Shelby, Mississippi. We chose these MATES because they store and maintain equipment and host annual training for multiple units. Camp Shelby is also a test site for the Controlled Humidity Preservation Program, and we observed equipment stored under controlled humidity conditions and discussed the status of the program with MATES officials.

To show the impact of NMC equipment turned in to a MATES after annual training, we used 30- and 15-percent NMC rates that assume no intervals and 2-week intervals between annual training periods. In determining quantities of equipment available for annual training, our analysis assumed that 90 percent of unit authorized personnel were assigned and that 70 percent of assigned personnel actually attended annual training with their units. We did not determine whether commanders could actually accomplish annual training tasks with less equipment than they requested.

To determine the maintenance cost avoidance achieved through equipment sharing and preservation, we conducted an analysis of nine equipment items that have high annual scheduled maintenance costs. These items are the Abrams Combat Tank, Bradley Infantry Fighting Vehicle, Bradley Cavalry Fighting Vehicle, Self-Propelled Howitzer, Recovery Vehicle, Armored Vehicle Launch Bridge, Armored Fire Support Personnel Carrier, Armored Personnel Carrier, and Command Post Carrier. We accepted the types and quantities of equipment that are

authorized for the units included in our review as being needed to carry out the units' mission. Further, we did not set up our three scenarios in a way that would adversely impact the units' annual training objectives.

To determine the cost to move equipment from one annual training site to another for those units in our analysis that could change annual training sites, we visited the Military Traffic Management Command, Arlington, Virginia, and obtained the transportation costs to move the equipment. We did not analyze the impacts that changing annual training sites would have on morale, the added travel time and transportation cost to another training site, or the actual maintenance personnel impacts associated with changing the amount of equipment at affected MATES.

We conducted our review from May 1996 to September 1997 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Chairmen of the Senate and House Committees on Armed Services and the Senate Committee on Appropriations, the Secretary of the Army, and the Director of the Office of Management and the Budget. Copies will also be made available to other interested parties on request.

As you know, 31 U.S.C. 720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report. A written statement must also be submitted to the Senate and House Committees on Appropriations with an agency's first request for appropriations made more than 60 days after the date of the report.

Please contact me at (202) 512-5140 if you or your staff have any questions concerning this report. Major contributors to this report were Reginald L. Furr, Jr.; Dudley C. Roache, Jr.; Bradley D. Simpson; and Karen S. Blum.

Sincerely yours,

Mark E. Gebicke
Director, Military Operations
and Capabilities Issues

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Abbreviations

CHP	Controlled Humidity Preservation
DOD	Department of Defense
MATES	Mobilization and Training Equipment Sites
NMC	nonmission-capable
OPTEMPO	operating tempo

The Controlled Humidity Preservation Program

In fiscal year 1994, the Army National Guard began the Controlled Humidity Preservation (CHP) Program. The purpose of the CHP Program is to avoid the annual scheduled maintenance cost of 25 percent of 890 selected equipment items and reduce the maintenance backlog throughout the Guard. Solutions under study include placing a portion of the Guard's vehicle fleet in either enclosed long-term preservation or dehumidified operational preservation. These techniques are projected to lengthen the service life of vehicle components. The program's objectives are to (1) reduce the number of labor hours used to maintain equipment, (2) reduce the quantity of repair parts used, (3) decrease the quantity of consumables used for periodic servicing of equipment, and (4) decrease Guard-wide operating tempo (OPTEMPO) costs. The program is not intended to eliminate the maintenance backlog.

The concept of dehumidified preservation is not new. The use of this technique dates to the 1930s. According to a Logistics Management Institute study,[1] dehumidified preservation of operational weapon systems has been used effectively abroad as a maintenance technology but has not been broadly implemented in the Department of Defense (DOD).

Humidity Degrades Equipment and Increases Maintenance Requirements

Relative humidity is an expression of the moisture content of the air as a percentage of what it can hold when saturated. The main problems caused by humidity are corrosion, mold, moisture regain, and condensation. Most materials absorb moisture in proportion to the relative humidity of the surrounding air. Therefore, the greater the moisture in the air, the greater the absorption rate of materials. Moisture has particularly hazardous effects on military electronic, optical, communication, and fire control equipment. Moisture in optics and fire control components clouds the vision of the crew and damages electronics. Communication and computer systems are especially sensitive to moisture, and machine surfaces, such as the main gun recoil system, are susceptible to corrosion. Corrosion generally remains a significant problem unless relative humidity is reduced to less than 45 percent.

The Logistics Management Institute study stated that moisture degradation of DOD weapon systems and equipment represents an important cost issue. Current costs are estimated to range between $3 billion and $12 billion annually. There are also numerous nonfinancial impacts, the most important being the reduced readiness and sustainability of DOD weapon

[1]Using Dehumidified Preservation as a Maintenance Technology for DOD Weapons Systems and Equipment, Logistics Management Institute, June 1996.

systems and equipment. An approach to mitigating moisture damage is to control the relative humidity in the air. By extracting moisture from the air, the relative humidity can be reduced to a level at which damaging moisture cannot form.

CHP Program Controls Humidity and Reduces Maintenance

The CHP Program consists of three parts. The first part, long-term preservation, is the process of storing selected equipment in an enclosure and maintaining the internal environment's relative humidity at the optimal range of 30 to 40 percent. If the relative humidity is controlled, the optimal humidity range can be reached, and corrosion will cease. With the use of this process, the Guard can defer all scheduled maintenance for up to 5 years. This process has been extensively evaluated and is now widely applied by many nations as a maintenance technology for operational weapon systems.

The Logistics Management Institute study stated that weapon systems and components can be dehumidified by utilizing a mechanical dehumidifier to process moisture-laden air into properly dehumidified air with a desired level of relative humidity. This processed air is recirculated into and around the equipment or system being preserved.

A highly efficient data acquisition and control system provides continuous monitoring and control of the long-term preservation program to evaluate and maintain the environment stabilization system, characterize the relative severity of the site environment, and confirm site compatibility with seasonal atmospheric changes. The system is designed to ensure that a stable, corrosion-free, low-humidity environment is sustained within each enclosure.

The second part of the CHP Program, modified long-term preservation, is similar to long-term preservation except that equipment may be taken out of the CHP environment and used as required. Maintenance may be deferred while equipment is within the CHP environment but maintenance requirements will accrue for that period of time the equipment is removed.

The third part of the program is operational preservation. Equipment is attached to central dehumidifiers and can be parked outside or within an enclosure. Dehumidified air is provided to the internal spaces of the equipment. No maintenance is deferred by this method; however, the dehumidification process reduces moisture-induced corrosion to the point at which a substantial reduction in electronic, optic, and fire control

systems faults is achieved. The equipment remains available for frequent training events but is connected to a dehumidification system during the intervening periods to dry the engine and crew compartments.

Equipment items put into long-term preservation are preserved at Technical Manual-10/-20 standards, thereby enhancing the combat readiness of Guard forces. The goal of the Guard is to put 25 percent of selected equipment into long-term preservation over a 5-year fielding schedule. The equipment will be placed in preservation for a minimum of 3 years and a maximum of 5 years. After this period, the equipment is to be put back into operation and replaced with similar equipment. In addition, the Guard anticipates that operational preservation will reduce faults in selected equipment by 30 percent, resulting in a significant reduction in unscheduled maintenance.

The Guard Is Verifying the Benefits of the CHP Program

The Guard is testing the various preservation treatments to validate the Guard's CHP concept and evaluate the physical benefits of different alternatives that control humidity on equipment that is sensitive to moisture. The test will measure the average maintenance labor hours and repair parts cost for selected equipment located in six different sites within six different treatment conditions. Three of the conditions (long-term, modified long-term, and operational preservation) use preservation treatments, and the other three do not. The test period is planned to last 1 year, and test results are expected in early 1998.

According to the test plan, Camp Ripley, Minnesota, and Camp Shelby, Mississippi, are testing sites for long-term preservation. Modified long-term preservation is being tested at these sites and at the Western Kentucky Training Site and the Unit Training and Equipment Site in Oregon. Camp Ripley, Camp Shelby, Western Kentucky, and Fort Stewart, Georgia, are test sites for operational preservation.

CALIBRE Systems, Incorporated, under contract to the Guard, performed an economic analysis of the test to validate the benefits of the CHP Program. The analysis compared CHP strategies to identify the strategy that provides the greatest overall benefit to the Guard. CALIBRE examined the following alternatives: (1) status quo, (2) long-term preservation, (3) operational preservation, and (4) a combination of long-term and operational preservation. Status quo, which is storing equipment in an ambient environment with minimum corrosive protection, is the method currently used by Mobilization and Training Equipment Sites (MATES).

Long-term preservation encloses equipment inside a regulated humidity environment with relative humidity between 30 and 40 percent. Operational preservation achieves the same results as long-term preservation but on a more limited scale. When not in use, equipment is externally attached to a central dehumidification system but remains parked without external protection from the environment. The combination of long-term and operational preservation places a defined quantity of equipment in both environments. Operational preservation reduces corrosive faults while the vehicles remain available for training; vehicles not required on a frequent or recurring basis for training are placed in long-term preservation.

The analysis assumed that the usage of equipment not placed into long-term preservation would increase by no more than 10 percent. Guard CHP Program officials told us that this estimate was based on their visits to states and discussions with Guard personnel about training activities. The officials found that an average of about 65 percent of personnel attended annual training. Therefore, the 10-percent figure is overestimated because much of the equipment is not currently being used for training. Officials agreed that, if 25 percent of the equipment were placed in CHP, usage of the remaining equipment would not increase, and the 10-percent estimate would be adequate even if 40 percent of the equipment were placed in CHP. In fact, studies show that increased equipment usage actually decreased the need for repairs because the equipment was used and did not sit idle.

The analysis concluded that all three preservation alternatives would provide benefits to offset implementation costs. The benefit-to-investment ratios for alternatives 2, 3, and 4 are 9, 7.6, and 8.9, respectively. All three alternatives have a break-even point of 1 year. The analysis recommended that the Guard implement alternative 4, the combination long-term and operational preservation. The alternative of long-term preservation by itself provided a slightly larger benefit-to-investment ratio; however, that alternative would not provide the Guard with the greater flexibility of placing equipment into either long-term or operational preservation.

States Endorse the CHP Program

Many states believe that the CHP Program will be beneficial in terms of avoided maintenance costs and increased equipment availability and readiness. Therefore, states are moving forward to implement the program, even though testing has not been completed. Kentucky and New York are 2 of 17 states with long-term preservation or operational preservation systems. Kentucky has 180,000 square feet of CHP space and

about 84 tanks in operational preservation. New York has 96,000 square feet for long-term preservation and 120 vehicles in operational preservation. In fiscal year 1997, 16 more states will add CHP systems.

Officials in each of the states we visited recognize the benefits of storing equipment using the CHP concept. They believe that CHP will avoid maintenance costs and improve equipment availability and readiness. Officials from Georgia and Tennessee stated that about one-third of the equipment at the Fort Stewart MATES could be put into CHP; Fort Stewart MATES officials agreed because the equipment is not needed for training. South Carolina officials also said that equipment not needed for training could be stored in CHP. Officials from North Carolina and Texas noted that with decreasing OPTEMPO funds, the Guard will be using equipment less, and CHP is a good technique for storing equipment not used for training. Officials at the Camp Shelby MATES, which is one of the CHP test sites, stated that they have seen a 30- to 40-percent reduction in electronic components needing repair because preservation has prevented corrosion on them.

Scenarios for Equipment Sharing at Annual Training Sites

According to our analysis, Army National Guard units can preserve more than 25 percent of their equipment in controlled humidity environments if units at the same annual training site pool and share equipment. Further, changing the location where some units are annually trained could maximize the amount of equipment that can be preserved.

Selected Units and Equipment Items

For our analysis, we identified units (1) at the same training location that could pool and share equipment and (2) that could change their annual training sites to maximize the amount of equipment that could be stored in controlled environments. Those units in our analysis included 6 of the 15 Separate Brigades,[1] the 49th Armored Division, and the 31st Armored Brigade. The units and their current MATES are shown in table II.1.

Table II.1: Units in Our Analysis and Their Current Mobilization and Training Equipment Sites

Unit	State	MATES location
48th Infantry Brigade (Mechanized)	Georgia	Fort Stewart, Ga.
218th Infantry Brigade (Mechanized)	South Carolina	Fort Stewart, Ga.
278th Armored Cavalry Regiment	Tennessee	Fort Stewart, Ga.
30th Infantry Brigade (Mechanized)	North Carolina	Fort Bragg, N.C.
155th Armor Brigade	Mississippi	Camp Shelby, Miss.
256th Infantry Brigade (Mechanized)	Louisiana	Fort Polk, La.
49th Armored Division	Texas	Fort Hood, Tex.
31st Armored Brigade	Alabama	Camp Shelby, Miss.

The nine tracked equipment items selected for our analysis are shown in table II.2. These items have high annual costs for scheduled maintenance. Except for the Armored Vehicle Launch Bridge, Guard units are required to put 50 percent of these items at a MATES that facilitates mobilization and use by units training at the MATES location. For these nine tracked equipment items, we determined the types and quantities of authorized equipment that the eight units in our analysis are scheduled to have on hand in fiscal year 1999 or funded through 2008. By 2008, all of the eight units are to have similar equipment, which will facilitate sharing among the units. Several of these units currently have these equipment items on hand, and pooling and sharing can begin after CHP facilities are in place.

[1]The Separate Brigades—formerly Enhanced Brigades—are organized and resourced so that they can be quickly mobilized, trained, and deployed to fast-evolving major regional conflicts.

Table II.2: Equipment Items Selected for Analysis

Item number	Description
1	M981 Armored Fire Support Personnel Carrier
2	M113 Armored Personnel Carrier
3	M577 Command Post Carrier
4	M2 Bradley Infantry Fighting Vehicle
5	M3 Bradley Cavalry Fighting Vehicle
6	M109 Self-Propelled Howitzer
7	M60/M48 Armored Vehicle Launch Bridge
8	M88 Recovery Vehicle
9	M1A1 Abrams Combat Tank

Note: The item numbers correspond with those included in tables II.4 through II.19.

Scenarios Developed

We developed four scenarios that offer the opportunity to maximize equipment sharing and preservation. These four scenarios have eight units that train annually at either Fort Stewart, Georgia; Fort Hood, Texas; or Camp Shelby, Mississippi. As shown in table II. 3, the current scenario does not require any of the units to change annual training sites, but scenarios 1 through 3 require that up to three of the units change training sites.

Table II.3: Scenarios for Sharing Equipment and Changing Annual Training Sites

	Annual training site				
Scenario	Fort Stewart	Fort Hood	Camp Shelby	Number of units	Number of moves
Current	48th and 218th Infantry Brigades and 278th Armored Cavalry Regiment	None	155th Armor and 31st Armored Brigades	5	0
1	48th and 218th Infantry Brigades and 278th Armored Cavalry Regiment	49th Armored Division and 256th Infantry Brigade[a]	155th Armor and 31st Armored Brigades	7	1
2	48th and 218th Infantry Brigades and 30th Infantry Brigade[a]	49th Armored Division and 278th Armored Cavalry Regiment[a]	155th Armor and 31st Armored Brigades	7	2
3	48th and 218th Infantry Brigades and 30th Infantry Brigade[a]	49th Armored Division and 278th Armored Cavalry Regiment[a]	155th Armor and 31st Armored Brigades and 256th Infantry Brigade[a]	8	3

[a]These units are the ones that, under our scenarios, would change annual training sites.

Computation of the Equipment Pool at Annual Training Sites

On the basis of the units' authorized equipment, we determined the amount of equipment for each of the nine items that would be needed if the units training at the same location pooled and shared their equipment. We assumed that

- the entire unit (i.e., brigade or division) went to annual training during a 2-week period;
- 90 percent of a unit's authorized personnel would be assigned;
- 70 percent of assigned personnel would actually attend annual training with the unit; and
- the unit would need an additional quantity of 5 percent to allow for equipment replacement in case some equipment broke down during the 2-week annual training period.

We used the 90-percent figure for the amount of authorized personnel assigned based on discussions with Guard officials, statistics on assigned strength, and the fact that Guard units normally do not have 100 percent of their authorized strength. The 70-percent figure for annual training attendance is based on actual attendance statistics, a RAND study, and discussions with Guard officials. The 5-percent additional quantity is based on discussions with Guard maintenance officials.

Because some unit-shared equipment would be turned in to MATES in a nonmission-capable (NMC) status at the end of the 2-week annual training period, we determined the amount of extra equipment that would be needed to have sufficient quantities of equipment on hand for the next unit to use for training. Because of the Guard's lack of historical information on the quantity of NMC equipment that is turned in to MATES, we asked MATES officials to provide us with an estimate. The average estimate for several equipment items from two MATES ranged from 12 to 16 percent. The average estimate from four MATES ranged from 21 to 36 percent. On the basis of these estimates, we chose to use rates of 15 and 30 percent. We also considered the capability of MATES personnel to repair this equipment in time for the next unit to use it for annual training. Lacking information on the capability of MATES to repair equipment, we assumed for each of the nine items used in our analysis that the MATES could repair no more than 10 of the items in a 2-week period. We did not consider the impact of MATES maintenance personnel having to spend time issuing and receiving equipment from units that were training at the MATES rather than spending this time repairing equipment. In addition, we analyzed the effect on the maintenance quantity of units having consecutive training and a 2-week period between training.

For each scenario, we calculated the quantities of the nine equipment items that would be placed in long-term preservation at each of the MATES in our analysis based on (1) the quantities currently located there and (2) 50 percent of the units' authorized equipment, which is required by Guard regulation to be located at MATES. We used the greater of these two quantities in our analysis as the quantity located at the MATES. The total quantity of equipment needed for training and the additional quantity needed to compensate for equipment undergoing maintenance determines the pool size needed at each of the three annual training sites. The difference in quantities between the equipment that is located at the MATES and the amount needed for the pool becomes available for CHP long-term preservation. Of that equipment, we allocated 25 percent to meet the Guard's 25-percent goal. The remaining quantity represents additional equipment that can be put into preservation based on sharing equipment and changing annual training sites.

Analysis of Scenarios

Analysis of each of the four scenarios shows that the Guard can place more than 25 percent of its equipment in long-term preservation by sharing unit equipment at annual training sites and changing some units' training sites. For each scenario, we determined the total quantity of the nine equipment items that can be placed into long-term preservation at the three training sites and the resulting maintenance cost avoidance. The quantities and cost avoidance are divided to show the results of the cost avoidance of the Guard's 25-percent goal and the additional cost avoidance resulting from increased sharing among units. The results for each scenario are based on units turning in

- 30 percent of the 9 equipment items in an NMC condition with no break between units coming to annual training,
- 15 percent of the 9 equipment items in an NMC condition with no break between units coming to annual training,
- 30 percent of the 9 equipment items in an NMC condition with a 2-week break between units coming to annual training, and
- 15 percent of the 9 equipment items in an NMC condition with a 2-week break between units coming to annual training.

Current Scenario

We analyzed the five units that train annually at Fort Stewart and Camp Shelby. This scenario does not require any of the units to change their annual training site; therefore, the additional equipment and cost

avoidance over the Guard's 25-percent goal that could be put into long-term preservation would result from greater sharing among the units.

Tables II.4 through II.7 show the quantity of equipment that could be placed in long-term preservation using different assumptions and the resulting benefits. The total cost avoidance ranges from $14.6 million to $20 million, of which $4.4 million to $9.7 million is based on the benefits of having units pool and share equipment at annual training.

Table II.4: Equipment Quantities Stored in Long-Term Preservation Assuming a 30-Percent NMC Turn-in Rate and No Break Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	16	$307,504	13	$249,847	29	$557,351
2	87	884,181	82	833,366	169	1,717,547
3	39	601,848	30	462,960	69	1,064,808
4	62	1,931,734	16	498,512	78	2,430,246
5	13	450,229	3	103,899	16	554,128
6	16	405,088	16	405,088	32	810,176
7	11	291,159	11	291,159	22	582,318
8	25	628,250	21	527,730	46	1,155,980
9	76	4,678,180	17	1,046,435	93	5,724,615
Total	**345**	**$10,178,173**	**209**	**$4,418,996**	**554**	**$14,597,169**

Table II.5: Equipment Quantities Stored in Long-Term Preservation Assuming a 15-Percent NMC Turn-in Rate and No Break Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	16	$307,504	17	$326,723	33	$634,227
2	87	884,181	107	1,087,441	194	1,971,622
3	42	648,144	37	570,984	79	1,219,128
4	62	1,931,734	35	1,090,495	97	3,022,229
5	15	519,495	5	173,165	20	692,660
6	16	405,088	20	506,360	36	911,448
7	11	291,159	13	344,097	24	635,256
8	25	628,250	27	678,510	52	1,306,760
9	76	4,678,180	41	2,523,755	117	7,201,935
Total	**350**	**$10,293,735**	**302**	**$7,301,530**	**652**	**$17,595,265**

Table II.6: Equipment Quantities Stored in Long-Term Preservation Assuming a 30-Percent NMC Turn-in Rate and 2 Weeks Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	16	$307,504	21	$403,599	37	$711,103
2	87	884,181	107	1,087,441	194	1,971,622
3	42	648,144	47	725,304	89	1,373,448
4	62	1,931,734	36	1,121,652	98	3,053,386
5	15	519,495	6	207,798	21	727,293
6	16	405,088	24	607,632	40	1,012,720
7	11	291,159	15	397,035	26	688,194
8	25	628,250	33	829,290	58	1,457,540
9	76	4,678,180	41	2,523,755	117	7,201,935
Total	**350**	**$10,293,735**	**330**	**$7,903,506**	**680**	**$18,197,241**

Table II.7: Equipment Quantities Stored in Long-Term Preservation Assuming a 15-Percent NMC Turn-in Rate and 2 Weeks Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	16	$307,504	21	$403,599	37	$711,103
2	87	884,181	127	1,290,701	214	2,174,882
3	42	648,144	49	756,168	91	1,404,312
4	62	1,931,734	52	1,620,164	114	3,551,898
5	15	519,495	6	207,798	21	727,293
6	16	405,088	24	607,632	40	1,012,720
7	11	291,159	15	397,035	26	688,194
8	25	628,250	34	854,420	59	1,482,670
9	76	4,678,180	58	3,570,190	134	8,248,370
Total	**350**	**$10,293,735**	**386**	**$9,707,707**	**736**	**$20,001,442**

Scenario 1

For this scenario, we analyzed seven units training at Fort Stewart, Fort Hood, and Camp Shelby. The 256th Infantry Brigade changes its annual training site to Fort Hood and shares equipment with the 49th Armored Division. Therefore, the additional equipment that could be put into long-term preservation would be a result of more units sharing equipment because of a change in training sites.

Tables II.8 through II.11 show the equipment that could be placed in long-term preservation under different assumptions and the resulting benefits. The total cost avoidance ranges from $23.1 million to $30.9 million, of which $5.3 million to $11.3 million is based on the benefits of having units pool and share equipment at annual training and changing the 256th Infantry Brigade's annual training site to Fort Hood.

Table II.8: Equipment Quantities Stored in Long-Term Preservation Assuming a 30-Percent NMC Turn-in Rate and No Break Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	32	$615,008	21	$403,599	53	$1,018,607
2	179	1,819,177	129	1,311,027	308	3,130,204
3	75	1,157,400	30	462,960	105	1,620,360
4	105	3,271,485	16	498,512	121	3,769,997
5	25	865,825	9	311,697	34	1,177,522
6	25	632,950	16	405,088	41	1,038,038
7	11	291,159	11	291,159	22	582,318
8	42	1,055,460	21	527,730	63	1,583,190
9	132	8,125,260	17	1,046,435	149	9,171,695
Total	**626**	**$17,833,724**	**270**	**$5,258,207**	**896**	**$23,091,931**

Table II.9: Equipment Quantities Stored in Long-Term Preservation Assuming a 15-Percent NMC Turn-in Rate and No Break Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	32	$615,008	27	$518,913	59	$1,133,921
2	179	1,819,177	164	1,666,732	343	3,485,909
3	83	1,280,856	37	570,984	120	1,851,840
4	118	3,676,526	35	1,090,495	153	4,767,021
5	27	935,091	13	450,229	40	1,385,320
6	27	683,586	20	506,360	47	1,189,946
7	11	291,159	13	344,097	24	635,256
8	44	1,105,720	28	703,640	72	1,809,360
9	139	8,556,145	41	2,523,755	180	11,079,900
Total	**660**	**$18,963,268**	**378**	**$8,375,205**	**1,038**	**$27,338,473**

Table II.10: Equipment Quantities Stored in Long-Term Preservation Assuming a 30-Percent NMC Turn-in Rate and 2 Weeks Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	32	$615,008	33	$634,227	65	$1,249,235
2	179	1,819,177	164	1,666,732	343	3,485,909
3	84	1,296,288	51	787,032	135	2,083,320
4	115	3,583,055	36	1,121,652	151	4,704,707
5	27	935,091	15	519,495	42	1,454,586
6	29	734,222	24	607,632	53	1,341,854
7	11	291,159	15	397,035	26	688,194
8	44	1,105,720	37	929,810	81	2,035,530
9	132	8,125,260	17	1,046,435	149	9,171,695
Total	**653**	**$18,504,980**	**392**	**$7,710,050**	**1,045**	**$26,215,030**

Table II.11: Equipment Quantities Stored in Long-Term Preservation Assuming a 15-Percent NMC Turn-in Rate and 2 Weeks Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	32	$615,008	33	$634,227	65	$1,249,235
2	179	1,819,177	194	1,971,622	373	3,790,799
3	84	1,296,288	54	833,328	138	2,129,616
4	123	3,832,311	57	1,775,949	180	5,608,260
5	27	935,091	15	519,495	42	1,454,586
6	29	734,222	24	607,632	53	1,341,854
7	11	291,159	15	397,035	26	688,194
8	44	1,105,720	38	954,940	82	2,060,660
9	146	8,987,030	58	3,570,190	204	12,557,220
Total	**675**	**$19,616,006**	**488**	**$11,264,418**	**1,163**	**$30,880,424**

Scenario 2

For this scenario, we analyzed seven units training at Fort Stewart, Fort Hood, and Camp Shelby. The 30th Infantry Brigade changes its training site to Fort Stewart and shares equipment with the 48th and the 218th Infantry Brigades. Thus, three infantry brigades will have the same types and quantities of equipment at Fort Stewart. The 278th Armored Cavalry Regiment also changes its training site from Fort Stewart to Fort Hood and

shares equipment with the 49th Armored Division. Therefore, the additional equipment that could be put into long-term preservation would be a result of similar units sharing equipment because of a change in training sites.

Tables II.12 through II.15 show the equipment that could be placed in long-term preservation under different assumptions and the resulting benefits. The total cost avoidance ranges from $25.6 million to $33.8 million, of which $7.4 million to $15 million is based on the benefits of having units pool and share equipment at annual training and changing the 30th Infantry Brigade's and 278th Armored Cavalry Regiment's annual training sites to Fort Stewart and Fort Hood, respectively.

Table II.12: Equipment Quantities Stored in Long-Term Preservation Assuming a 30-Percent NMC Turn-in Rate and No Break Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	32	$615,008	23	$442,037	55	$1,057,045
2	179	1,819,177	124	1,260,212	303	3,079,389
3	74	1,141,968	26	401,232	100	1,543,200
4	84	2,617,188	45	1,402,065	129	4,019,253
5	38	1,316,054	16	554,128	54	1,870,182
6	25	632,950	16	405,088	41	1,038,038
7	11	291,159	10	264,690	21	555,849
8	43	1,080,590	22	552,860	65	1,633,450
9	141	8,679,255	35	2,154,425	176	10,833,680
Total	**627**	**$18,193,349**	**317**	**$7,436,737**	**944**	**$25,630,086**

Table II.13: Equipment Quantities Stored in Long-Term Preservation Assuming a 15-Percent NMC Turn-in Rate and No Break Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	32	$615,008	28	$538,132	60	$1,153,140
2	179	1,819,177	165	1,676,895	344	3,496,072
3	82	1,265,424	39	601,848	121	1,867,272
4	85	2,648,345	77	2,399,089	162	5,047,434
5	38	1,316,054	19	658,027	57	1,974,081
6	27	683,586	20	506,360	47	1,189,946
7	11	291,159	13	344,097	24	635,256
8	44	1,105,720	30	753,900	74	1,859,620
9	146	8,987,030	67	4,124,185	213	13,111,215
Total	**644**	**$18,731,503**	**458**	**$11,602,533**	**1,102**	**$30,334,036**

Table II.14: Equipment Quantities Stored in Long-Term Preservation Assuming a 30-Percent NMC Turn-in Rate and 2 Weeks Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	32	$615,008	33	$634,227	65	$1,249,235
2	179	1,819,177	164	1,666,732	343	3,485,909
3	84	1,296,288	51	787,032	135	2,083,320
4	86	2,679,502	75	2,336,775	161	5,016,277
5	38	1,316,054	22	761,926	60	2,077,980
6	29	734,222	24	607,632	53	1,341,854
7	11	291,159	15	397,035	26	688,194
8	44	1,105,720	39	980,070	83	2,085,790
9	146	8,987,030	64	3,939,520	210	12,926,550
Total	**649**	**$18,844,160**	**487**	**$12,110,949**	**1,136**	**$30,955,109**

Table II.15: Equipment Quantities Stored in Long-Term Preservation Assuming a 15-Percent NMC Turn-in Rate and 2 Weeks Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	32	$615,008	33	$634,227	65	$1,249,235
2	179	1,819,177	194	1,971,622	373	3,790,799
3	84	1,296,288	54	833,328	138	2,129,616
4	86	2,679,502	97	3,022,229	183	5,701,731
5	38	1,316,054	22	761,926	60	2,077,980
6	29	734,222	24	607,632	53	1,341,854
7	11	291,159	15	397,035	26	688,194
8	44	1,105,720	39	980,070	83	2,085,790
9	146	8,987,030	94	5,786,170	240	14,773,200
Total	**649**	**$18,844,160**	**572**	**$14,994,239**	**1,221**	**$33,838,399**

Scenario 3

For this scenario, we analyzed eight units training at Fort Stewart, Fort Hood, and Camp Shelby. The 30th Infantry Brigade changes its training site to Fort Stewart and shares equipment with the 48th and the 218th Infantry Brigades. Thus, as in the last scenario, three infantry brigades would have the same types and quantities of equipment at Fort Stewart. The 278th Armored Cavalry Regiment changes its training site from Fort Stewart to Fort Hood and shares equipment with the 49th Armored Division. The 256th Infantry Brigade also changes its annual training site to Camp Shelby and shares equipment with the 155th Armor Brigade and the 31st Armored Brigade. Therefore, the additional equipment that could be put into long-term preservation would be a result of similar units sharing equipment because of a change in training sites.

Tables II.16 through II.19 show the equipment that could be placed in long-term preservation under different assumptions and the resulting benefits. The total cost avoidance ranges from $30.6 million to $39.2 million, of which $11 million to $18 million is based on the benefits of having units pool and share equipment at annual training and changing annual training sites for the 30th Infantry Brigade, 278th Armored Cavalry Regiment, and 256th Infantry Brigade to Fort Stewart, Fort Hood, and Camp Shelby, respectively.

Table II.16: Equipment Quantities Stored in Long-Term Preservation Assuming a 30-Percent NMC Turn-in Rate and No Break Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	35	$672,665	29	$557,351	64	$1,230,016
2	193	1,961,459	165	1,676,895	358	3,638,354
3	86	1,327,152	43	663,576	129	1,990,728
4	137	4,268,509	49	1,526,693	186	5,795,202
5	27	935,091	27	935,091	54	1,870,182
6	27	683,586	23	582,314	50	1,265,900
7	12	317,628	14	370,566	26	688,194
8	46	1,155,980	33	829,290	79	1,985,270
9	134	8,248,370	63	3,877,965	197	12,126,335
Total	**697**	**$19,570,440**	**446**	**$11,019,741**	**1,143**	**$30,590,181**

Table II.17: Equipment Quantities Stored in Long-Term Preservation Assuming a 15-Percent NMC Turn-in Rate and No Break Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	35	$672,665	35	$672,665	70	$1,345,330
2	193	1,961,459	206	2,093,578	399	4,055,037
3	91	1,404,312	61	941,352	152	2,345,664
4	150	4,673,550	85	2,648,345	235	7,321,895
5	27	935,091	31	1,073,623	58	2,008,714
6	29	734,222	27	683,586	56	1,417,808
7	12	317,628	18	476,442	30	794,070
8	47	1,181,110	41	1,030,330	88	2,211,440
9	141	8,679,255	86	5,293,730	227	13,972,985
Total	**725**	**$20,559,292**	**590**	**$14,913,651**	**1,315**	**$35,472,943**

Table II.18: Equipment Quantities Stored in Long-Term Preservation Assuming a 30-Percent NMC Turn-in Rate and 2 Weeks Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	35	$672,665	41	$787,979	76	$1,460,644
2	193	1,961,459	205	2,083,415	398	4,044,874
3	92	1,419,744	74	1,141,968	166	2,561,712
4	147	4,580,079	83	2,586,031	230	7,166,110
5	27	935,091	36	1,246,788	63	2,181,879
6	31	784,858	31	784,858	62	1,569,716
7	12	317,628	20	529,380	32	847,008
8	47	1,181,110	50	1,256,500	97	2,437,610
9	144	8,863,920	87	5,355,285	231	14,219,205
Total	**728**	**$20,716,554**	**627**	**$15,772,204**	**1,355**	**$36,488,758**

Table II.19: Equipment Quantities Stored in Long-Term Preservation Assuming a 15-Percent NMC Turn-in Rate and 2 Weeks Between Training Periods

	Guard 25% goal for equipment preservation		Additional equipment that can be preserved		Total equipment that can be preserved	
Item	Quantity	Cost avoidance	Quantity	Cost avoidance	Quantity	Cost avoidance
1	35	$672,665	41	$787,979	76	$1,460,644
2	193	1,961,459	236	2,398,468	429	4,359,927
3	92	1,419,744	78	1,203,696	170	2,623,440
4	154	4,798,178	111	3,458,427	265	8,256,605
5	27	935,091	36	1,246,788	63	2,181,879
6	31	784,858	31	784,858	62	1,569,716
7	12	317,628	20	529,380	32	847,008
8	47	1,181,110	50	1,256,500	97	2,437,610
9	148	9,110,140	103	6,340,165	251	15,450,305
Total	**739**	**$21,180,873**	**706**	**$18,006,261**	**1,445**	**$39,187,134**

Comments From the Department of Defense

UNDER SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

PERSONNEL AND
READINESS

SEP 15 1997

Mr. Mark E. Gebicke
Director, Military Operations and Capabilities Issues
National Security and International Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Gebicke:

I want to begin by thanking you for the opportunity to comment on this report. I agree that it is important that we explore every efficiency possible to reduce costs while maintaining our Forces at the best possible state of readiness.

I concur with the recommendation made in the draft report entitled "ARMY NATIONAL GUARD: Sharing Unit Training Equipment Would Help Avoid Maintenance Costs" (GAO Code 703155/OSD Case 1420). The approach outlined leverages the efforts of both the GAO and the Army National Guard.

As you may know, the Army National Guard is already looking at placing 25% of their equipment in the LTP Program and are conducting a study to determine the best preservation techniques and equipment mix. The results of that study are due in January 1998. The Secretary of Defense appreciates the hard work and effort of both agencies and fully supports any initiative that results in cost savings/avoidance and efficiencies while preserving force readiness.

Again, I want to thank you for the opportunity to comment on your draft report. Enclosed is a detailed response to the recommendation for your review.

Sincerely,

Rudy de Leon

Enclosure: As Stated

GAO DRAFT REPORT – DATED JULY 24, 1997
(GAO CODE 703155) OSD CASE 1420

"ARMY NATIONAL GUARD: SHARING UNIT TRAINING EQUIPMENT WOULD HELP AVOID MAINTENANCE COSTS"

DEPARTMENT OF DEFENSE COMMENTS TO THE RECOMMENDATIONS

Now on p. 16,

RECOMMENDATION: The GAO recommended that the Secretary of Defense direct the Army National Guard to (1) develop and implement a strategy, along with the modernization of Guard units, to provide controlled humidity facilities at the training sites that will achieve the greatest cost avoidance benefit; (2) incorporate the concept of equipment sharing as a way of doing business in the Guard ; and (3) change the annual training locations of Guard units where feasible to achieve maximum cost avoidance benefits through greater equipment sharing while achieving training objectives. (p. 22/GAO Draft Report)

DOD RESPONSE: We concur with the recommendation as written. The Army National Guard is currently conducting a study to determine the best preservation techniques and the equipment mix for the long term preservation (LTP) program. Based on the results of the ARNG study and the recommendations in the GAO report, the ARNG will develop and present their strategy and an implementation plan to meet the recommendations.

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