ARMY review(s) completed.

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JCS review completed.

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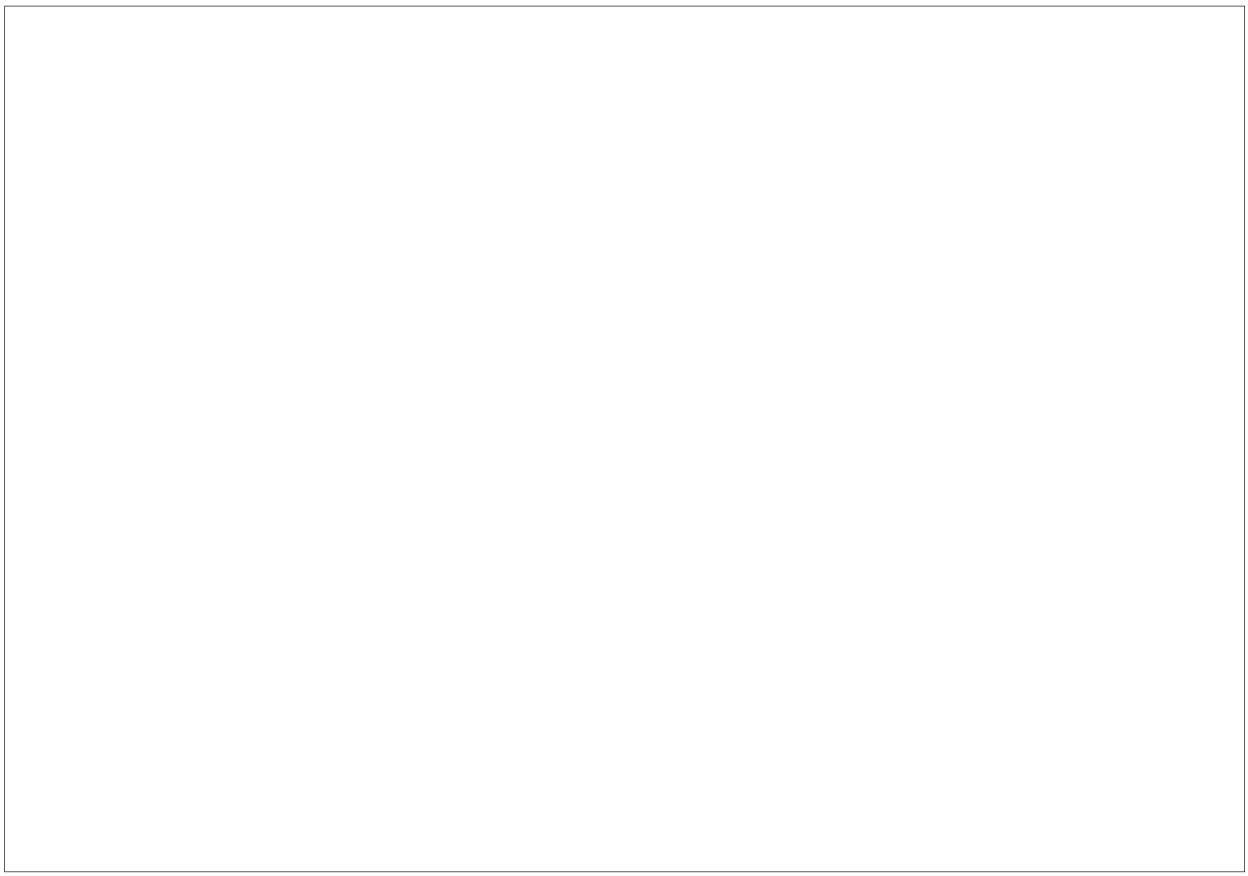

POSSIBLE ALTERNATIVES TO THE ROLLING THUNDER PROGRAM

(The Case Where All Except Approximately Five Percent of the Attack and Armed Reconnaissance Sorties in North Vietnam are in Route Packages I, II, and III). (no. 7)

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12 April 1968

JCS review completed.

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Foreword

The primary yardstick by which the effectiveness of any bombing program against North Vietnam is measured is the consequences which the neutralization of the chosen group of targets has or will have on Hanoi's ability to sustain Communist military operations in South Vietnam. The consequences of any bombing campaign, however, are limited by the nature of North Vietnam's contribution to the fighting in the south. North Vietnam essentially serves only two purposes:

a. as a source of manpower, and

b. as a logistics funnel.

Therefore, those economic activities which are normally found to be lucrative targets for bombing campaigns, namely, the industrial war-supporting sinews of a nation, are essentially not present in North Vietnam. They lie in the Soviet Union and Communist China, who not only furnish the munitions, petroleum, and other supplies needed by the VC/NVA forces, but also stand ready to make up deficits in the civilian economy, such as shortfalls in crop production.

Potential effects of attacks on North Vietnamese target systems, therefore, are necessarily somewhat circumscribed by these circumstances.

CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
12 April 1968

INTELLIGENCE MEMORANDUM

POSSIBLE ALTERNATIVES TO THE ROLLING THUNDER PROGRAM

(The Case Where All Except Approximately Five Percent of the Attack and Armed Reconnaissance Sorties in North Vietnam Are in Route Packages I, II, and III). (No. 7)

Summary

This paper analyzes the anticipated effects of a Rolling Thunder program that allocated all but about 5 percent of attack and armed reconnaissance sorties in North Vietnam against Route Packages I, II, and III. This area is one which has borne the brunt of the Rolling Thunder campaign over the past three years. The proposed change could raise the monthly attack sortie rate from the 1967 level of 6,000 to about 8,000, or approximately 40 percent. Route Packages I, II, and III encompass an industrially unimportant, sparsely populated area, whose value is as a logistics funnel to supply VC/NVA forces in Laos and South Vietnam. We believe proposed concentration of the bombing effort against North Vietnam on the three southernmost areas would have the following direct effects:

1. In the short run, it would complicate the problems of supplying

Note: This memorandum was produced solely by CIA. It was prepared by the Office of Economic Research and was coordinated with the Office of Current Intelligence and the Director's Special Assistant for Vietnamese Affairs.

the local population, but would be unlikely to have more than a very temporary effect on the flow of men and supplies to South Vietnam. The routes leading from the route packages into Laos and the DMZ are utilized to only about 15 percent of their capacity. Within a week to 10 days, Hanoi could shift the necessary repair crews from the northern areas to cope with the higher levels of damage. The demonstrated capability of the North Vietnamese to mobilize quickly the needed men (about 15,000 in this case) and materials to repair damaged key transport points and construct alternative bypasses means that any effects on the flow of essential materiel would be highly limited in time.

2. Added losses of trucks and railroad rolling stock could be supplied easily by other Communist nations, primarily the USSR and Communist China. These nations have demonstrated an ability to respond rapidly to Hanoi's needs for such equipment.

3. Over time, Hanoi would probably shift some of its surface-to-air missile systems and AAA guns to the southern route packages. This shift could raise the present very low loss rate of 1.2 US attack aircraft per 1,000 sorties over Route Packages I, II, and III to a level closer to the general average for North Vietnam. About 16,000 additional troops would have to be added to the North Vietnamese forces if Hanoi succeeded in securing replacement air defense equipment from the USSR and Communist China to redeploy in the northern areas.

Since the redirected Rolling Thunder program would have no direct effect -- apart from some highly temporary disruption -- on Hanoi's capability to sustain the war in South Vietnam by continuing the infiltration of men and materiel, it is most unlikely that there would be any direct effect on the will of the regime to continue the war.

The international reaction to confining the bombing campaign to Route Packages I, II, and III would probably be favorable, since the attacks would avoid the populated areas of North Vietnam and would be confined to areas which are infiltration funnels to Laos and South Vietnam.

It is unlikely the proposed shift in the bombing program would have any significant effect on Hanoi's present position on negotiations with the US. The North Vietnamese have to date offered to meet with US officials only for the purpose of discussing a complete cessation of the bombing.

I. Air Operations

A. Previous Attacks Over Route Packages I, II, and III

Since the beginning of the Rolling Thunder program, Route Packages I, II, and III have borne the brunt of the US air attacks. Almost 80 percent of all attack sorties flown in North Vietnam during 1966 were against targets in these route packages. In 1967 the increased emphasis on targets in the Hanoi and Haiphong areas and on points on the lines of communication (LOC's) in the Northeast brought the share of attacks on the three southern route packages down to about two-thirds. However, because of the increased intensity of the bombing program last year, the average number of attack sorties flown per quarter over Route Packages I, II, and III increased from about 16,200 in 1966 to 17,900 in 1967. Sortie levels have been consistently highest in the third quarter, when the best flying weather prevails, and lowest in the first and fourth quarters in the face of poor weather. Attack sorties over Route Packages I, II, and III during 1966, 1967, and 1968 are given by quarter in the following tabulation:

	1966	1967	1968
January-March	6,500	15,430	11,130
April-June	14,900	22,180	
July-September	26,500	20,220	
October-December	16,650	13,960	
Total	*64,550*	*71,790*	*N.A.*

During 1967, about 140,000 tons of ordnance was dropped on targets in Route Packages I, II, and III, an increase of about 60 percent over 1966. B-52 aircraft delivered about 30 percent of this tonnage, largely against tactical military targets. Of the total delivered by B-52's, approximately 70 percent

was against military targets, nearly 14 percent against storage and supply areas, and the remainder against infiltration and logistics targets, such as roads, truck parks, and staging areas. The B-52 attacks were heavily concentrated in the area immediately north of the DMZ and areas close to the Mu Gia Pass. The 98,000 tons of ordnance delivered by attack aircraft other than the B-52's was targeted largely against infiltration and logistics targets -- bridges, vehicles, storage areas, transshipment points, and watercraft.

The US aircraft loss rates sustained over Route Packages I, II, and III have consistently been the lowest of the war because enemy air defenses have been relatively weaker in the southern than in the northern route packages. Slightly more than one-third of all Rolling Thunder combat losses have been sustained in Route Packages I, II, and III, despite the large share of total attacks flown against these areas. During the last three quarters -- July 1967-March 1968 -- 76 aircraft were downed by Communist defenses in these areas while participating in a total of 65,300 attack and support sorties -- a loss rate of 1.2 aircraft per 1,000 sorties. By comparison, the loss rate of attack and support aircraft throughout North Vietnam during the same period was 2.0 per 1,000 attack and support sorties. The comparable loss rate over Route Package VI was 4.3 -- three and a half times greater. Losses and corresponding loss rates of attack and support aircraft in Route Packages I, II, and III are given by quarter in the following tabulation:

	Aircraft Losses				
	Route Packages				
1967	I	II	III	Total	Loss Rate [a]
January-March	13	0	10	23	1.0
April-June	15	3	11	29	1.0
July-September	30	5	3	38	1.4
October-December	17	1	4	22	1.0
1968					
January-March	9	5	2	16	1.0

a. Losses of attack and support aircraft per 1,000 attack and support sorties. Loss rates for the first two quarters of 1967 are estimated.

B. Stepped-up Attacks Against Route Packages I, II, and III

Assigning all but 5 percent of the Rolling Thunder sorties to strikes against Route Packages I, II, and III (assuming the same level of attacks against North Vietnam as in 1967) would make available almost 30,000 more sorties than were targeted against the three southern route packages last year. This would raise the monthly attack sortie rate to almost 8,000, compared with 6,500 in 1967 in this area. Such a shift in geographic coverage could increase by 42 percent the level of attack in this area. Weather constraints, however, suggest that the additional sorties available might have to be divided between targets in Laos and the three southern route packages, so that the number of sorties available for attacks against Route Packages I, II, and III would represent a 25-percent increase over 1967. If it is desired to achieve a 40-percent increase in southern North Vietnam, this could be done by diversions of aircraft from targets in Laos.

Poor weather restricts the level of attack in North Vietnam and in Laos during alternate halves of the year. The best weather for air operations over the panhandle of North Vietnam normally extends from mid-May to mid-September, corresponding to the poorest flying weather in Laos. The best weather for air operations in Laos extends from mid-October to mid-March when attacks are sharply reduced in North Vietnam. Parts of September, October, March, May and all of April are transition periods when the weather is fair for attack over both areas. By the use of radar systems runs, attack sorties are flown in the southern route packages throughout the year. The limited number of aircraft equipped with the needed radar systems, however, suggests that the level of attack sorties in the sourthern area probably would not be increased during the poor flying weather.

During 1967 the total of 117,950 attack sorties flown against Laos and the North Vietnamese panhandle were distributed 61 percent in North Vietnam and 39 percent in Laos. If this 60-40 ratio is used to distribute the 30,000 additional

attack sorties, a one-quarter increase in attack sorties could be achieved in both Laos and the North Vietnamese panhandle. About one-half of the additional attack sorties over each area could be flown in the good weather season, about one-quarter in each of the fair weather seasons, and none in the poor season. Attack sorties flown per month during 1967 for each weather season are shown in the following tabulation:

	Route Packages I, II, and III		Laos	
Season	Weather	Attack Sorties per Month	Weather	Attack Sorties per Month
Spring transition- (Mid-March to Mid-May)	Fair	6,870	Fair	4,260
Southwest monsoon- (Mid-May to Mid-September)	Good	8,050	Poor	1,390
Autumn transition- (Mid-September to Mid-October)	Fair	5,310	Fair	2,020
Northeast monsoon- (Mid-October to Mid-March)	Poor	4,110	Good	6,010

C. Limited Attacks in Route Packages IV, V, and VI

Assuming the 1967 level of sorties but limiting attacks against targets in Route Packages IV, V, and VI to 5 percent of total Rolling Thunder sorties results in only 5,300 sorties being available for targeting against the northern route packages, compared with 35,000 last year.

The reduced number of sorties, if judiciously targeted, could have, however, a significant impact on some aspects of the North Vietnamese economy and

military posture. During 1967 the number of sorties flown against some target systems in the three northern route packages was not large. About 1,030 attack sorties were flown against industrial targets. As few as a quarter of this number of attacks probably would prevent any major restoration of electric power and industrial production. Something less than 1,600 sorties were directed at airfields in the northern area and about 1,600 against radar systems. In 1967, only 290 attack sorties were made against the key Doumer and Canal des Rapides bridges in the Hanoi area, and about 4,000 sorties were flown against industrial, military, and logistics targets in the entire Hanoi/Haiphong area.

It would not be possible, however, to maintain a significant interdiction effort against the main LOC's throughout the northeast. Between 9,000 and 10,000 sorties were flown against rail lines in the northern route packages in 1967, and at least as many against highways and waterways together. About 3,000 attack sorties were flown against the key Hanoi-Dong Dang rail line alone.

II. Importance of Route Packages I, II, and III

The importance of Route Packages I, II, and III stems mainly from their strategic location astride the logistical pipeline to southern Laos and South Vietnam. Men and supplies from North Vietnam sent to support the war in the south must transit all or part of these three route packages. Although poor in resources, the area supplies manpower and local construction materials for repair of these critical LOC's.

The three route packages are of only slight economic importance. They contain less than 15 percent of the population and 20 percent of the land area of North Vietnam, about equal to the area of Connecticut and Massachusetts combined. There are no identified mineral resources and much of the region is mountainous, forested, and sparsely populated. The population of the area is predominantly rural; only four communities have more than 4,000 -- Vinh, Dong Hoi, Vinh Linh, and Ha Tinh. Agriculture and fishing are the principal occupations. Rice and other foods are grown in all three route package areas, but only Route Package III is self-sufficient in food production. There are a few minor industrial plants in the Vinh area, including an electric generating plant and a small machine plant (both rendered inoperative by the bombing), a small cement and concrete products plant, and a sugar mill. A few other small industrial facilities are scattered throughout the area. With no ports capable of receiving foreign imports directly, Route Packages I, II, and III depend on supplies from the north for almost all of their manufactured goods, including spare parts and materials for repair of transport equipment. In addition, Route Packages I and II import a small part of their food needs from the rest of the country.

III. The Logistic System

A. Transportation Facilities

The road system constitutes the most important form of transport in Route Packages I, II, and III, although other forms of transport -- rail, tramway, and waterway -- supplement the roads and add to the total capacity and flexibility of the logistic system. Distances are short; the northeast corner of Route Package III to the Mu Gia Pass is about 125 miles and the northern border of the area to the DMZ is about 200 miles (see the map). Total capacity of the transport system in these route packages is far in excess of both the tonnages that move to support the military and economic requirements of Route Packages I, II, and III, and the tonnages of military supplies that are funnelled through the region to Laos, the DMZ, and South Vietnam.

1. Highways

Two roads of moderate capacity -- Route 15 and Route 1A -- support most of the through movement in the area. These two routes have a combined capacity of 2,100/500 tons* each way per day near the northern border of Route Package III. The capacities of the highways

* *The first figure (2,100) denotes dry season capacity during about nine months of the most favorable weather, and the second figure (500) denotes the wet season capacity during three months of heavy rainfall. Heavy rains begin sometime between August and October, depending on the location in the southern part of North Vietnam, and extend for about three months. Capacity figures given are estimated theoretical capacity. Photography of truck activity in this area, especially during the recent holiday truce periods which occurred during the wet season, indicate that the roads -- especially Route 1A -- can accommodate levels of movement in excess of the estimated capacity.*

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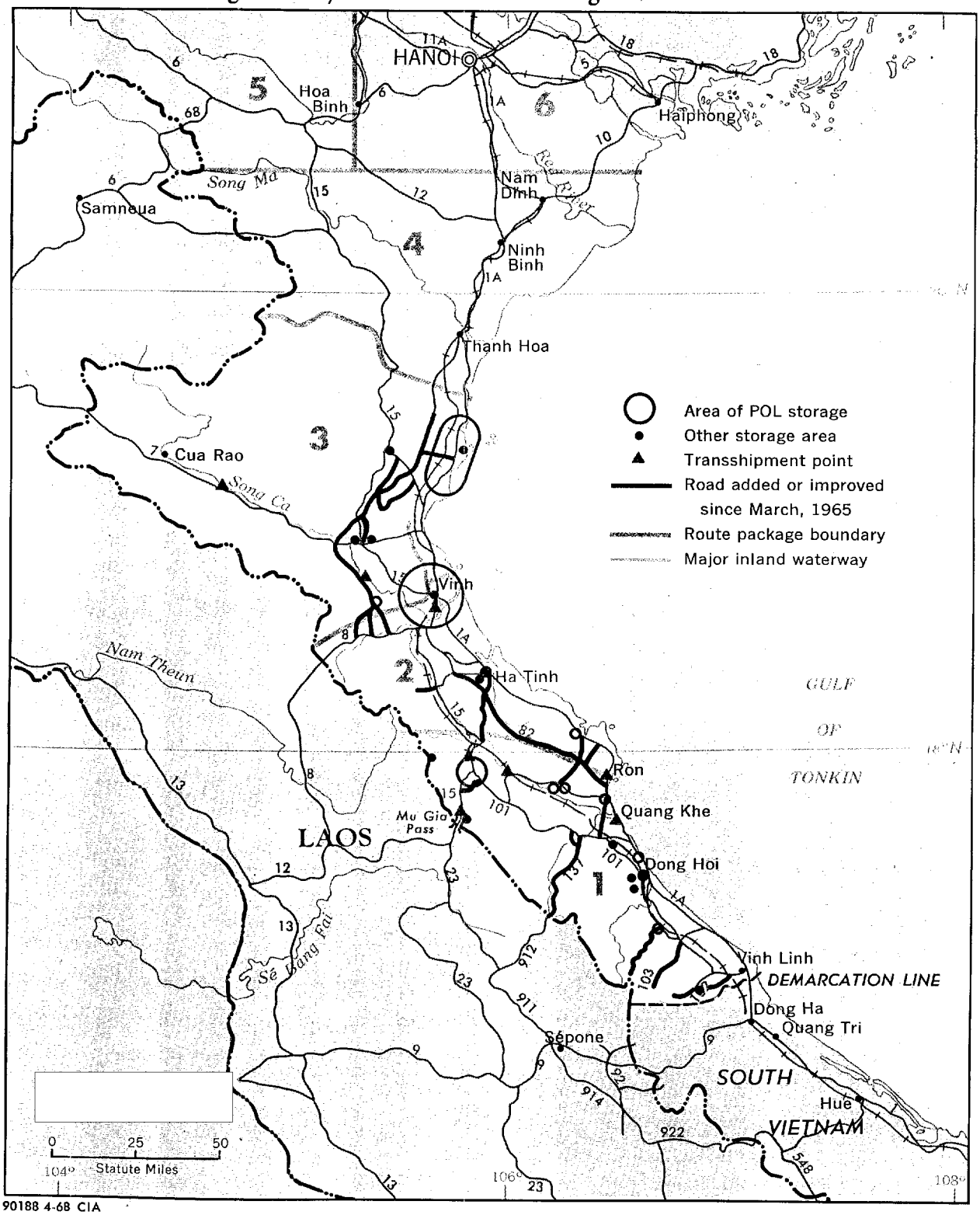
North Vietnam: Logistical Systems in Route Packages 1, 2 & 3



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within the southern route packages, and the capacities of the roads exiting into Laos and the DMZ are both in excess of the capacities of the two roads leading into the route packages, giving the highway system within the area excess capacity to counteract the results of air attacks.

Road distances are not great. Truck traffic flows into Route Package III primarily by Route 1A, but also by Route 15, and continues southward 39 and 69 miles, respectively, to the Vinh and Ha Tinh areas. Truck movements southward from Vinh and Ha Tinh generally move either to Laos (via Routes 7, 15, and 137), a distance of about 120 miles, or to the Dong Hoi and DMZ area (via Route 1A and 101), a distance of about 140 miles.

2. Railroads

Rail service into the area moves on the 68-mile Thanh Hoa - Vinh segment of the 200-mile Hanoi - Vinh line. The line has an uninterdicted capacity of 2,200 tons each way per day, but through service is usually impossible because of bombings, although shuttle traffic continues. The yard at Thanh Hoa, just north of the northern boundary of Route Package III, serves as a major distribution center for the movement of supplies south to Vinh. Before the bombing, trains negotiated the run between Thanh Hoa and Vinh in six hours, but movement is much more difficult and time consuming today. Despite the heavy bombing, however, traffic continues on the line. At Vinh, freight is transshipped from the main railroad line to trucks or inland watercraft and some of it is moved to Xom Khe for further shipment on a tramway.

In addition to the main railroad line, there is a rail tramway which extends from Xom Khe, 30 miles south of Vinh, to Dong Tam, a distance of 47 miles. The estimated uninterdicted capacity of the tramway is about 500 tons each way per day. The tramway is used by small meter-gauge cars hauled by motor trucks with flanged wheels and

is generally not used to any great extent, but some movement has been observed during truce periods.

3. Waterways

The use of water transport is limited by geography and US naval and air action, but a substantial amount of goods continue to move over inland and coastal waters. The inland waterways within the region do not provide a through route for the movement of traffic south to the DMZ or west to the Laotian border. Locally, however, inland watercraft are used extensively to support overland transport. Sampans, ferries, junks, rafts, and canoes are widely used to ferry goods across interdicted LOC's. They also perform a significant part in the distribution and dispersal of supplies away from the important transshipment areas. Coastal routes are almost exclusively restricted to use by barges, junks, and other similar craft. These craft are unloaded at makeshift transshipment areas into trucks for movement by road or sometimes into other watercraft for further movement on the inland waterways. By hugging the coast and moving at night, this coastal traffic is able to continue, although at a reduced level, in spite of US naval operations. The use of larger craft has been made difficult by both naval patrols and Rolling Thunder bombings of port facilities.

4. Primitive Transport

Primitive means of transport such as cargo-carrying bicycles also perform a significant role in moving goods through the southern route packages. The North Vietnamese have imported thousands of specially designed bicycles, capable of carrying about 500 pounds each. Twelve such bicycles have the carrying capacity of one three-ton cargo truck. These bicycles, together with coolies, elephants, and water buffaloes, have been often reported transporting supplies in the more remote areas.

5. Storage Facilities

Although Route Packages I, II, and III are closer to the fighting fronts than other areas of North Vietnam, less than one-half of the more than 700 identified supply, storage, and transshipment areas in North Vietnam are located in these areas. Only about 8 percent of the storage capacity for military supplies in this area originally on the JCS target list remains active. The destruction of military stores in this region by the Rolling Thunder program has been considerable and almost all supplies maintained in these route packages are now stored in small, dispersed sites.

B. Operation of the System

The North Vietnamese logistical system is well organized and adequately maintained. Military shipments are under control of the Rear Services Headquarters near Hanoi. Economic shipments are controlled at the province and district levels. Liaison is maintained between the military and civilian transport authorities at nearly every level so that the best use can be made of the scarce transport resources and that vital traffic can be maintained.

To counter the effects of the Rolling Thunder program against the LOC's in Route Packages I, II, and III, the North Vietnamese have employed numerous techniques to insure the continued through shipment of necessary material. Most transport operations are conducted only during hours of darkness, or under the cover of poor weather. Elaborate traffic control systems, staffed by the local population, have been established to expedite the flow of traffic and warn of impending air attack. In addition, the major storage, dispersal, and transshipment centers have been strategically located in the large populated areas exempt from the bombing. These centers, principally Thanh Hoa, Vinh, and Ha Tinh, are all at the junction of major supply routes. Trucks can make round-trips between

them under cover of darkness (see the tabulation below). South of Ha Tinh, logistic supplies are widely dispersed along the infiltration routes leading into Laos and the DMZ.

Area	Distance	Estimated Turnaround* Time (Hours)
Thanh Hoa - Vinh	62	9
Vinh - Ha Tinh	30	6

* *At an average speed, 20 miles per hour, and including three hours for loading and unloading.*

C. Traffic Flows

The North Vietnamese have continually increased the volume of supplies moved south through the three southern route packages. The total daily volume moved south into Route Package III in 1967 was about 770 tons, more than double the volume of 1965. Large increases occurred in late 1965 and in 1966 as countermeasures to the bombing became more effective and the insurgency in South Vietnam increased in intensity. The increase in 1967 over 1966 was quite small, possibly only about 10 percent, but thus far in 1968 there has been a further increase in the volume moved into Route Package III. This increase is mainly the result of the step-up in personnel infiltration into South Vietnam, logistic support for the war in South Vietnam, and the increase in Communist troop strength and activity in Laos.

About one-third of the total flow into Route Package III is strictly economic goods, and the other two-thirds are military supplies and military-related economic goods such as petroleum. About 80 percent of the volume that moves into Route Package III is used in the three southern route packages and in the DMZ area, about 15 percent is moved into southern Laos for use

there or in South Vietnam, and the remainder is moved west on Route 7 into northern Laos to support Communist troops and civic action programs in the Plaine des Jarres area.

The above estimates, however, are based on indirect evidence, rather than on firm intelligence. The estimates are derived from Communist military requirements in the DMZ; military and economic requirements in Route Packages I, II, and III; traffic movements reported by US pilots flying over the area; and reports by road watch teams of traffic moving into Laos.

Road watch reports indicate that the average daily volume of goods delivered into southern Laos has increased markedly, as shown in the tabulation below. The volume delivered into Southern Laos in the first quarter of this year has been more than 60 percent greater than the same period last year. If this trend continues, the average volume delivered during 1968 will be about 160 tons per day. This tonnage is sufficient to meet current requirements in Laos, to satisfy the external supply requirements of the Communist forces currently in South Vietnam, and to support further augmentation of these forces by four divisions.

	Short Tons per Day	Percent Increase over Previous Years
1965	35	
1966	75	114
1967	95	27

The volume of traffic flowing into the three southern route packages is small in relation to transport capacity. Compared with about 850 tons a day moving south into Route Package III during the first quarter of 1968, truck routes had 2,100/500 tons of uninterdicted capacity, with a railroad as well as inland and

coastal water routes available to provide additional transport capacity. Furthermore, the volume of tonnage moving within Route Package III rapidly diminishes as the supplies are moved south, and the total capacity of the transport system decreases less rapidly than the decrease in traffic. Routes leading into Laos are used on the average at less than 15 percent of their capacity.

Route Packages I, II, and III have also been heavily used for the infiltration of North Vietnamese troops to South Vietnam. MACV's estimate of total infiltration, accepted and possible, from October 1965 through February 1968, totals 203,500. In the first quarter of this year the North Vietnamese may have mounted the largest infiltration effort they have ever undertaken. Total infiltration to South Vietnam for the first three months of 1968 may have reached 40,000 to 50,000 men. The speed with which some infiltrators have reached South Vietnam tends to confirm earlier indications that some of the troops are being moved by truck despite the US air interdiction campaign.

IV. Probable Effects of Escalated US Air Attacks

The record of the Rolling Thunder program against Route Packages I, II, and III during the previous three years of bombing indicates that even escalated attacks against these route packages will not have a significant impact on the area's transportation system. Throughout the past three years, all highways, waterways, and rail facilities in the area have been attacked repeatedly, as well as fords, ferries, pontoon bridges, transportation equipment, truck parks, and storage and supply areas. Despite the high level of attacks which have hampered some operations, the transport network continues to function, and the North Vietnamese have organized substantial repair forces to cope with the damage. The network provides adequate service and capacity to meet North Vietnam's logistic requirements in the area and to the South.

A. Railroads

The rail line between Thanh Hoa and Vinh, the tramway south of Vinh, and the rail yards at Vinh and Thanh Hoa have been attacked and damaged repeatedly during the three-year bombing campaign, but quick repairs and emergency arrangements have allowed goods to continue to move by rail. In 1967, about 3,500 sorties were directed against these targets, nearly one-half the total directed against the entire Hanoi-Vinh line. The intensity of attack against the rail line over the past three years has prevented through service to Vinh and has limited the line's capacity by causing a shift of some traffic from the conventional meter-gauge rail equipment to the smaller tram cars because of line and bridge limits south of Thanh Hoa. Despite the heavy damage inflicted by the bombing, operations between interdicted points have continued. Various alternate facilities constructed around bridges and yards and quick repairs have contributed to the overall flexibility of the system. Most movement occurs at night, when attacks are less effective against supplies being moved.

B. Highway System

Air attacks against the highway system in Route Packages I, II, and III over the last three years have not sustained the interdiction of highway operations. The heaviest attacks of the entire Rolling Thunder program have been concentrated against highway targets located in the three southern route packages, with Routes 1A, 15, 7, and 101 receiving the greatest damage. Although these strikes have interrupted and impeded traffic, repair efforts and countermeasures have been effective in maintaining traffic flows throughout the system.

Despite the bombings, the overall capacity of the road network in Route Packages I, II, and III has been increased. Two major roads -- Routes 101 and 137 -- have been built and several secondary roads improved since the start of the bombing campaign in 1965. Route 101, completed in 1966 and more than 200 miles in length, was built to serve as a less vulnerable north-south inland alternate to coastal Route 1A. Route 137 was built to provide an additional road into Laos. This route connects the important Quang Khe transshipment area to Route 911 in Laos (26 miles). A new, well-built road extending from the Dong Hoi area toward the southwestern corner of the DMZ (16 miles) is well under construction and is now only two miles from the Laotian border.

An increase in sortie rates would probably have little effect on truck traffic. A comparison of truck traffic observed moving into southern Laos through Mu Gia Pass (see the chart) by months in 1967 and 1968 with the sortie rate over Laos and North Vietnam in the area of the Pass shows no obvious correlation, either direct or inverse. In some months, both sortie rate and truck traffic increased or decreased together, whereas in other months one factor increased and the other decreased.

C. Waterways

Attacks against water routes in Route Packages I, II, and III have hampered waterborne transport, but traffic continues to move.

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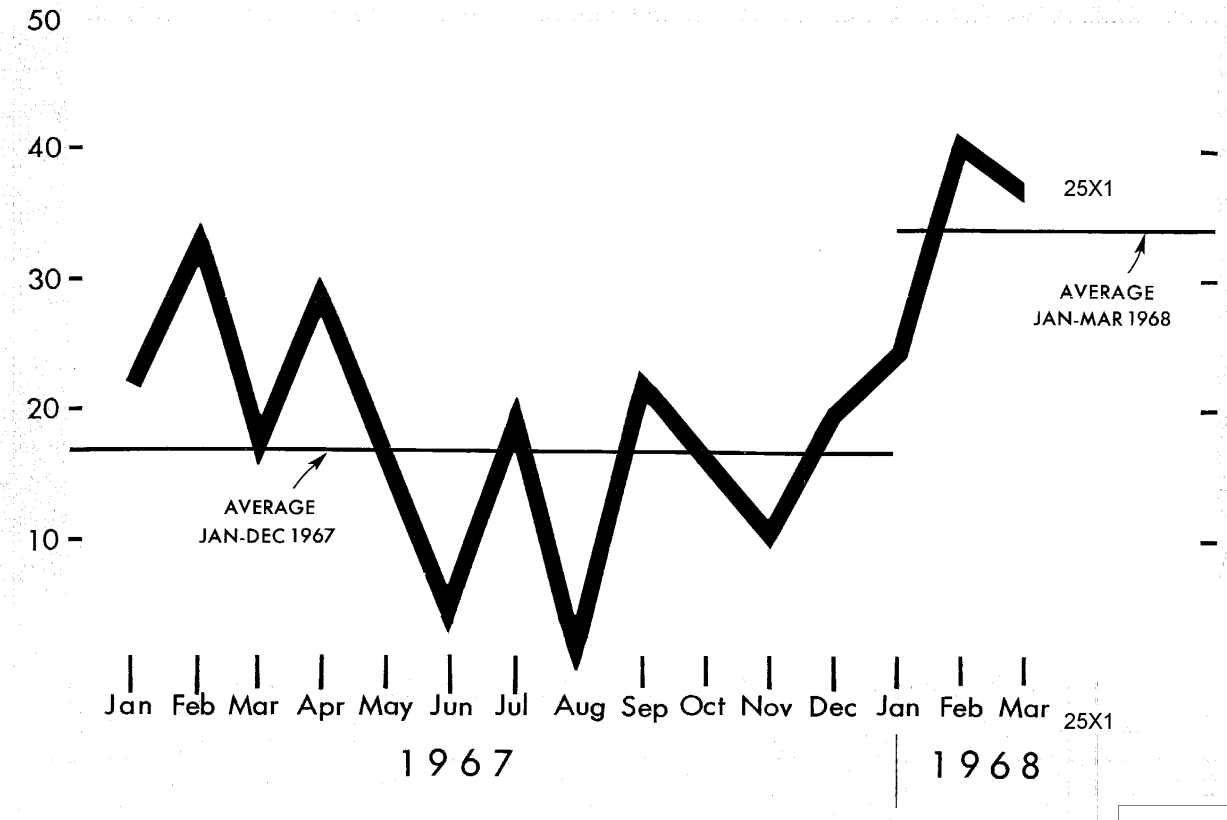
Average Number of Trucks per Day Moving South Through Mu Gia Pass

January 1967—March 1968



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The coastal ports in Route Packages I, II, and III have been heavily damaged but are still in partial use. Wharf areas have been damaged, berthing blocked by sunken vessels, and nearly all storage space has been extensively damaged or destroyed. The small port and transshipment facility at Quang Khe is probably the most heavily attacked target in North Vietnam. However, numerous small craft, such as sampans, still operate at these port facilities and transit rivers on which the ports are located.

Operation Sea Dragon, a US Navy surveillance and interdiction operation of North Vietnam military and logistic targets along the North Vietnamese coast south of 20° North latitude, supplements the Rolling Thunder program in the southern route packages and has denied the use of coastal waters to large North Vietnamese ships, but some coastal traffic continues to move. One cruiser and four destroyers are normally maintained on station patrolling these coastal waters. Since the operation was begun in October 1966, it has reportedly destroyed about 1,000 craft and damaged another 1,300. The operation appears successful in prohibiting large coastal vessels from operating in these southern coastal waters.

The mining program using the MK-36 Destructor weapon has been in effect against the waterway system since June 1967, but the overall performance of the weapons has been uneven and has not denied the North Vietnamese the use of important waterways. About 10,000 MK-36's have been employed in the three southern route packages. Targets that have been heavily seeded with Destructors continue to be used. An example is the Kien Giang River, near Dong Hoi, in Route Package I. From 1 December 1967 to 31 March 1968, a total of 1,783 MK-36 devices were seeded from the mouth of this river to about 10 nautical miles upstream, but most waterway and transshipment facilities were still operational.

The planned increase in seedings of the MK-36 may increase the effectiveness of the mining program. It is anticipated that by June of 1968,

13,000 devices per month will be available and the level of seedings will reach this level soon afterwards. The total amount of weapons deployed in the June 1967 - 31 March 1968 period was 19,500. Of this total, 10,000 have been dropped in Route Packages I, II, and III. Thus the anticipated increase in weapons deployed is from 19,500 in a ten-month period to a level of 13,000 per month. The planned rate of increase, therefore, is quite rapid and it is difficult to estimate final results this early in the program.

D. Bridges

Much of the bombing activity against the transportation system in Route Packages I, II, and III has been directed against key bridges along the major land routes. Through 1967, 285 such bridges had been repeatedly attacked and damaged in the southern route packages, compared with 404 bridges attacked in all of North Vietnam. Although these strikes have interrupted and impeded traffic, repair efforts and countermeasures have been effective in maintaining traffic flows throughout the system.

The North Vietnamese should be able to counter an increased level of bombing of bridges in Route Packages I, II, and III. The North Vietnamese have already built an average of 1.42 alternate facilities or bypasses -- pontoon bridges, cable bridges, ferries, and fords -- per bridge in the south. Although there are more water crossings in the south than in the north, they are less formidable to bypass. For example, the water crossings in the south are not as wide or as deep as the streams in the Red River Delta. Moreover, in Route Packages I, II, and III, river-crossing targets will be principally those associated with truck movements, and it is easier and cheaper to repair such facilities than railroad bridges. A relatively small additional diversion of the North Vietnamese labor force would be able to make necessary repairs and bypasses.

E. Transport Equipment

1. Trucks

Since the beginning of the Rolling Thunder program, the North Vietnamese have lost about 5,200* trucks in North Vietnam. Estimates of yearly losses are given in the tabulation below:

Year	Effective Truck Losses*
1965	360
1966	1,900
1967	2,700
1968 (first quarter)	250

During 1967, 72,000 attack sorties were flown over Route Packages I, II, and III, resulting in the loss of about 2,400 trucks, a ratio of about 29.4 sorties for each truck destroyed (see Table 1). Truck losses in Route Packages I, II, and III were especially high in the second and third quarters of 1967, the periods of good weather. During the third quarter of 1967, when the best flying weather prevailed, only 15 sorties were flown for each truck destroyed, compared with 63 sorties in the fourth quarter.

* *To arrive at an estimate of effective truck losses in both North Vietnam and Laos, pilot reports are first adjusted to eliminate double counting. Then a deflation factor is applied to adjust for inaccuracies in the data and for the North Vietnamese ability to repair and rebuild trucks. Inaccuracies are caused by high aircraft speeds; poor visibility resulting from weather, smoke, and dust after attacks; night operations; and intense AAA fire. The formula for computing effective losses agreed to by CIA and DIA is as follows: 75 percent of those trucks reported destroyed and 25 percent of those reported damaged are considered to be effective losses and are deducted from the inventory.*

Trucks have been much more lucrative targets in the southern route packages than in Route Packages IV, V, and VI. In the third quarter of 1967, more than 11,000 sorties were flown over the northern route packages, but only 60 trucks were destroyed. In comparison, 20,000 sorties in Route Packages I, II, and III destroyed 1,300 trucks during the same period.

Despite these large losses, there are no apparent shortages of motor trucks in the area, primarily because of continued large imports through Haiphong and by rail through China. Truck activity has continued at a high level, and road-watch teams situated along the major infiltration routes in Laos have noted steadily increasing truck traffic from North Vietnam into Laos over the past year. North Vietnam has increased its truck inventory from the pre-bombing level of 9,000 vehicles to more than 11,000 vehicles at present.

Increased truck losses from escalated attacks would have little effect on truck inventories. If the number of sorties against Route Packages I, II, and III increases by 25 percent in 1968 and the ratio of sorties to destroyed trucks remains the same, then about 3,100 trucks could be expected to be destroyed annually in the three southern route packages. However, North Vietnam's Communist allies have in the past quickly provided trucks to make good such losses. About 4,700 trucks were imported during 1967, and North Vietnam received about 900 trucks by rail from the Soviet Union in December 1967, only two months after a request made in October 1967.

2. Watercraft

About 6,700 watercraft have been destroyed during the Rolling Thunder program. The following tabulation gives total number of watercraft estimated to be destroyed and damaged by year as reported by pilots:

Year	Watercraft Destroyed/Damaged
1965	1,200
1966	9,250
1967	11,600
1968 (first quarter)	800

In 1967, destruction and damage to watercraft was greatest in Route Package III, which has a more developed inland waterway system than the other two route packages south of Thanh Hoa. The reported destruction of watercraft in each route package by quarter is given in Table 2.

The impact of past and future watercraft losses is slight. There is no evidence that the transport system has been limited by a shortage of watercraft. If the number of sorties against Route Packages I, II, and III increases by 25 percent in 1968 and the ratio of sorties to destroyed or damaged watercraft remains the same, about 9,500 watercraft will be destroyed or damaged in 1968. This loss would be nominal compared with the estimated total North Vietnamese inventory of 30,000 small craft. These small craft can be replaced by local construction or by imports from China if necessary.

3. Railroad Equipment

Data on the destruction of railroad cars are not available by route package. However, on the entire Hanoi-Vinh line in 1967, pilots reported destroying 355 railcars and damaging 658. During the same period, a total of 6,988 sorties were flown against the rail line, of which an estimated 3,470 sorties were flown against that portion of the line in Route Packages I, II, and III. Against the entire Hanoi-Vinh line, 19.7 sorties were required for each railcar destroyed and 10.6 for each railcar damaged. If the bombing effort against railroads is increased by 25 percent, and assuming that the ratios of sorties per railcar destroyed or damaged were maintained under an increased level of

attack, about 400 cars would be destroyed and 800 damaged.

Despite this attrition, there are no apparent shortages of rail equipment in the area. Photography of Thanh Hoa continues to show large concentrations of rail equipment. While the reported figures of equipment destroyed and damaged on the Vinh line represent about 40 percent of country-wide losses, the total inventory of railcars in North Vietnam has actually increased since the bombing began. Counts of cars from high-level photography in 1967 reveal about 2,000 to 2,300 railcars in the country, compared with about 1,800 before the bombing. It is believed that imports from China have more than offset losses.

V. Countermeasures

A. Air Defense

An increase in air attacks against Route Packages I, II, and III probably would be countered by shifting some antiaircraft artillery and SAM firing battalions from Route Packages IV, V, and VI. The movement of equipment and related operating personnel could be accomplished within ten days. An air defense capability against a decreased level of attacks would still remain in the northern areas after the redeployment, because the regime would continue to regard the defense of Hanoi and Haiphong as a high priority.

An increase of 40 percent in attack sorties in the southern area might be countered by redeploying about 750 antiaircraft weapons to Route Packages I, II, and III. This level of redeployment could be accomplished by reducing the AAA inventory in Route Packages IV, V, and VI by 20, 40, and 10 percent, respectively. This equipment, weighing 4,000 tons, could be moved south in a week to ten days. The AAA order of battle in the three southern route packages averaged 1,885 weapons of 37-mm or larger during March-December 1967. The remaining AAA inventory in the north would still be formidable. The North Vietnamese might attempt to offset an AAA redeployment by increased imports to continue their present air defense order of battle in the north.

North Vietnam might redeploy perhaps five SAM firing battalions and one support battalion to Route Packages I, II, and III. This shift would about double the SAM order of battle in Route Packages I, II, and III, currently estimated at five to six firing battalions. The redeployed battalions, with equipment weighing 3,000 to 3,500 tons, could be moved south in three to four days and could be moved back to the north in the same length of time in case of a sudden increase in attacks against that area. However, the North Vietnamese probably would try to import equipment for an additional five firing battalions to bring the inventory in the north to the present level.

If they moved five units south, an additional 25 SAM sites probably would be constructed in Route Packages I, II, and III to augment the 19 sites that are currently capable of accepting SAM equipment.

B. Manpower

North Vietnam would probably counter the escalated attacks by moving additional manpower into Route Packages I, II, and III to maintain the logistic system and to man the additional AAA's and SAM's, but this manpower requirement would be small and would have little effect on the country as a whole.

The North Vietnamese would probably respond to the stepped-up bombing by transferring 15,000 full-time workers to repair damage to the lines of communication in the south. At present, there are an estimated 72,000 North Vietnamese civilian road construction workers, including 56,000 workers in Route Packages I, II, and III and 24,000 to 40,000 Chinese construction troops employed throughout the country. About 15,000 experienced workers could be transferred within a short period of time, bringing the permanent labor force in the area up to about 70,000 personnel. This number of workers would be adequate to repair damage and/or construct additional bypasses caused by the change in the bombing pattern. Additional part-time workers could readily be obtained from the indigenous population of 2.7 million.

Redeployment of air defense equipment probably would result in an increased requirement for about 16,000 personnel -- 15,000 for the antiaircraft artillery and less than 1,000 for the SAM's -- but it is likely that troops would accompany their equipment being deployed to the south. There would be a requirement for an equal number of trained personnel in the north if and when imported equipment became available to replace equipment moved to the south.

Table 1

Estimates of Effective Truck Losses in North Vietnam, 1967

25X1

25X1

	Quarterly 1967				
	First	Second	Third	Fourth	Total
Route Packages I, II, and III					
Losses	195	684	1,343	220	2,442
Sorties	15,426	22,182	20,216	13,961	71,785
Sorties per loss	79.1	32.4	15.1	63.5	29.4
Route Packages IV, V, and VI					
Losses	39	65	61	77	242
Sorties	5,126	9,543	11,363	8,414	34,446
Sorties per loss	131.4	146.8	186.3	109.3	142.3

Table 2

Estimates of Watercraft Destroyed and Damaged
and Sorties Flown by Route Package, 1967

25X1

25X1

Route Package		Quarters First	Second	Third	Fourth	Total
I	Destroyed/damaged	319	975	867	467	2,628
	Sorties	11,334	12,919	15,032	11,324	50,609
	Sorties per destroyed/damaged	35.5	13.3	17.3	24.2	19.3
II	Destroyed/damaged	261	680	576	177	1,694
	Sorties	1,588	3,987	2,554	1,134	9,263
	Sorties per destroyed/damaged	6.1	5.9	4.4	6.4	5.5
III	Destroyed/damaged	410	1,534	782	553	3,279
	Sorties	2,504	5,276	2,630	1,503	11,913
	Sorties per destroyed/damaged	6.1	3.4	3.4	2.7	3.6
IV	Destroyed/damaged	442	864	765	1,049	3,120
	Sorties	2,726	3,144	2,610	2,298	10,778
	Sorties per destroyed/damaged	6.1	3.6	3.4	2.2	3.5
V	Destroyed/damaged	1	20	6	2	29
	Sorties	720	1,201	939	844	3,704
	Sorties per destroyed/damaged	720.0	60.0	156.5	422.0	127.7
VI	Destroyed	122	188	206	361	877
	Sorties	1,680	5,198	7,820	5,272	19,970
	Sorties per destroyed/damaged	13.8	27.6	38.0	14.6	22.8

25X1