The Logistics Target System

The Rolling Thunder attack against lines of communication, bridges and transportation equipment targets has resulted in losses to North Vietnam of over $30 million or over three-fourths of the estimated direct damage inflicted on all economic targets. Forty six bridges or 20 percent of the bridges on the rail lines subjected to air attacks have been damaged or destroyed, and 212 highway bridges have been destroyed or damaged. In spite of the continued and increasing armed reconnaissance attacks on the five major railroad lines, on only two--Hanoi to Vinh and Hanoi to Lao Cai--has rail service been effectively interdicted for most of the time since the bombings began. The Hanoi - Dong Dang line has been interdicted for through service several times but for a total of only a few months. The Hanoi-Haiphong line has been interdicted for a total of only a few weeks. The Hanoi - Thai Nguyen line has been able to maintain through traffic almost constantly.

Losses of transportation equipment, particularly motor trucks, have increased sharply in recent months. According to pilot reports over 2,000 trucks have been destroyed or destroyed. These pilot reports undoubtedly overstate actual results but even without adjustment,

The North Vietnamese responded to these attacks with a crash construction effort to implement a pre-strike planning program designed to keep lines of communication open to develop more sophisticated methods of concealment for roads, bridges and factories, and to complete an impressive proliferation of bridge bypasses and alternate routes. By the end of 1965 an estimated 70,000 workers had been added to the labor force of construction work-camps engaged in rail and road repairs.

The success of these countermeasures is seen in statistics on the number of bridges destroyed or damaged and the repair measures adopted by North Vietnam to keep traffic moving. Of the total of 253 bridges damaged--46 rail or rail highway bridges and 212 highway bridges--North Vietnam
has found it necessary to repair only 67 bridges--22 rail or rail/highway and 45 highway bridges. The major emphasis has been to construct temporary crossings or by-passes, over 173 of these having been constructed to replace damaged highway bridges. The savings resulting from these expedients are impressive. North Vietnam has had to expend only $3 million on temporary repairs compared to a cost of over $12 million if all the damaged or destroyed bridges were permanently repaired or reconstructed.

Although the air strikes have patently made it more difficult and costly to maintain traffic movement, the countermeasures adopted have proved extremely effective. Overall transport performance has been maintained at pre-bombing levels. The known movement of supplies into Laos and South Vietnam during the 1965-66 dry season was double that of the previous year.

After an initial shaky response to Allied bombings, the North Vietnamese were able to consolidate their position and are now able to maintain and improve their transportation system even though the bombings have increased. The ease with which they converted to a wartime construction base during 1965 indicates that further increases in air attacks would undoubtedly be countered by an expansion of existing capabilities to keep open all important routes to South Vietnam.

The level of interdiction carried on through June 1966 has been insufficient to create any major strains in the North Vietnamese transport system. If interdiction continues at current levels through mid-1967, the North Vietnamese should have no difficulty in maintaining current levels of traffic, including imports and exports by land.

Meaningful pressures on North Vietnamese transport capabilities would require an air attack program that denies the country its ability to maintain seaborne imports and exports, increases import requirements, and concentrates transport on the land connections to Communist China. Such an air attack program would have to include measures to close North Vietnam's major seaports, the neutralization of remaining petroleum storage facilities and vital economic targets such as the Haiphong cement plant, and a highly intensified program of armed reconnaissance against surface
transport and lines of communication linking North Vietnam and Communist China.

The two rail connections to China are currently used at only about one-third of their normal capacity. If measures against the major seaports could stop as much as 50 percent of normal import trade, these rail lines would be forced to operate at approximately full capacity under interdicted conditions. If more seaborne traffic had to be diverted to overland movement and additional import requirements were generated, by neutralization of the cement plant for example, the rail traffic requirement would increase even beyond the uninterdicted capacity of the rail lines.

Sustained interdiction of the lines would force the Communists to allocate considerable amounts of manpower and materials to maintain the railroad lines and alternate highway routes. Virtually all daylight traffic would stop and night traffic would be disrupted thus slowing down movement and making the logistic resupply of Communist forces considerably less reliable than at present.

Some economic requirements would have to go unsatisfied and many of the Bloc aid projects and domestic construction programs would have to be postponed. Modern industrial production would be slowed down and there would be increasing though not critical problems in food and distribution problems.

There would, of course, be adequate transport capacity to support the military establishment and to continue the present level of aggression in South Vietnam and Laos. But the support of these activities would be a much more costly and difficult burden. The population of North Vietnam would also be more keenly aware of the deprivations and costs associated with the war.

C. The State of Civilian Morale

1. General Review

The initial response of North Vietnam's civilian population to the US/GVN air attacks was characterized by a high degree of patriotic enthusiasm. The air attacks in large measure have been a strong force for unifying the population in its resistance to the "US aggressors." As the
air attacks have continued and intensified, there has been a waning of popular enthusiasm. This has not, however, reached the point that it has any meaningful impact upon the determination of the regime to continue with the war or the policy options it may elect to achieve its objectives.

Almost every segment of the civilian population of North Vietnam has been forced to make some sacrifice in its standard of living as the result of the bombing. However, civilians living in the southern part of the country—about 15 percent of the population—have suffered far greater hardships in the form of personal and property losses, shortages of consumer goods, and sharp declines in income resulting from interruption of normal economic activity. Letters from residents of the southern part of the country to relatives in Thailand cite personal hardships and anxieties resulting from air strikes more frequently than in the past and more often than letters from residents of other parts of the country.

Data released by the Ministry of Labor in the spring of 1966 on the excessive rates of absenteeism among construction workers in the southern provinces may reflect the poor state of morale there. Absenteeism due to illness among construction workers largely engaged in repair work on the transportation system in the southern part of the country averaged 16.3 days per worker in 1965 or 5 percent of total working days scheduled. Morale and discipline problems resulting from shortages of food continue to hamper operations at both civilian work camps and at military units in the southern provinces.

Elsewhere, the hardships caused by evacuation from urban centers, splitting of families, reductions in quality of consumer goods and services, increases in work hours largely without additional compensation, and losses of income resulting from transfers from normal jobs to lower paying defense-related tasks are less severe but apparently have depressed civilian morale to some extent. There is little explicit evidence available on the morale of civilians living outside of target areas. A March 1966 Hanoi press report stated that a decline in the health and morale of workers at the country's second largest machinery plant—the Tran Hung Dao Machinery and Tool Plant in Hanoi, which produces items for military as well as civilian use—
had occurred due to the increase in regular working time and in outside duties.

Nevertheless, recent public discussion of the need to tighten control over both party members and the general population implies that the regime fears there may be some deterioration of public morale. An article in the March 1966 issue of the party journal Hoc Tap, detailed weaknesses in the party's techniques for disciplining erring members, and in April 1966, Ho Chi Minh called for "harsh disciplinary measures" against a number of party members and cadres in party cells who failed to carry out party policies correctly. Less than two weeks later the chairman of the Supreme Peoples Organ of Control in the government called for a revision of the sections of the legal code dealing with counterrevolutionary activities, protection of state property, and the rights and duties of citizens "in order to satisfy the demands of wartime."

This recent emphasis upon breakdowns of discipline implies that patriotic appeals alone are no longer sufficient to maintain civilian enthusiasm for the war. The original strength of appeals to the patriots was evident from the response of over 3 million youths (ages 16-30) and 1.7 million women, or about 50 percent of the working age population, to give active support for the war effort by performing various essential economic and paramilitary tasks under the "three readies"* and "three responsibilities"** movements. Intercepted letters indicate that the participants in the movements were highly motivated to contribute to the war effort.

The continuation of bombing appears, however, to be gradually intensifying economic and political problems to the point that the patriotic fervor with which the population initially greeted the air strikes is being diminished.

*The "three readies" for youth are: (1) ready to fight; (2) ready to join the army; (3) ready to go wherever the country requires them.

**The "three responsibilities" for women are: (1) responsibility to produce and do other tasks to free the men to fight; (2) responsibility to take over family affairs and to encourage their husbands and sons to serve in combat; (3) responsibility to serve in battle if necessary.
Discussions of civilian mobilization in North Vietnamese publications during 1966 indicate that the regime is encountering difficulties in effectively employing those already mobilized. These difficulties are largely blamed on the lower level cadres in both the government and the party, who are said to discriminate against young people in general and women in particular in the assessment of responsibilities. The morale-depressing effects of prejudice and discrimination in the mobilization effort is compounded by the sheer inability of North Vietnam's cadre force to manage the task. Managerial inefficiencies have proliferated since air strikes began in February 1965, and have prevented an orderly reallocation of the labor force. Cadres have been criticized in the North Vietnamese press for mobilizing construction workers and starting projects without plan.

In an effort to stimulate patriotic fervor the regime's propaganda makes clear the direct connection between North Vietnamese support for the war in the South and the bombing of North Vietnam. Intercepted letters and reports indicate that civilians in North Vietnam do in fact see the bombing as a direct consequence of the support furnished by North Vietnam to the Viet Cong. They, moreover, take great pride in their country's achievements in downing American aircraft and often mention the well-publicized achievements of Communist forces in South Vietnam.

Despite the regime's propaganda on the success of the "liberation forces" in the south, the population in North Vietnam is probably increasingly aware that the war is not going well and that heavy casualties are being suffered by North Vietnamese troops who have been sent south. North Vietnamese soldiers who have been captured or who have defected in South Vietnam reveal that some indication of the hardships, sickness, and injuries suffered by infiltrated troops is provided the people at home through letters and by eyewitness reports from wounded veterans who have returned home. If these casualties mount and the morale of the North Vietnamese troops in South Vietnam drops seriously, there is likely to be a comparable drop in the morale of the civilian population. Knowledge of military reverses in the field rather than the effect of bombing at home was a major factor in
the decline of popular morale in Japan and Germany in World War II.

2. Prospects

Civilian morale is likely to continue to decline in North Vietnam over the next 12 months because of the probability of further declines in civilian living standards. Agricultural difficulties—resulting at least in part from the mobilization effort—have already affected the current harvest, intensifying the already tight food situation in North Vietnam. Pham Hung, a member of the party politburo and director of the Financial and Trade Bureau of the Premier's Office stated in May 1966 that prices of food on the free market have already started to rise because of setbacks in the spring harvest and that "some...comrades...doubt it will be possible to stabilize the situation in the forthcoming period." In addition to the pressure on food supplies, other strains on civilian living standards will probably increase. Despite the possibility of a further decline in civilian morale during the next year, such an eventuality is not likely in the foreseeable future to deprive the leadership of freedom to pursue the conflict in whatever manner it chooses.

II. The Significance of Laos and Cambodia

The ability of the Communists to launch and to sustain the insurgency movement in North Vietnam has been greatly facilitated by the essentially free access they have had to those areas in Laos and Cambodia which border South Vietnam. Laos has developed as the major route for the infiltration of men and supplies into South Vietnam. Cambodia, which has been used to a limited extent as a source of supplies and has served principally as a safe-haven for Communist forces, is becoming increasingly important as an integral part of the logistics system. The unique value to the Communists of both countries lies in their neutral status. The logistic resupply activities in Laos are hindered only by aerial interdiction and such ground activities as have been conducted to date. Both of these measures have had only a limited effectiveness. Cambodia, on the other hand, provides the Communists an almost complete immunity from US/GVN and allied military reaction. The opportunities to apply political or economic pressures to induce a Cambodia reaction against Communist use of its territory are also extremely limited.

I-16
A. Laos

1. Supply Requirements and Road Capacity

The Communists have been able to use three routes to supply their forces in South Vietnam—the sea route from North Vietnam (or China), the Laotian land route, and the Cambodian route.* Although the use of any particular route has varied over time, the overwhelming share of supplies needed to meet the external logistic requirements of the Communist forces in South Vietnam are being moved by truck from North Vietnam through the Laotian Panhandle.

The increasing use of the Laotian supply route is shown graphically in Figure 1-2 which compares the movement of supplies by truck into the southern panhandle during the 1965 and 1966 dry season. During the 1965 dry season trucks carried an average of some 34 short tons of supplies a day into the infiltration corridor of Laos for a total resupply of over 6,000 tons. During the 1966 dry season, however, the daily movement of supplies into Southern Laos was about 84 tons or almost 17,000 tons during the season of which 15,100 were delivered to the infiltration corridor. In both years the flow of supplies was also supplemented by a small—2 tons a day—movement around the DMZ. Figure 1-2 also shows the dramatic increase in the through movement of supplies to the borders of South Vietnam. Although the Communists had to increase the flow of supplies for their forces in the Panhandle they were at the same time able to increase the flow of supplies by truck to South Vietnam from at least 900 tons in 1965 to 7,350 tons thus far in 1966.

a. The Logistic Requirement

The estimated VC/NVA military strength in South Vietnam in mid-1966 was between 260,000 and 280,000 which includes an estimated 118,000 regular troops. These troops require approximately 150 tons of supplies daily.

*The reference here is to supplies moved into South Vietnam from any point in Cambodia, and is not intended to refer to supplies that move on the Laotian route and merely cross northeast Cambodia before entering South Vietnam.
Figure 1-2

SUPPLIES TRUCKED FROM NORTH VIETNAM INTO THE LAOTIAN PANHANDLE DURING THE 1965 AND 1966 DRY SEASONS

1965
Average Daily Receipts in Panhandle
34 Tons

1966
Average Daily Receipts in Panhandle
84 Tons

---

Tons
0
2,000
4,000
6,000
8,000

1965
Dec 1964-May 1965 180 days

5,220
Panhandle
900
South Vietnam

1966
Nov 1965-Jun 1966 210 days

6,760
7,350

---

* Short tons

**Deliveries into the Laotian infiltration corridor shown here reflect 20% less in transit due to pilferage, spoilage, and aerial interdiction. In addition to these deliveries, both Laos and South Vietnam received some supplies from Cambodia.
at present levels of combat. Only a small part of this daily requirement—some 20 tons of Class II (weapons), Class IV (quartermaster, engineer, and medical) and Class V (ammunition) supplies—must be obtained from out of country. We have noted in recent months, however, that because of internal distribution problems within South Vietnam the Communist forces stationed in the food-deficit central highlands are obtaining rice supplies from Cambodia. The present estimates of the probable build-up of Communist forces and rates of combat by mid-1967 would, of course, increase these requirements substantially. The total daily requirement by mid-1967 could be in the order of 210 tons a day. The external requirement would then be 35 tons a day at present levels of combat or some 55 tons a day if the level of combat should double. These external supply requirements are small and their fulfillment requires the use of only a small percentage of the capacity of the supply routes through Laos.

b. Logistic Capacity

The capability to move supplies overland through North Vietnam and Laos to South Vietnam is restricted by the capacity of the roads in Laos. The current uninterdicted capacity of the infiltration network in the Laotian Panhandle for truck movement to points within a few miles of South Vietnam is about 400 tons a day in the dry season and 100 tons a day in the rainy season. Come rain or come shine this capacity ranges from 5-20 times the current external logistic requirement of the Communist forces in South Vietnam and from 2-7 times the probable external requirements under current estimates of the probable build-up of Communist forces by mid-1967.

The prospects are dim that conventional air interdiction can reduce the capacity of this network to a level that would represent an effective ceiling on the volume of supplies that can be moved through Laos. During the 30-day bombing pause from December 1965-January 1966 some 8,000 sorties dropped 16,000 tons of ordnance on the main supply routes in the Panhandle. In spite of this attack the level of truck traffic moving south during the same period—29 trucks per day—was twice the level of truck traffic in the same period one year.
earlier. Similarly, a photograph analysis of 26 route segments interdicted during 1965 in MR IV in North Vietnam showed that route capacity was reduced on only nine segments. On only two of these segments was capacity reduced more than 25 percent.

In view of these assessments and the fact that the level of traffic moving on these routes is a small volume of military traffic using, on the average, only slightly over 20 percent of road capacity, the Laotian supply network must be regarded as relatively invulnerable to conventional air interdiction.

2. Maintenance and Improvement of the Route Through Laos

The difficulty in interdicting the supply network through Laos is compounded by the intensive efforts which the North Vietnamese have expended in camouflaging roads, in effecting rapid repairs, in resorting to night travel, and other innovations to keep traffic moving, and at the same time to improve and expand the original network. As shown in the map (Figure I-3) the infiltration network through Laos now consists of some 650 miles of roads compared with about 150 miles at the end of the 1964 dry season.

a. Road Construction

At the end of 1964 the truckable road network in Laos extended only as far south as Muong Nong. By the end of 1965 the network had advanced another 100 miles farther south. During the 1966 dry season a more intensive effort was put forth. The southward route was extended another 60 miles to the tri-border area and more than 100 miles of new roads were built in Laos and Cambodia to connect the infiltration network with the Cambodian road system. In addition, 130 miles of new alternate roads, including the alternates to Mu Gia Pass, were built in the northern part of the country. The details of the 1965-66 construction are shown in Figure I-4. The net effect of the expansion in 1966 has been to provide an alternate route for every road that existed prior to the end of 1964. Furthermore the main north-south network has improved to the extent that some through truck traffic
LAOS PANHANDLE
ROAD CAPACITIES AND DEVELOPMENT

- Communist roadnet mid-1965
- Communist roadnet developed since mid-1965 (Laos only, except for 137 and 97)
- Other road
- Communist controlled area

Road capacity in tons per day
Dry season 600/125 Rainy season

Figure 1-4

[Map showing road capacities and development]
apparently is moving for the first time during any rainy season.

b. Labor Utilization

In earlier years the supply movement through Laos was essentially jungle trails. In 1961, for example, some 2,000 men were required to operate the trail movement through Laos. The construction of an improved road system and the need to maintain it under conditions of air interdiction required substantial inputs of manpower.

The labor force engaged in building and maintaining roads in the Laos Panhandle has an estimated total strength of 20-25,000 laborers, comprised of Communist engineering troops supported by locally conscripted labor. The Panhandle is sparsely populated so that a large part of this labor force has been brought in from other parts of Laos or from countries adjacent to the Laos border - including North Vietnam. We are unable to determine the number of North Vietnamese in this labor force. Available reports indicate that North Vietnamese labor does work on routes 23, 911 and 92 if not others.

The labor force on roads in Laos is organized into workcamps similar to those in North Vietnam. They are located along the entire road system and probably dispersed as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>No. of Camps</th>
<th>Estimated Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mu Gia Pass/Rte 23</td>
<td>1</td>
<td>4,500</td>
</tr>
<tr>
<td>(Including a rock quarry)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 911/912</td>
<td>3</td>
<td>9,000</td>
</tr>
<tr>
<td>(including a rock quarry)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 914/92</td>
<td>1</td>
<td>3,000</td>
</tr>
<tr>
<td>Route 96</td>
<td>1</td>
<td>3,000</td>
</tr>
<tr>
<td>Route 110</td>
<td>1</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>22,500</strong></td>
</tr>
</tbody>
</table>
These workcamp organizations are responsible for designated segments of roads. The total strength of a workcamp will vary with the volume of work under way and the availability of local labor. Figure I-5 illustrates the rate at which these laborers have been able to complete road construction projects. The rapid expansion of the road net in 1965-1966 and increases in traffic have made a larger maintenance force necessary. Given the remarkable increase in the mileage of new motorable roads constructed in the past year, it is believed that the present labor force can maintain the road net and can expand the network even if the level of air strikes increases during 1966-67.

Some construction equipment is being used for road building in Laos and has contributed to the rapid completion of new roads. Aerial photography has shown unidentified pieces of construction equipment, probably bulldozers and road graders, at key routes under construction. It is believed that the inventory of construction equipment in the Laos Panhandle could be increased during 1966-67 if the level of interdiction by air strikes were increased.

c. Repair Activities

Workcamps in Laos have been as efficient in the repair of bomb-damaged roads and bridges as their counterparts in North Vietnam. They have been able to build a new timber bridge at Ban Nape on route 8 within the 3-day interval of comparative aerial photography. Photography also reveals the clearing of landslides caused by bombings on route 92 within 3 days and repairs to interdicted portions of route 110 within 3-4 hours. Moreover, the repairs have been carried out while the road system was in a stage of considerable expansion.

3. Vulnerability of the Laotian Route

The Communists in the Panhandle are better able to counteract the bombings now than they were a year ago. They apparently have the ability and resources to increase and improve countermeasures to air attack. Experience in Laos and in North Vietnam shows that conventional air interdiction is unlikely to create any significant or sustained reduction in the road capacity of the infiltration network in Laos, as long as the Communist forces require such a small volume of logistic support from North Vietnam.
# SCHEDULE OF ROAD CONSTRUCTION IN LAOS

August 1965 - April 1966

<table>
<thead>
<tr>
<th>Route Number</th>
<th>1965</th>
<th>1966</th>
<th>Average Rate of Road Construction (Miles per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mu Gia Bypass Net (17)</td>
<td></td>
<td></td>
<td>.23</td>
</tr>
<tr>
<td>911 (63)</td>
<td></td>
<td></td>
<td>.84</td>
</tr>
<tr>
<td>912 (61)</td>
<td></td>
<td></td>
<td>.51</td>
</tr>
<tr>
<td>914 (40)</td>
<td></td>
<td></td>
<td>.33</td>
</tr>
<tr>
<td>923/96 (123)</td>
<td></td>
<td></td>
<td>.68</td>
</tr>
<tr>
<td>165 East of Chavane (9)</td>
<td></td>
<td></td>
<td>.33</td>
</tr>
<tr>
<td>110 (119)</td>
<td></td>
<td></td>
<td>.99</td>
</tr>
</tbody>
</table>
The enormity of the task assigned to air interdiction is apparent in this example. We assume that the nature of the VC/NVA external logistic requirements remains essentially unchanged and that air interdiction has produced a sustained 25 percent reduction in the capacity of the supply network. Even under these assumptions conventional air interdiction could not effectively reduce resupply capabilities through Laos until the VC/NVA force structure reached a level of at least six times the build-up estimated by mid-1967 at current levels of combat, or until the mid-1967 force engaged in combat at a rate some ten times greater than that being waged in South Vietnam.

The most promising means of effectively reducing Communist resupply capabilities are by denying them access to supplies in South Vietnam, forcing them to engage in a greater level of combat and at the same time denying them access to the Cambodian and sea infiltration routes. During the past dry season we estimate that the Communist forces in the food-deficit central highlands may have been receiving as much as 15 tons of rice daily from Cambodia. If this source were denied and the rice had to be supplied from North Vietnam through Laos the logistic problem would become more difficult. It would not be critical at this time, but as the VC/NVA build-up continues the excess of route capacity over supply requirements would be reduced significantly.

B. Cambodia

For years the Viet Cong have used Cambodia as a sanctuary and as a minor source of supplies. With the expansion of Communist activities and the introduction of NVA units into the conflict, even greater use is being made of Cambodia as a sanctuary area and as a source of supplies.

1. Sanctuary

The Viet Cong and, more recently, North Vietnamese forces use Cambodian territory in many areas along the 600-mile border for sanctuary and bivouac purposes. Important Viet Cong and North Vietnamese Army military facilities, such as rest camps, training areas, hospitals, workshops, and storage depots, now operate in Cambodia. Photography shows at least two Communist base areas in northeast Cambodia. (See the map, Figure I-6)
A recently captured Viet Cong document reveals in the clearest terms to date how the Communists have been using Cambodian territory for sanctuary with the complicity of at least local Cambodian officials. The document is a report of an early April 1966 Viet Cong meeting dealing with problems associated with the use of Cambodian territory. It makes clear the importance which the Viet Cong attaches to its Cambodian sanctuary and suggests that Cambodia will loom even larger in Communist planning as the war intensifies in South Vietnam. The document indicates that the principal use of Cambodian territory, at least in the Tay Ninh - Svay Rieng area, is to harbor rest and recovery camps for Viet Cong wounded.

2. Cambodia as a Source of Supplies

Most of the supplies procured by the Communists in Cambodia have been purchased in the open market in small amounts and moved clandestinely across the border by primitive transport. In the past year, however, the volume of supplies moved to the Communists has definitely increased. Recent reporting, including captured documents, indicate that the VC are acquiring in Cambodia substantial quantities of cloth, pharmaceuticals, surgical supplies, salt, fish, gasoline, communications equipment, and office supplies. Sihanouk has also made so-called "humanitarian" gifts of medicine and food to the Viet Cong. We estimate that at least 5,000 tons of rice and probably as much as 10,000 tons have been sold to the Communists. A frequently reported figure of 20,000 tons appears to be possible. During late 1965 and early 1966 Cambodian traders reportedly moved substantial amounts of rice northward on the Mekong River to Cambodian towns of Kratie and Stung Treng. The rice was then moved onward by small water craft or by truck to the South Vietnamese and Lao-tian borders. For the first time we have reliable reports that truck convoys carrying rice also crossed the border four or five miles into Vietnamese territory after nightfall. The Viet Cong control the border on four routes that enter Tay Ninh and Binh Long Provinces. The purchase of rice in Cambodia probably is a logistic expedient to supply VC/NVA units operating in rice deficit areas, instead of attempting to move the rice from surplus areas within South Vietnam.

The use of Cambodia as a transfer area or as a source of arms and ammunition is difficult to assess.
Almost certainly, the Communists have established arms caches on Cambodian territory for support of the VC and NVA forces. Cambodian troops may occasionally have provided arms to the VC, but such incidents have not been widespread and apparently have not involved collusion or foreknowledge on the part of the Cambodian government.

Arms shipments probably have also moved south from Laos through northeastern Cambodia into South Vietnam. Developments in the fair-weather road network during the past dry season strongly suggest that the route was intended to support such traffic during the dry season (See the map). This traffic could have moved with permission of the local Cambodian authorities but without the knowledge of the officials in Phnom Penh.

Even without the cooperation of the Cambodian government the Communists could make greater use of Cambodian territory. They could expand the current type of small-scale infiltration by sending more people to purchase supplies in the open market and by making more use of legitimate import houses and the Communist apparatus in Phnom Penh. Instead of moving these supplies across the border by clandestine means, they can hire trucks to move supplies to the border in the same manner that some shipments of food have already been made.

Cambodia, accordingly, must be regarded as a definite asset to the Communist forces both as a sanctuary and as a major route for obtaining food and other supplies.
APPENDIX A

RECUPERABILITY OF THE TRANSPORTATION SYSTEM IN NORTH VIETNAM

"In the task of ensuring communications, we scored many good achievements and gained much good experience in 1965. In the years to come, to develop past successes we must increase reserve projects, means of production, tools and equipment, and rationally organize the manpower necessary to repair and restore bridges and roads rapidly so as to ensure continuous transport."

Nguyen Con, Chairman, State Planning Committee, to the National Assembly of North Vietnam - 27 April 1966

I. Effects of the Rolling Thunder Program

A. Overall

As of mid-year 1966 direct losses caused by air strikes against the transportation system in North Vietnam amounted to over $30 million or over three-fourths of the estimated cost of replacement of all economic facilities damaged by the Rolling Thunder program. The air attacks have accounted for the damage or destruction of 46 rail and rail/highway bridges and 212 highway bridges. Losses of transport equipment were as follows*:

<table>
<thead>
<tr>
<th>Destroyed</th>
<th>Damaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessels</td>
<td>1,700</td>
</tr>
<tr>
<td>Vehicles</td>
<td>800</td>
</tr>
<tr>
<td>Railroad Freight Cars</td>
<td>570</td>
</tr>
<tr>
<td>Locomotives</td>
<td>8</td>
</tr>
</tbody>
</table>

*These figures are basically those obtained from pilot reports but adjusted downward on the basis of photography and analysis of bomb damage assessments of individual strikes in an effort to eliminate both exaggeration and duplication.
In addition to these losses, damage and disruption to the transport system has resulted from interdiction strikes against road systems and from attacks on railroad yards at Vinh, Yen Bai, Thai Nguyen, and Nam Dinh. Both the amount of time and cost of repairing the damage resulting from these strikes has been negligible.

The air strikes to date have concentrated primarily on transportation targets in the southern part of North Vietnam. The most significant strikes, however, have been against transport routes in the northern and central parts of North Vietnam. The interdiction program has produced relatively uneven results in attaining its objective of halting rail traffic.

Only one rail line—Hanoi to Thai Nguyen—has been open for through traffic almost continuously since the air strikes began. The Hanoi to Vinh line has been effectively interdicted for through rail service for most of the period. Through rail service on the Hanoi—Lao Cai line, which carried an estimated 30 percent of total rail traffic in 1964, has been halted during most of the period since mid-July 1965. Interdiction of this line disrupted the export of apatite and stopped the movement of Chinese transit traffic to and from Yunnan Province.

The important Hanoi—Dong Dang and Hanoi—Haiphong lines which carry the bulk of North Vietnam's imports have been subjected to the least amount of bombing. They are also the two lines transiting territory which provides more alternatives for bypasses and other expedients to maintain traffic movement. The Hanoi—Dong Dang line has been interdicted for through service for a total of only a few months. The Hanoi—Haiphong has been interdicted for a total of only a few weeks. Successful interdiction of the Hanoi—Dong Dang line would have particularly important and measurable effects. When the line came under heavy attack in late 1965 the import of Chinese coal was shifted from rail to sea transport. The coal movement was shifted back to rail transportation in March 1966 but was noted to be again moving by sea in May when the rail line was again interdicted for through traffic.
B. Damage to Bridges

The status of the bridges damaged or destroyed by air attack is shown in the following tabulation:

<table>
<thead>
<tr>
<th></th>
<th>Rail and Highway Bridges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail/Highway Bridges</td>
<td>Damaged or Destroyed 46</td>
</tr>
<tr>
<td></td>
<td>Repaired 22</td>
</tr>
<tr>
<td></td>
<td>To Be Repaired 24</td>
</tr>
<tr>
<td>Highway Bridges</td>
<td>212</td>
</tr>
<tr>
<td>Total</td>
<td>258</td>
</tr>
<tr>
<td></td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>191</td>
</tr>
</tbody>
</table>

The North Vietnamese have found it necessary to repair slightly over 25% of the bridges damaged or destroyed. Rather than effect costly and probably short lived repairs they have chosen to concentrate on the construction of alternate bypasses such as fords, ferries and temporary bridges. A total of 173 alternate crossings have been confirmed by aerial photography. These alternate crossings have been used particularly to sustain highway transport. The net effect is that North Vietnam now has more highway crossings than it had before the start of the bombings.

The use of temporary expedients to ensure continuous transport is particularly attractive to the North Vietnamese not only because the expedients are generally less vulnerable to air attack but also because they can be implemented at far less cost. The permanent repair or reconstruction of the bridges attacked to date would cost North Vietnam an estimated $12.2 million. The cost of temporary repairs and other expedients to maintain traffic, however, has been only $2.9 million.

II. Countermeasures to Air Attack

A. Repair of Bridges

As indicated above, one of the major responses of the North Vietnamese to the air attack on their transportation has been to use temporary expedients to keep traffic moving. The following survey of the damage or destruction of bridges on the principal rail lines illustrates this point in detail.
Hanoi to Vinh

This line is approximately 170 nautical miles (nm) in length and includes 26 major bridges (over 90 feet in length) and 48 minor bridges (less than 90 feet long). Eleven of the 26 major bridges have been damaged by air strikes. Seven of these have an operational bypass bridge or one under construction. Four have no bridge bypass, but in all cases there is evidence of some means of crossing such as foot bridges, pontoon bridges, or ferry crossing.

Although 15 bridges have not been damaged, three of them have bypass bridges already under construction; a reflection of North Vietnam's widespread pre-strike planning.

Vinh to Xom Khe

On this stretch of line, which is approximately 52 nm long, 6 major and 4 minor bridges have been damaged or destroyed. Fifty percent have evidence of bypass efforts in addition to attempts at repair of the original bridge.

The North Vietnamese have demonstrated considerable ingenuity and expertise in keeping traffic moving on this line and there is little or no indication that these capabilities have diminished appreciably.

Hanoi to Dong Dang

The line from Hanoi to the Chinese border is approximately 86 nautical miles in length. There are 25 bridges 50 feet and over in length. Ten of these bridges may be considered as major structures.

Photographic coverage is available on seven bridges, of which all but two have railroad bypasses either operable or under construction. At least three major bridges on this line have been damaged by U.S. air strikes. Repairs to these bridges are being carried out with modern equipment; the new substructures are massive and the repairs appear to be of a permanent nature. The nature of these repairs and the installation of dual gauge track in certain locations give every indication that the North Vietnamese hope to keep this line open under all conditions.
Hanoi to Haiphong

This line, the most important for the movement of imported economic goods, is approximately 52 miles in length. Two bridges have been damaged by air attack.

Bypass activity includes a new temporary bridge which is assumed to be operational, as well as an existing ferry crossing in the immediate vicinity. Repairs to the damaged original bridges are in evidence, though lack of photography precludes a determination of the pace of repair.

Hanoi to Lao Cai

The line from Hanoi to the Chinese border is approximately 156 nautical miles in length and has 45 major and 29 minor bridges. Photographic coverage shows the damage or destruction of 4 major and 9 minor bridges above Yen Bai and in rough terrain along the Red River. The Viet Tri bridge, located south of Yen Bai, was destroyed late in June of this year. The rugged nature of the terrain and the constriction of the road bed has forced the North Vietnamese to repair the damaged structures rather than resort to bypasses. Only two bypasses are discernible in available photography.

Highway bridges

Damage or destruction of a highway bridge in North Vietnam does not present the complications associated with such an act in more industrialized countries. This is borne out by a graphic review of the status of damaged highway bridges since November 1965.

Figure I-7 shows the cumulative totals of bridges of all types which have been destroyed or damaged plotted against the total number of bridges in need of repair at any given time. The difference between the two lines is the total number of bridges repaired. During the bombing pause from 24 December 1965 to 30 January 1966 the number of bridges repaired is seen to be appreciable. The difference since that period generally remains the same. The costs to repair or reconstruct the damaged bridges is shown in two categories—the cost of permanent repair and cost of temporary repairs that were made to keep traffic moving around all damaged structures. The decreasing trend shown for the cost of temporary repairs reflects the increased use of alternate methods of bypassing a given vulnerable crossing. This is more clearly shown in Figure I-8.
Figure 1-7

NORTH VIETNAM
DESTRUCTION OF BRIDGES VERSUS REPAIR
1 November 1965 - 1 June 1966

1. Cost of Permanent Repair
2. Bridges Destroyed
3. Bridges Not Repaired
4. Cost to Make Temporary Repairs Only

Legend:
- Bridges
- Cost of Permanent Repair
- Bridges Destroyed
- Bridges Not Repaired
- Cost to Make Temporary Repairs Only

Date:
- 1 Nov 1965
- 1 Dec 1965
- 1 Jan 1966
- 1 Feb 1966
- 1 Mar 1966
- 1 Apr 1966
- 1 May 1966
- 1 Jun 1966
NORTH VIETNAM: STATUS OF HIGHWAY BRIDGES

1 November 1965 - 1 June 1966

Bridges Damaged/Destroyed
Total Alternate Crossings
Total Bridge Repairs
Total Bridge Repairs and Alternate Crossings

Figure 1-8
Figure I-8 presents the status of the highway bridges only. The total of highway bridges damaged or destroyed is plotted against the total of bridges actually repaired, the number of alternate crossings, and the number of crossings to which no repairs have been made and no alternate means of transportation have been provided. To further clarify repairs and alternate crossings this is divided into total bridge repairs and total alternate crossings.

The total of bridges repaired (45) is around one-fourth of the total number (173) of new alternate crossings. The total of these two categories now exceeds the total 212 highway bridges which were damaged or destroyed. As of June, fords accounted for 65 percent of all alternate crossings with bypass bridges, ferries, foot bridges and pontoon bridges ranking in descending order. The largest number of bridges destroyed have been at crossings which have shallow streams, at least during the dry season. The longer and more important bridges are at locations requiring other than crossings by fords. At these more important crossings, more than one type of temporary crossing is usually in evidence.

In sum, the North Vietnamese are presently in a better position to keep their lines of highway transportation open, by having developed a high degree of skill in repairing damaged structures and in building more alternate crossings in order to increase the options available for the routing of highway traffic.

B. Improvement of Rail Lines

As the air strikes extended into the northern part of North Vietnam, the Hanoi regime undertook more permanent measures to ensure the operation of the vital Hanoi - Dong Dang line, and the connecting lines to Haiphong and Thai Nguyen.

Construction is under way to provide greater flexibility and limit the effectiveness of attempts to interdict these lines. A third rail is being laid along the Hanoi - Dong Dang line at least between the Chinese border and Kep, and possibly all the way to Hanoi. When this work is completed, probably within the next few months to Kep, both standard-gauge and meter-gauge rolling stock can be used on the line. As noted above several rail bypasses to bridges and at least one bypass around the city of Lang Son have been constructed or are currently under construction. In
addition, a standard-gauge rail line is under construction between Kep and the iron and steel complex at Thai Nguyen. Completion of the Kep - Thai Nguyen line, probably by the end of 1966, will provide the North Vietnamese with an alternate rail supply route in case of interdiction of the Hanoi - Dong Dang line between Kep and the Hanoi area, and will also permit the use of standard-gauge equipment for the movement of coke and coal from China to Thai Nguyen. If the line is interdicted between Kep and Dong Dang, the North Vietnamese can use rail shuttle service between bombed bridges in addition to shifting much of the volume of supplies to sea transportation.

Rail shuttle service also has been noted on the Hanoi-Haiphong line when the Hai Duong bridge is interdicted. Both a highway bypass bridge and a railroad bypass bridge have been constructed to circumvent the Hai Duong bridge in case of interdiction. Both of these bridges have spans that can be detached during the day and floated into place for use at night. Large barges with rails across them are being used as bridge spans for the rail bypass bridge. In addition, there are several waterways connecting Haiphong with Hanoi and other major cities which have a total capacity in excess of the capacity of the railroad.

C. New Road Construction and Improvement

The North Vietnamese have mounted a major effort to keep the road system functioning, particularly the vital links in Military Region IV (MR IV) which carry supplies to the Communist forces in Laos and South Vietnam. Since the beginning of the allied bombing over 200 miles of roads have been constructed and over 300 miles have been improved. At the present time about 60 miles of new roads are under construction.

The emphasis on new road construction is to provide a new inland route south from Thanh Hoa to Dong Hoi in MR IV. This new route, to be completed by the fall of 1966, will provide an alternate to the heavily interdicted coastal route. The new route follows terrain which avoids stream crossings and possible chokepoints. The development of this new route and the improvement of existing routes are providing the Vietnamese with an increased flexibility and capacity for the movement of supplies southward which is becoming increasingly difficult to overcome by bombing methods.
D. Use of Labor, Materials and Equipment

By the end of 1965, the North Vietnamese had developed its workcamp organization into a viable system with an estimated 70-100,000 workers. The air strikes which started in February 1965 concentrated first upon Military Region IV which has its headquarters at Vinh. The initial North Vietnamese response to the air attacks seemed confused and disorganized. This state of affairs apparently lasted for only a relatively short period because the level of traffic flow at that time was only slightly diminished. Before the air was cut the level of traffic in MR IV had reached new highs.

The labor force of construction workcamps in MR IV in early 1965 totaled about 5,000 men of varying degrees of roadbuilding experience. Workcamps from northeast and northwest North Vietnam were transferred to the Vinh area during April and May. Common laborers and youth from Hanoi and Haiphong also were sent south to Vinh in June-July and as many as 60,000 youth may have been added to the workcamp force. The original workers who had some skill became the nucleus for teaching the inexperienced labor on the job. In addition, a small share of the labor force was sent to local training classes and to Communist China to learn the operation, maintenance and repair of construction equipment.

These workcamps implemented the contingency plans set up in Hanoi by stationing units at chokepoints, shifting labor to heavily bombed areas, procuring building materials and setting up motor pools for construction equipment.

As a result of this pre-strike planning the North Vietnamese are now better able to counteract the air strikes than they were a year ago. They have the ability and resources to increase and improve the countermeasures still further. The chokepoints are less critical now because alternate routes and crossings have been constructed. Moreover, the labor force has gained a great deal of experience in making quick repairs, using camouflage and carrying out other innovations to deceive the enemy.

The major share of repair work is carried out by simple repair methods and with basic building materials, primarily timber and rock products that are at present in adequate supply. There are an estimated 6 rock quarries in MR IV near key routes such as 1A, 15 and 7 that supply rock
products for repair and roadbuilding projects. Bamboo, the universal building material of southeast Asia, is used extensively in construction of temporary highway bridges. Two saw mills in western Nghe An Province provide large dimension timber for repairs to railroad bridges. The North Vietnamese recently have also purchased large dimension timber from Cambodia, which indicates a possible shortage of larger sizes. Although the North Vietnamese use all salvageable components at a damaged bridge, shortages of timber in 1966-67 might necessitate shipment of steel bridge girders from the north, particularly from the assembly area at the Thai Nguyen Iron and Steel Combine or Communist China.

The inventory of construction equipment used by workcamps has increased since the start of the bombings and continued negotiations by the North Vietnamese with other Communist countries undoubtedly will provide additional units during 1966-67. The estimated inventory of construction equipment in use for road construction and bridge repair in MR IV consists of the following:

<table>
<thead>
<tr>
<th>Type</th>
<th>January 1965</th>
<th>June 1966</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulldozers</td>
<td>30</td>
<td>65</td>
</tr>
<tr>
<td>Mobile Cranes</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Scrapers</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Road Graders</td>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

Although the USSR and other Communist countries have supplied many dump trucks to North Vietnam for aid projects, it is not known how many have been earmarked for use in construction work in MR IV.

The experience gained by North Vietnamese in expanding the road network and in building alternate as well as additional stream crossings has given them greater expertise and speed in the repair of bomb-damaged structures and roads. As more labor and equipment is made available to the workcamps, even greater speed will be achieved in completing repairs. A selective listing of the speed with which these measures are completed is shown in Table 1-3. The listing reflects activity in MR IV and cannot be considered representative of the more extensive repair work that has been observed on the rail bridges farther north.

I-33
<table>
<thead>
<tr>
<th>Location</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge and Ferry on Route 1A (unlocated)</td>
<td>10.5 hours (for small vehicles)</td>
</tr>
<tr>
<td>Same work site</td>
<td>30.5 hours (for large vehicles)</td>
</tr>
<tr>
<td>Cau Giat Bridge (1915N/10540E)</td>
<td>2 days (for 8-ton vehicle)</td>
</tr>
<tr>
<td>Route 15, km 262-266</td>
<td>29 hours</td>
</tr>
<tr>
<td>Dia Loi Ferry (1816N/10540E)</td>
<td>21 hours</td>
</tr>
<tr>
<td>Route 15 at Dia Loi Build ford and fill craters in road</td>
<td>7 days</td>
</tr>
<tr>
<td>Loc Yen Bridge (1810N/10542E)</td>
<td>24 hours</td>
</tr>
<tr>
<td>Khe Thoi Ford (unlocated)</td>
<td>30 hours</td>
</tr>
<tr>
<td>Muong Sen Ferry (1924N/10408E)</td>
<td>48 hours</td>
</tr>
<tr>
<td>Khe Quyen Bridge (unlocated)</td>
<td>48 hours</td>
</tr>
<tr>
<td>Hanoi-Vinh Rail line at Dien Chau Repair track at km 300</td>
<td>12 hours</td>
</tr>
<tr>
<td>Hiem Bridge (unlocated)</td>
<td>30 hours</td>
</tr>
<tr>
<td>Repaired 3 damaged spans</td>
<td>8 hours</td>
</tr>
<tr>
<td>Route 15 segment</td>
<td></td>
</tr>
</tbody>
</table>
E. Possible Innovations in 1966-67

The main effort by the North Vietnamese in 1966-67 will be to further improve the lines of communications within the Rolling Thunder target zone and additional pre-strike preparations in the Hanoi-Haiphong sanctuary area in anticipation of air strikes against communications in this zone. Additional alternate routes and stream crossings will probably be completed and greater effort made to camouflage them. The Chinese engineer units northeast of Hanoi will continue to maintain the Dong Dang rail line, thereby allowing greater flexibility in allocating resources to maintain lines of communications in other areas. More innovations can be expected in bridge repair methods to speed up restoration, particularly construction of more pontoon bridges, ferries, and fords.

If the rate of air strikes against the logistics targets system were doubled the North Vietnamese would probably be able to cope with the additional damage by increasing the labor force working on lines of communications by 40,000-50,000 persons. The additions to the labor force need not be greater because of the large amount of work already done in expanding the road system and building bypasses and other temporary crossings. The main thrust of future labor efforts will be in maintenance and repair of this expanded road system. The North Vietnamese have made an impressive demonstration of their proficiency in the speedy repair of interdicted roads.

III. Effect of Air Attacks on Traffic Movements

A. Through June 1966

Interdiction of the transportation network at the levels carried out through mid-1966 has not succeeded in reducing the traffic carried by the North Vietnamese transportation system. Unless there is a substantial increase in the level of interdiction, the North Vietnamese should have no serious difficulty in maintaining both the volume of imports and exports carried by land transport in 1965 and in sustaining the total transport performance of all modes of transportation. The estimated volume of imports and exports moved by rail on the Hanoi-Dong Dang line in 1965 was about 30 percent greater than that carried in 1964. This increase created no additional problems for the rail system because of the loss of Chinese transit traffic during the last half of the year. Total transport performance in 1965 by all modes of
transportation in terms of tons carried increased by about 5 percent above the 1964 level. Total tons carried during the first half of 1966 are estimated to have continued to increase slightly. (See Table I-4). The slight decreases in railroad performance were more than compensated by increases in highway, inland water, and coastal water performance. Total performance in terms of ton-miles, however, is estimated to have decreased slightly in 1965 and in the first half of 1966.

Table I-4

NORTH VIETNAM


<table>
<thead>
<tr>
<th></th>
<th>1964</th>
<th>1965</th>
<th>Jan - June 1966</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Performance:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Million tons carried</td>
<td>20.6</td>
<td>21.7</td>
<td>11.0</td>
</tr>
<tr>
<td>Million ton-miles</td>
<td>1,200</td>
<td>1,160</td>
<td>550</td>
</tr>
<tr>
<td>International Trade by Rail:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imports (thousand tons carried)</td>
<td>180</td>
<td>350</td>
<td>N. A.</td>
</tr>
<tr>
<td>Exports (thousand tons carried)</td>
<td>220</td>
<td>170</td>
<td>N. A.</td>
</tr>
</tbody>
</table>
The most serious problem for the North Vietnamese in maintaining the 1965 level of transport performance during July 1966 - June 1967, assuming the current level of air attacks and choice of targets, is the possibility of more frequent interdiction of the Hanoi - Dong Dang and Hanoi-Haiphong rail lines.

More frequent interdiction of these lines would disrupt the normal flow of through traffic from China but we estimate that the interdiction would not reduce the capacity of the lines below the levels needed to handle the normal volume of military and civilian supplies imported over rail connections to China.

B. Intensive Interdiction of Transportation

A significant escalation of the air attacks against North Vietnam could have more meaningful results. To illustrate this we assume an escalated program of air attacks that results in the continued interdiction of all major rail, highway, and combination rail/highway bridges, including bypass bridges, throughout North Vietnam. Port facilities at Haiphong, Cam Pha, and Hon Gai, the major railroad repair shop at Gia Lam, and all major railroad yards are also assumed to be subjected to effective and repeated air attacks. Significant military and economic targets such as the remaining petroleum storage facilities and the Haiphong cement plant are also taken under attack.

The postulated attack would present North Vietnam with an immediate and severe problem in maintaining normal traffic movements, particularly the vital import traffic.

Sustained interdiction of the lines of communication would force the Communists to allocate considerable amounts of manpower and materials to maintain the railroad lines and alternate routes. Intensive armed reconnaissance would stop all daylight traffic and disrupt night traffic, thus slowing down movement and making the logistic resupply of Communist forces considerably less reliable than at present.

In order to maintain imports normally carried by ocean-going ships the North Vietnamese would have several alternatives. These include the diversion of seaborne trade to South China ports and using land transport routes or coastal shipping to move cargoes to and from North Vietnam; the use of small watercraft to load and unload ocean-going
ships while they are anchored outside North Vietnam ports; and the use of other minor ports in North Vietnam.

If only one-half of the normal traffic through Haiphong could be handled by lighters and other craft once the port is closed and watercraft are subject to 24-hour armed reconnaissance, the other half would probably move through China by rail to North Vietnam. In this case 300 tons per day of general cargo imports and up to 400 or 500 tons per day of petroleum imports would be transferred to rail transport. Railroad connections to Communist China are currently operating at only about one-third capacity. This added traffic would compel North Vietnam and China to divert some overland traffic via Yunnan Province and the Hanoi - Lao Cai line. Both lines would then be forced to attempt to operate at full capacity under interdicted conditions. If production in the cement plant were also halted at the same time, an additional import requirement for cement, probably as high as 1700 tons a day would be generated. This additional tonnage would raise traffic far beyond the uninterdicted capacity of the Hanoi - Dong Dang rail line, the principal import route. The overburdening of the rail lines would become more acute if even less traffic could be handled by lightering and/or coastwise movement.

The North Vietnamese would probably be forced to make greater use of highway and inland water traffic. Although it is extremely difficult to interdict these systems, their greater use would increase the opportunities for harassment of actual traffic movement. The roads from China are estimated to have a limited capacity in the rainy season of about 1,000 tons EWPD. In the area north of Hanoi the height of the rainy season occurs during July through September. A sustained high level of interdiction during this period would be more effective in reducing the gap between transport capabilities and the volume of traffic to be moved.

The intensified attacks would have little impact in halting either essential imports or the flow of petroleum

---Short tons are used throughout this Appendix.
necessary to sustain the logistic pipeline to South Vietnam. The amount of petroleum needed to sustain this system is small. North Vietnamese forces and civilian activities in MR IV, which includes the four southern provinces of the country, were consuming petroleum at the rate of 1,500 tons per month at the end of 1965. With the higher level of transport activity observed during the 1966 dry season, the average level of consumption in MR IV probably amounted to about 2,000 tons per month. The delivery of this petroleum as well as other supplies (including food) to MR IV probably requires an additional 500 tons of fuel per month.

The movement of supplies to and through Laos requires the consumption of only a small share of the petroleum moved into MR IV. At the end of 1965, it appeared that only about 400 tons of the 1,500 tons per month shipped to MR IV were used in the Laotian Panhandle. At present, this amount probably has increased to 500-600 tons. Trucks used to carry supplies destined for South Vietnam are estimated to consume about one-fourth of the fuel moved into the Panhandle.

The restrictions of rail traffic and the consequent additional requirements on truck and inland water transportation would seriously affect the availability of transportation for all nonessential economic needs. This lack of transport availability in conjunction with the disruption of imports through the ports would soon cause modern industry to grind to a halt unless substantial stockpiles of raw materials had been accumulated at the plants. Even if some of the plants had stockpiles sufficient to continue operating, internal distribution or export of their products would be seriously handicapped by insufficient transportation. Modern industry, however, represents only a small portion of North Vietnam's economic output.

If modern industry were forced to a standstill by escalated air attacks, demands for internal distribution for the industrial sector would be eliminated. The loss of demand for petroleum for the industrial sector would permit the allocation of most of the available petroleum to the transportation of military supplies, food, and other civilian essentials such as civil defense items and medicines. This transport capacity would be supplemented by the use of primitive transport.
The immediate and direct effect of the increased interdiction of the transport system on the availability of food would not be serious. Existing food storage facilities in the countryside are so decentralized that they require little transportation by modern means. The distribution of food to the cities, mainly Hanoi, Haiphong, and Nam Dinh, however, would be more difficult.

The long-range effect on the production and distribution of food, however, could cause some serious problems. The intensified air attacks on the level assumed in this report probably would aggravate manpower shortages and further disrupt that part of the irrigation system dependent on petroleum and electric power and could cause a decrease in food production. Decreased food production in conjunction with a decrease in transport capability could aggravate the problem of supplying a sufficient amount of food to the larger cities. The transport problem probably still would not be critical, however, because only 4 percent of the population lives in the three largest cities and only 7 percent lives in all cities of more than 10,000 persons.
ANNEX II

THE EFFECTS OF SOVIET AND CHINESE INVOLVEMENT IN THE WAR ON THE VIETNAMESE COMMUNISTS
ANNEX II

THE EFFECTS OF SOVIET AND CHINESE INVOLVEMENT
IN THE WAR ON THE VIETNAMESE COMMUNISTS

I. Introduction

There is substantial evidence that the political positions of the Soviet Union and Communist China on the war, and the amount of their material assistance to the war effort, are highly significant influences on Vietnamese Communist policy. The importance of Soviet and Chinese support and assistance has been readily admitted by the Vietnamese. In his April 1965 speech setting forth the situation and tasks facing the Vietnamese after the US began bombing the North, Premier Pham Van Dong said simply that the "more" the Vietnamese are "supported and assisted in all fields by the socialist camp, the more they will be able to struggle vigorously and resolutely" against the enemy in Vietnam. In April of 1966, Dong re-emphasized the significance of bloc backing in a declaration that the "victories" of the Vietnamese people are not only the results of their own efforts, but are also the "result of the infinitely valuable sympathy, support and assistance by the fraternal socialist countries."

The Vietnamese view bloc support as valuable in sustaining and, in some ways, increasing the military pressure the Communists can bring to bear in South Vietnam. They also see it as a protective umbrella which partially inhibits direct allied military pressure on the DRV and helps to negate the effects of the bombing of the North. Firm Soviet and Chinese backing also helps complete the ideological equation in the conflict so important to the Communists, i.e., this is a "war of liberation" and it is the duty of all Communists to support and encourage such wars.

II. The Significance of Economic and Military Aid

A. General Level of Aid

In an apparent response to the allied air offensive, military and economic assistance provided by the
USSR and Communist China increased sharply in 1965. Although the total amounts of aid extended during 1965 are not known, reasonably firm evidence enables us to estimate that military aid amounting to about $250 million and economic aid of about $100 million was probably delivered in 1965. The Communist allies have undoubtedly undertaken commitments to provide additional assistance but we are unable to make any meaningful estimates of the total value of these commitments. There is reliable evidence that the USSR in 1965 did commit itself to extend additional assistance of at least $160 million. We do not know if this extension is for military or economic programs. The weight of available evidence suggests that it is not for weapons but is probably intended as assistance in the rebuilding of bomb damaged facilities or for defense-related activities.

The immediate significance of the military and economic aid provided by other Communist countries is that it provides North Vietnam the material means to carry out its aggressive programs. North Vietnam is significant militarily as a logistic base for the transmission of military supplies to South Vietnam, as a source of manpower, and as the center for control of the insurgency. As a primitive economy it has a capability to produce only minor items of military equipment and relies on other Communist countries for all of its heavy military equipment and most of its small arms and ammunition. Material assistance to North Vietnam is also significant as an apparent commitment of other Communist countries to underwrite the material costs of the war and to assist in the reconstruction of North Vietnam's economy. These assurances undoubtedly underlie North Vietnam's apparent willingness to lose its economic facilities to air attack and to persist in its pursuit of the war in South Vietnam. This attitude is undoubtedly strengthened by the knowledge that even more assistance will be forthcoming in 1966. Preliminary data on shipping to North Vietnam show that imports continue to rise above 1965 levels. At the same time exports are continuing to decline so that the growing import surplus can only be financed by additional assistance from Communist countries.

B. Economic Aid

Known economic credits and grants extended by Communist countries through 1962 amounted to more than $956
million. (See Table II-1). About 40 percent of the total was in the form of grants. By the end of 1964 from $550-800 million or 60-80 percent of the extension had been drawn. The USSR accounted for $370 million (40 percent) of total extensions and Communist China provided $457 million (48 percent). The remaining $130 million was supplied by the European Communist countries and token amounts were provided by Albania, North Korea, and Mongolia.

After an apparent hiatus of two years the Soviet program for economic assistance to North Vietnam was revived in February 1965 when Premier Kosygin visited Hanoi. As the war expanded substantial new extensions of economic aid were made in mid-1965. The only public statements about the value and composition of the aid has come from Hungary which is reported to have granted a modest $5.5 million for trucks, telecommunications equipment, medical supplies, and machine tools. Rumania is also reported by intelligence sources to have extended a credit of $4.4 million.

In December 1965 and January 1966 new aid agreements were signed with all Communist countries, suggesting that the mid-1965 agreements were small. Since then other Communist countries have promised increased assistance for North Vietnam. In May 1966, Moscow reported an agreement to provide technical assistance; additional Chinese aid for agriculture was announced in July. All the Warsaw Pact members also pledged increased economic aid to North Vietnam in July 1966.

We estimate that deliveries of economic aid in 1965 were in the order of $100 million or from 20-40 percent above the average annual level in 1955-1964.

In June 1966 Soviet specialists were reported in North Vietnam to determine equipment needs for constructing new enterprises and rebuilding those destroyed by US air attacks.

All of these developments foreshadow a substantially increased aid in 1966 and 1967, a trend already confirmed by our intelligence on the volume and composition of North Vietnamese imports.

II-3
C. Military Aid

Military aid to North Vietnam which had previously been on a relatively small scale reached at least $250 million in 1965.* About three-fourths of this aid, by value, was provided by the USSR as the supplier of North Vietnam's modern air defenses, particularly its SAM system and jet interceptors. The approximately $50 million provided by Communist China was limited principally to conventional arms.

1. Soviet Military Aid

By the end of 1965 Soviet military aid to North Vietnam approached $450 million. The sequence and value of Soviet arms aid to North Vietnam was as follows (in million US $):**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value (in million US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953-63</td>
<td>222</td>
</tr>
<tr>
<td>1964</td>
<td>53</td>
</tr>
<tr>
<td>1965</td>
<td>167</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>442</strong></td>
</tr>
</tbody>
</table>

Military aid extended after August 1964 and in early 1965 probably was completely delivered by the end of 1965. Major deliveries included equipment for about 20 surface-to-air missile firing battalions, 8 IL-28 light jet bombers, 11 MIG-21 jet fighters, 25 MIG-15/16 jet fighters, over 1,000 AA guns ranging from 37-100 mm., and hundreds of vehicles. (See Table II-2).

*The value of military aid is expressed in Soviet foreign trade prices.

**Values, reported in rubles, have been converted to dollars at the official exchange rate: 1 ruble = US $1.11.
The cost of this technical assistance was probably less than $10 million.

Following North Vietnam's active confrontation with the US in the Tonkin Gulf incidents of August 1964, the Soviets extended Hanoi the reported $53 million grant listed above for antiaircraft and including $17 million for surface-to-air missile systems and missile and flight training for North Vietnamese crews. Shortly after Kosygin's visit to Hanoi in February 1965, another $167 million was reportedly granted for aircraft and additional antiaircraft and SAM equipment.

An indication of continued military aid in 1966 is contained in reports on the "Gratuitous Aid and Technical Assistance Agreement" signed in Moscow in December 1965. Reportedly, the USSR agreed to provide large quantities of 130-mm antiaircraft guns, other ground equipment, and possibly 60 additional MIG-21 jet fighters. Although not enough is known on types and quantities of equipment to permit an estimate of the value of the arms portion of the agreement, the cost of the antiaircraft guns and jet fighters alone will exceed $80 million.

2. Chinese Military Aid

There is little information on Chinese military aid to North Vietnam, but we estimate that total aid by the end of 1965 was on the order of $125 million of which about $50 million was delivered in 1965. Although the North Vietnamese armed forces are structured basically on Chinese rather than Soviet lines, until 1960-61 they were equipped largely with weapons from the USSR. From 1960 to the Gulf of Tonkin incidents in August 1964 Chinese arms aid to Hanoi probably increased to a point where it equalled—if it did not exceed—Soviet arms aid. Following the Gulf of Tonkin incidents, the Chinese continued to provide some weapons, including 44 MIG-15/17 jet fighters and 4 Shanghai-class fast patrol boats, but fell far behind the USSR as the major arms supplier. The major Chinese contribution to Hanoi's war effort has been as a provider of military construction units and materials and, possibly, operational antiaircraft elements.

Some elements of Chinese military units are positioned in Northeast and Northwest near the main railroad
lines leading to Yunnan and Kwango. Elements of two railroad engineer divisions of the People's Liberation Army (PLA) and an antiaircraft division are known to be in these areas. Although little is known regarding the size of this force, it is estimated that from 25,000 to 45,000 Chinese may be involved.

Aside from these operational units, Chinese military technicians in North Vietnam may exceed 1,000. Unconfirmed reports state that 200 North Vietnamese pilots and ground crews trained in China in 1961-64. Although little is known on the numbers of Chinese technicians advising North Vietnam in the period 1961-64, they are believed not to have been so large as to move the cost of this military technical assistance above the $10 million spent by the USSR.

3. Other Communist Military Aid

Military aid supplied to North Vietnam by the Communist countries of Eastern Europe before 1965 was negligible. The major items of military and emergency reconstruction aid extended or delivered by these countries since then may be summarized as follows:

<table>
<thead>
<tr>
<th>Donor Country</th>
<th>Nature of Aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czechoslovakia</td>
<td>Small Arms, Ammunition</td>
</tr>
<tr>
<td>East Germany</td>
<td>10 Field Hospitals</td>
</tr>
<tr>
<td>Hungary</td>
<td>Medicines, Hospital</td>
</tr>
<tr>
<td>Poland</td>
<td>Barges, Trucks, Hospital</td>
</tr>
<tr>
<td>Romania</td>
<td>Vehicles, Trucks</td>
</tr>
</tbody>
</table>

East European aid primarily is of a quasimilitary, defense support nature (even the Czechoslovakian small arms were mainly sporting rifles for training purposes). This aid has gained impetus in 1966 and may be expected to increase substantially in the future.

D. Bloc Aid as a Critical Factor in Continuing the War

Although Soviet and Chinese military and economic aid has been small in terms of their capabilities, it is absolutely vital to North Vietnam's ability to adequately
defend its territory and to support the insurgency in South Vietnam. A cessation of bloc military aid would, in fact, almost certainly make it impossible for the Vietnamese to sustain the war in South Vietnam at its present level of intensity.

North Vietnam has no productive capability to produce heavy military equipment or the new family of weapons with which the VC Main Forces are being equipped. The NVA and VC Main Forces are totally dependent on outside sources for the 7.62 family of weapons and the heavier weapons being introduced into South Vietnam. If these sources were denied, the VC/NVA forces would be deprived of their major offensive capabilities, and once stockpiles were exhausted these forces would be compelled to revert to a much lower level of military activity.

Since the available evidence points not only to a continuation, but to a probable increase in bloc aid during the last half of 1966, it does not appear likely that the Vietnamese Communists will be faced with devising any substitutes for it or of altering their policy to take account of its cessation during the foreseeable future. Moreover, so long as Soviet and Chinese support continues at least at its present levels, it does not appear that the Vietnamese Communists would view it as a critical factor in any basic determination they might make on whether to continue the fighting. Vietnamese Communist assertions that, in the final analysis, they must rely mainly on their own resources to prosecute the revolution appear to reflect a genuine and deeply held belief. The theme of "self-reliance" has been a persistent one in Vietnamese Communist statements, and has not at all been abandoned or dampened down in the face of the increasing allied military pressure on the Viet Cong and on the DRV.

In March of 1966, for example, DRV party spokesman Truong Chinh declared that the "strategic line" of the revolution was still to rely "mainly on our own forces" while fighting a protracted war. In April, Ho Chi Minh told a Cairo newsman that the Vietnamese people, while "highly appreciating" the assistance of the socialist countries would "basically depend on their own forces." In May, another North Vietnamese politburo spokesman, Pham Hung, reiterated that, even while employing assistance from the bloc, "our dictum is to rely principally on our own strength."