AN APPRAISAL
OF THE
BOMBING
OF
NORTH VIETNAM
1 JULY-31 OCTOBER 1968
[S-3379/AP-4A]

Prepared Jointly by
The Central Intelligence Agency
and
The Defense Intelligence Agency

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FOREWORD

This report is the last in a series prepared at the request of the Secretary of Defense to evaluate certain aspects of the ROLLING THUNDER program. The report covers three general areas of concern: Effects on Military Targets; Leadership and Public Reactions; and Effects on the VNN Economy. The discussion of political effects is limited to those developments within North Vietnam which relate to Hanoi's attitude toward continuing the war and the effects the ROLLING THUNDER attack has on civilian morale in North Vietnam. The report covers the third quarter of 1968 (July through September) and has been supplemented with an appended report for October, the final month of the ROLLING THUNDER program.
An Appraisal of the Bombing of North Vietnam
July-September 1968, and October 1969

Summary

Bombing restrictions continued to confine ROLLING THUNDER strikes to the area below the 19th Parallel during the third quarter, but their number increased considerably. Strike emphasis was on the logistics system; few worthwhile economic or military targets exist in the area. Truck sightings decreased but the number of trucks destroyed was up slightly. Operations against waterway facilities and waterborne logistics craft were particularly successful at transshipment points where concentrations of supplies awaited movement.

Construction and repair activity on lines of communication continued north of the 19th Parallel. Key highways and rail lines were open to traffic except during short periods of flooding and severe weather associated with typhoons. Severe weather also interrupted port operations at Haiphong.

An increased tempo of air defense activity was noted during the period. Forty US aircraft were lost, 38 of them to the substantially increased number of antiaircraft guns in the Panhandle. Six MIG fighters were destroyed as a result of US action.

Repairs to damaged industrial facilities north of the 19th Parallel slowed during the past quarter, but this may reflect shifting emphasis from temporary repair to permanent reconstruction. Electric...
Generating capacity is slightly less than 50 per cent of pre-strike capacity. Two power plants were shut down possibly to permit the start of reconstruction. At the Haiphong Cement Plant a second kiln was put into operation in late August, bringing this plant up to about one-third of its pre-strike capacity. Romania and Hungary signed agreements to supply equipment for industrial projects.

Total seaborne imports and exports declined during the quarter, although imports of foodstuffs continued at a high level. Petroleum imports dropped dramatically during July and August, but rose sharply in September to slightly more than the current consumption level. Seaborne exports of coal have dropped each month since April. Despite the decrease in shipping, port congestion at Haiphong surpassed all previous levels, partly because of typhoon Wendy in early September.

During October, the first month of the fourth quarter, the number of air strikes was 10 per cent greater than in September. The combination of air interdiction and bad weather resulted in considerable interruptions to highway traffic. However, truck sightings and the numbers of vehicles damaged or destroyed decreased. New road construction continued in the Panhandle. The level of watercraft activity remained about the same and limited rail traffic was maintained by shuttling between damaged points. In the northern part of the country the restoration of damaged bridges continued; permanent repair apparently is under way on the Viet Tri Railroad/Highway Bridge.
Seaborne imports in October were 30 per cent above the September level. Despite the continued high level of import activity, ship turnaround time at Haiphong decreased, and the amount of open-storage cargo at the port decreased.

The value of measurable damage inflicted on North Vietnam during the third quarter of 1968 amounted to $30 million and that during October to $6 million. The largest share of the damage was to transport equipment. The cumulative cost of damage through the bombing campaign reached nearly $500 million. There continues to be many additional losses that cannot be assigned meaningful values.
Appraisal of the Bombing During July-September

Effects on Military Targets

1. During the period July-September 1966, more than 38,000 attack sorties were flown against targets in southern North Vietnam, compared with about 27,000 the previous quarter. The intensified air campaign in the southern route packages is shown in the graphic. Strike emphasis included transport facilities, vehicles, and air defense targets. [NFD]

2. Truck sightings decreased from 12,000 in the previous quarter to 10,000, as poor weather and sustained interdiction of a number of key choke points disrupted truck traffic. Nighttime sightings again exceeded daytime sightings. In addition, nearly 3,000 trucks were reported destroyed or damaged, slightly more than in the previous period. Heavy traffic was observed on interior routes in the Panhandle area in July and August, following the trend of the second quarter. In September, however, the combined effects of the air interdiction campaign and typhoon Bess decreased traffic, and no definite pattern could be discerned. Poor weather and the air campaign also caused deterioration of Route 15, resulting in a low level of reported traffic. [NFD]

3. Road construction and repair activity continued throughout the country. Construction of new road segments in the Vinh area will supplement the road system leading toward the DMZ and southern
Laos. The Hanoi Rail/Highway Bridge (Paul Doumer) was reopened to vehicular as well as rail traffic in mid-July. (NFD)

4. Operations against waterborne logistics craft and transshipment points were particularly successful during the quarter. Sightings and reports of damage to watercraft by both air and SEA DRAGON operations increased significantly. Night strikes against waterway transshipment points, which account for 60 per cent of the total effort against these targets, have been especially effective. The high rate of secondary explosions noted during night attacks implies a higher level of watercraft operations and supply activity than indicated by daylight reconnaissance. The North Vietnamese have reacted to night attacks by shifting transloading points within the immediate area of the road net. In the extreme southern Panhandle, smaller concentrations of logistics craft were noted than in the preceding quarter. (NFD)

5. About 30 miles of a petroleum pipeline system that was first observed in July 1968 is located west of Vinh between Phuc Yen and Lang Coanh. The pipeline probably is four inches in diameter, similar to the Soviet portable pipeline and the US "invasion-type" pipeline. The throughput capacity of the system, about 1,100 metric tons per day, is greater than North Vietnam's total petroleum consumption of about 1,000 tons per day. About 100 small tanks are buried at Phuc Yen, and excavations for an
additional 100 to 150 tanks have been observed. The total capacity of this site will be at least 2,500 metric tons when completed, making it one of the largest dispersed petroleum sites in North Vietnam. However, there is no rail or water transport available at Phuc Yen to handle an appropriate input volume to the storage and pipeline facility. Therefore, the northern terminus of the system may actually be located elsewhere. The pipeline has been repeatedly damaged by air attacks, but the North Vietnamese have repaired or bypassed sections even though the system apparently has not yet been used. (NFD)

6. The only parts of the rail network south of the 19th Parallel are a 25-mile segment of the Hanoi-Vinh line and a 54-mile, low-capacity line from Xom Houi to Ma Thang. During the quarter, more than 200 air strikes were conducted against these lines. As many as 35 pieces of rolling stock were destroyed or damaged, a significant decline from the previous period because of strike emphasis against other transport modes. Rail bridges at Dien Chau and Tam Da north of Vinh received heavy damage and were unserviceable during most of the quarter. In late September, additional rolling stock was noted at Vinh. The North Vietnamese apparently had continued to make repairs and had taken advantage of the extremely limited in-service periods at these choke points. (NFD)

7. North of the 19th Parallel, rail bridges and lines were...
open to traffic most of the period. Severe interruptions were
caused by heavy flooding in some areas, however, from mid-August to
mid-September. High water at Hai Duong on the Hanoi-Haiphong line
closed this route for about two weeks. Flooding on the Hanoi-Lao
Gai line probably resulted in similar disruptions. Flooding at
Ninh Binh and Phuong Dinh closed the Hanoi-Vinh line briefly. Slow
progress on the uncompleted Kep-Hon Gai line continued near Hon Gai
with the addition of some new track and road-bed. Severe flooding
disrupted construction in an area southeast of Kep. [NFD]

9. Logistic activities and new construction increased at Thanh
Hoa, the main forward support base for the movement of material
farther south. Photography revealed a fast turnover of cargo and
new construction designed to improve the capability of the rail
facilities in this area. There was an apparent shift south of at
least part of the logistic support base. Three areas within 20
miles of the 19th Parallel had improved facilities and showed in-
creased activity. Each area is served by the rail line and Route 1A
and serves as a transshipment point from which goods can be quickly
moved south of the 19th Parallel. [NFD]

9. Port operations in Haiphong were complicated in the first
half of September by typhoon Wendy, which caused several ships in
port to run aground. Ship congestion by September surpassed all
previous levels, despite a decrease in shipping during the third
quarter. Ships leaving Haiphong in September had spent an average of more than 40 days in port -- a new high. Congestion decreased slightly during the latter part of the month, but probably will remain a major problem during October. Cargo stacked in open storage increased somewhat, caused in part by logistics difficulties resulting from flooding of the transport network leading from Haiphong to Hanoi. [NFD]

10. The over-all tempo of air defense activity this quarter increased over that noted during April-June. Reactions by air defense elements accounted for the destruction of 40 US aircraft. Ground fire south of the 19th Parallel again proved to be the most effective element of air defense. At least 38 aircraft were downed, nine more than in the previous quarter. Antiaircraft guns in the Panhandle increased substantially, from about 1,400 on 1 July to nearly 2,600 by 30 September. Light antiaircraft weapons accounted for the bulk of the increase. [NFD]

11. MiGs continued to fly into the lower Panhandle during the quarter. During eight engagements, US aircraft downed five North Vietnamese aircraft -- three MiG-21s and a pair of MiG-17s; no US aircraft were downed. An additional MiG-21 was downed by a TALOS missile on 22 September, the second MiG to be destroyed by US surface-to-air missiles. [NFD]

12. All major jet airfields in North Vietnam except Cat Bi were
considered operational at the close of the quarter. Construction activity continued at Kep and Hoa Lac. At Bai Thuong Airfield, the surface between the cement touchdown areas was covered with pierced steel planking. Use of Bai Thuong as a forward staging base for missions southward was partially substantiated when on several occasions photography revealed small numbers of MIG-17s and MIG-21s located on the field. The in-country MIG strength increased from about 30 in July to nearly 50 by the end of September. Most of the MIG force was concentrated at Phuoc Yen and Gia Lam Airfields, but a few aircraft were observed at Kep. Several helicopters were added to the order of battle and in late September an IL-18 was detected at Gia Lam Airfield. (NYD)

13. Only 50 SAM missiles were fired, equalling the number fired the previous quarter. Two aircraft were downed. SAM battalions increased to an estimated 35 to 40. About 30 of these were deployed in the Hanoi-Haiphong area and the remainder in the Panhandle. Strike action against SAM firing units located south of the 19th Parallel hampered SAM operations in the lower Panhandle for most of the quarter. By the end of the quarter, as many as five battalions were deployed near the 19th Parallel, possibly as a missile barrier or to cover MIGs returning from missions in the Vinh area. Modified PAM SONG guidance radar, possibly totaling 13 pieces of equipment, has been identified at 17 SAM sites in the Hanoi-Haiphong area.
Twelve new SAM sites were detected during the period. Most were concentrated in an area just below the 19th Parallel near Vinh Son. (/NED)

Leadership and Public Reactions

14. The Hanoi regime appeared to permit some relaxation of wartime controls on the population in the Hanoi area for the first time this summer. There was no evidence of relief from either food rationing or scarce supplies of other daily necessities, however, and the dreary exhortations to step up the already exhausting work pace continued. But at least in the Hanoi area, a special effort was made on National Day (1 September) to give the capital city residents a real three-day holiday. In addition, in recent months the regime has apparently allowed many of the evacuated children who have drifted back into Hanoi to stay with their families. Citizens of the Hanoi area have also grown lax about air raid precautions. One Western source described an air raid alert on 21 September in which the general public was slow and unresponsive, and the air defense countermeasures were too little and too late. (/NED)

15. There were limits, however, to the willingness of the regime to relax the heavy hand of official discipline. Young people who over-stepped these limits reportedly appeared on the streets of Hanoi this summer in the mod costume of young people of Free World countries, but new police regulations were immediately issued to discipline the youngsters. (/NFD)
16. The discernible relaxation in Hanoi may not have been
typical of the rest of the country. Much of the domestic propaganda
this summer has been designed to convince the people that continuing
sacrifice is necessary to bring the war to a successful conclusion
and to prevent any letdown in work effort. Westerners in the port
of Haiphong, for example, say the regime's determined grip on the
population of the port city is even harsher than before, with in-
creased pressure to work harder and faster. Although there is little
or no information on living conditions in the countryside, the press
exhortations suggest that these people are also forced to continue
to live and work much as they did under the daily threat of air
attack. [NFD]

Effects on the Economy

17. Repairs to damaged industrial installations have slackened
perceptibly since the second quarter, but the slowdown may reflect
a transition from temporary repair to permanent reconstruction of
facilities. Repair activity continues at a number of industrial
installations, but usually with only nominal change in operational
status. Significant repairs occurred at the Haiphong Cement Plant
where a second kiln was put into operation late in August; the two
kilns represent about one-third of the annual pre-strike capacity
of 660,000 metric tons. Rumania recently signed a $2.3 million aid
contract to provide cement manufacturing equipment, probably to
repair remaining damage at the Haiphong Cement Plant. Photography of
the Thai Nguyen Iron and Steel Complex in September shows some ground
scarring and clean-up activity near the damaged blast furnaces. A
new rail spur has been constructed within the complex to an un-
damaged fabrication shop. This activity, the first noted in more
than a year, may be preliminary to general reconstruction. [NFD]

18. In the electric power industry, shutdown of the Nam Dinh
plant during the entire month of September may portend general repair
of that facility. Its recent role of supplying steam for textile
finishing operations apparently has been taken over by a repaired
steam facility within the textile plant grounds. The heavily
damaged power plant at Thanh Hoa has been taken out of operation.
Construction of a new plant or reconstruction of the old plant is
under way with Hungarian assistance. Earth scarring near the un-
completed Thac Ba hydroelectric project may indicate resumption
of construction. There are no signs of work on the main dam and
power house. Electric power generating capacity in the Hanoi-
Haiphong area is slightly less than 50 per cent of pre-strike
capacity. Seven of nine power plants are in partial operation. [NFD]

19. North Vietnam's coal production apparently has declined.
Recent discussions in the North Vietnamese press by Premier Pham Van
Dong and others admit shortfalls in production caused by emphasis
on annual production targets during the past several years at the
expense of preparation for sustained extraction and future development. These problems can be attributed primarily to mismanagement of the coal industry, aggravated by bombing. Seaborne exports of coal decreased from 76,000 metric tons in April to 22,000 tons in September. This compares with a monthly average of 137,000 tons during the first quarter of 1966, and a record low average of 19,600 tons during the third quarter of 1967. In addition, photography from June to late August showed a noticeable decrease in coal stockpiled at the coal ports of Cam Pha and Hon Gai. Stockpiles at both ports, however, had begun to increase by the end of September. [NFD]

20. Production of coal during 1968 is tentatively estimated at about two million tons. This is one-half of the output in 1965, when domestic needs took half of total production. Therefore, internal requirements can be met unless there is a further decline in production of coal. [NFD]

21. Rice production continues below normal. Harvesting of the fifth-month crop was completed in July, a month late in some areas. The harvest was no greater than last year's low fifth-month crop. In some areas, the tenth-month crop was transplanted late because of the delay in harvesting the fifth-month crop. It also promises to be a disappointment. Heavy rains and flooding between mid-August and mid-September apparently destroyed some of the crop after it was too late to replant. In addition, management problems, insect damage,
and localized fertilizer shortages have also plagued the crop. [NFD]

22. Petroleum imports declined during July-September from the high levels maintained since December 1967. Total petroleum imports for the third quarter amounted to 72,000 metric tons, more than 40 per cent below the second quarter. Imports for the first nine months of 1968 reached almost 300,000 tons, compared with 256,000 tons for all of 1967. Consumption during the third quarter is estimated at about 30,000 tons per month. Stocks on hand at the end of September are estimated to have been equivalent to more than three months' supply at the current consumption rate. [NFD]

23. Total seaborne imports dropped to 422,000 metric tons in the third quarter, nearly 30 per cent less than the record total during the second quarter. All major import categories declined, although imports of foodstuffs continued at a high level. Seaborne imports in the third quarter remained higher than the comparable period in 1967, however, as shown below:

<table>
<thead>
<tr>
<th>Cargo</th>
<th>1967 Third Quarter</th>
<th>1967 First Quarter</th>
<th>1968 Second Quarter</th>
<th>1968 Third Quarter</th>
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<tr>
<td>Total a/</td>
<td>256</td>
<td>141</td>
<td>592</td>
<td>422</td>
</tr>
<tr>
<td>Bulk Food</td>
<td>82</td>
<td>141</td>
<td>228</td>
<td>190</td>
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<tr>
<td>Petroleum</td>
<td>43</td>
<td>100</td>
<td>119</td>
<td>69</td>
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<tr>
<td>Fertilizer</td>
<td>22</td>
<td>55</td>
<td>41</td>
<td>28</td>
</tr>
<tr>
<td>Other</td>
<td>109</td>
<td>165</td>
<td>204</td>
<td>134</td>
</tr>
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</table>

Because of rounding, components may not add to the totals shown.
24. Seaborne exports dropped to 136,000 metric tons during July-September. This was 37 per cent below the second quarter level, but more than double the amount exported during July-September 1967. Coal exports were at the lowest level since the last quarter of 1967, having declined each month since April. Seaborne exports of cement, apatite, or pig iron still have not been resumed. (NFD)

25. Cumulative measurable damage attributable to the ROLLING THUNDER program through September 1968 is estimated at $492 million as shown in Tab A. Damage inflicted during the third quarter amounted to $30 million, an increase over the first and second quarters. About $9 million was damage to the military establishment. Some $21 million was economic damage of which transport equipment accounted for nearly $14 million. In addition to these measurable losses, there continue to be many other losses which cannot be assigned meaningful values. (NFD)
Appraisal of the Bombing During October

Summary

The number of air strikes against targets in the Panhandle of North Vietnam increased during October. Air interdiction and bad weather resulted in considerable interruptions to highway traffic. Truck sightings and numbers of vehicles damaged and destroyed decreased while the level of watercraft activity remained about the same. New road construction continued in the Panhandle.

The restoration of damaged bridges in the northern part of the country went ahead, with work under way on the Viet Tri Railroad/Highway Bridge. Repair of industrial installations continued but no important increases were made in operational capacity. Seaborne imports during October were above the September levels. Ship turnaround time at Haiphong decreased despite the continued high level of import activity. The amount of open-storage cargo at the port decreased.

Measurable damage inflicted against facilities and equipment during October is estimated at $6 million. The cumulative cost of damage throughout the bombing campaign reached nearly $500 million.
Effects on Military Targets

1. The 11,850 attack sorties flown during October against targets below the 19th Parallel were more than 10 per cent above the September level. Heavy rains, as well as the intense interdiction campaign, disrupted logistic activity throughout the area, but the southern part of the Panhandle was hardest hit. New road bypasses and bridges were built to counter effects of the air attacks. (NFD)

2. About 1,500 trucks were sighted south of the 19th Parallel in October, 20 per cent below the number in September. Some 450 trucks were reported destroyed and damaged -- a decrease of about 100 from the previous month. Moderate-to-heavy traffic was observed just north of the DMZ on the interior routes and light-to-moderate traffic at the junction of Routes 101 and 137. Very light traffic was observed by pilots on Routes 137 and 15 heading toward Laos, but roadwatchers on Route 15 reported an increase in truck activity in the vicinity of the Laos border. (NFD)

3. In the north, piers were under construction beneath the highway cable bridge at Viet Tri, indicating that the temporary bridge is undergoing permanent reconstruction. In Haiphong near Route 10, a highway bridge was observed under construction. When completed, this bridge will improve the traffic flow north of Haiphong. (NFD)
4. During October, strikes against waterway targets continued at levels comparable to those of the previous quarter. Nearly 150 attacks were directed against fixed waterway targets including 43 waterway transshipment points. The Giap Ngat transshipment point near Quang Khe continued to be the most heavily struck facility. In early October, a strike near Vinh against the Trung Luong Lock, which connects the Song Cao and the intra-coastal waterway, interrupted traffic. Traffic was also temporarily interrupted on the Song Cua Lo, 12 miles north of Vinh; strike aircraft blocked the only inland water approach into Vinh from the north. Damage to watercraft from air attacks during the month was about the same as in the previous quarter, while damage from BHA DRAGON operations decreased slightly.

5. About 75 strikes were conducted against the rail lines south of the 19th Parallel, an increase of about 20 from the previous month. Destruction and damage of railroad rolling stock increased over the preceding month, but was comparable to the low levels noted generally since January. Continuous strikes were flown against the rail bridges at Dien Chau and Tam Da, north of Vinh, restricting through rail service to Vinh during the month and forcing the North Vietnamese to rely on shuttle service.

6. Photography of 5 October revealed a possible small diesel locomotive pulling a train on the Hanoi-Vinh rail line approximately
six miles south of Thanh Hoa. This was the first time this type of equipment had been observed in use on the main line. This locomotive is capable of pulling a load far greater than can be pulled by a flange-wheeled truck, and it weighs considerably less than a steam locomotive. [NFD]

7. The rail lines north of the 19th Parallel were open for through service during October except at Viet Tri on the Yen Vien-Laoc Hai rail line, where a rail ferry is still employed. Flooding was observed at some locations on the unfinished Keo-Hon Hai rail line. This probably slowed construction on this single-track line. [NFD]

8. North Vietnamese air defense activity throughout the month remained low. A total of 11 US aircraft were downed by enemy action; antiaircraft fire was the most effective element of air defense, accounting for at least nine US aircraft. There were reports of 100 antiaircraft guns near the DMZ, but their presence could not be substantiated in photography. [NFD]

9. All principal airfields north of the 19th Parallel were serviceable during the month. There was some evidence of minor work on Dong Hoai and Vinh Airfields south of the 19th Parallel. North Vietnamese MiG-21s under control of the Vinh GCI facility penetrated south of the 19th Parallel on only two occasions -- once as far as the Vinh area. There were no engagements with US
aircraft. However, MiGs are believed to have operated from Bui Thuong on at least seven days with most of the activity occurring after the 21st. \(\text{NFD}\)

10. SAM activity during October was light. Only seven missiles were fired at US aircraft; one A7 was downed. Five new SAM sites were discovered in the vicinity of the 19th Parallel, where four firing battalions continued to operate. There was no evidence in October of any occupied sites south of the Vinh area. Force levels in the Red River Delta area remained at about 30 battalions, 13 of which are believed to be equipped with the modified FAN SONG radar. \(\text{NFD}\)

Effects on the Economy

11. Repair activity continued during October at several industrial plants. A second boiler was repaired at the Haiphong West power plant, but this increased the plant's capability only slightly. Repairs were also made at the Haiphong Cement Plant and the Nui Dinh and Uong Bi power plants; their operational capacity remained about the same. \(\text{NFD}\)

12. Seaborne exports increased in October to 46,000 metric tons compared with 25,000 tons in September. Exports of coal in October were almost double the previous month, but were still below the monthly average for the first three quarters of the year. \(\text{NFD}\)

13. Total seaborne imports for October amounted to 164,000 metric
tons, an increase of more than 20 per cent above the September level. Imports of bulk food increased to 53,000 tons, nearly 10,000 tons below the monthly average for the first three quarters of 1968. Food imported from the USSR accounted for nearly 40 per cent of the total. Most of it arrived during the last half of the month, apparently in response to a North Vietnamese request for a substantial increase in Soviet flour. Fertilizer imports increased to 15,000 tons after relatively small deliveries during August and September. [MFD]

14. Seaborne imports of petroleum were about 34,000 tons, slightly above the current consumption level estimated for North Vietnam. Stocks on hand at the end of October probably exceeded the normal three months requirements. [MFD]

15. Ship congestion at Haiphong remained serious during most of October, but showed definite signs of a break in the latter part of the month. Average layover time for departing dry cargo ships fell from more than 40 days in September to 35 days in October. Layover time for ships carrying bulk food, which had increased significantly during the third quarter despite priority unloading, decreased to the normal layover time of about a week during the last half of the month. [MFD]

16. The amount of open-storage cargo at the port of Haiphong decreased significantly in October according to photography. Cargo-handling capabilities in the storage areas were improved by the
17. Measurable damage inflicted against North Vietnam during October is estimated at about $6 million, giving a total cumulative cost throughout the bombing campaign of nearly $500 million (see Tab B). In addition, there were many other losses which cannot be assigned meaningful values.
### Value of Economic and Military Damage Attributed to the ROLLING THUNDER Program 1965 Through September 1968

#### Economic

<table>
<thead>
<tr>
<th>Direct Losses</th>
<th>Million US $</th>
<th>Indirect Losses</th>
<th>Million US $</th>
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<td>Transportation Equipment</td>
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#### Military

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<td><strong>TOTAL, Direct &amp; Indirect</strong></td>
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\(a\) Of the total, \$13.0 million is estimated to have been expended to date on the repair of damaged and destroyed bridges and \$28.0 million is estimated for complete restoration of bridges damaged or destroyed.

\(b\) Losses of agricultural crops through 1967 were arbitrarily attributed entirely to the indirect effect of the bombing. An unknown part of these losses is in fact due to weather and other natural causes. Crop losses for 1968 have not been attributed to the bombing even though bombing during the first quarter may have adversely affected planting.

\(c\) Excluding the cost of damage by US naval operations along the coast of southern North Vietnam.

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MORI Document ID: 14452:14452
### Value of Economic and Military Damage

**Attributed to the ROLLING THUNDER Program**

**1965 Through October 1968**

#### Economic

<table>
<thead>
<tr>
<th>Direct Losses</th>
<th>Million US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railroad/Highway Bridges</td>
<td>41.0 a</td>
</tr>
<tr>
<td>Transportation Equipment</td>
<td>103.2</td>
</tr>
<tr>
<td>Electric Power Plants</td>
<td>33.1</td>
</tr>
<tr>
<td>Petroleum</td>
<td>7.8</td>
</tr>
<tr>
<td>Manufacturing Facilities</td>
<td>18.2</td>
</tr>
<tr>
<td>Railroad Yards and Shops</td>
<td>6.6</td>
</tr>
<tr>
<td>Maritime Ports and Shipyards</td>
<td>3.1</td>
</tr>
<tr>
<td>Miscellaneous Armament</td>
<td>3.0</td>
</tr>
<tr>
<td>Reconnaissance</td>
<td></td>
</tr>
</tbody>
</table>

**SUBTOTAL, Direct Losses** | 218.0 |

<table>
<thead>
<tr>
<th>Indirect Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exports</td>
</tr>
<tr>
<td>Agriculture b/</td>
</tr>
<tr>
<td>Fishing</td>
</tr>
</tbody>
</table>

**SUBTOTAL, Indirect Losses** | 125.4 |

**TOTAL, Direct & Indirect** | 343.4 |

#### Military

<table>
<thead>
<tr>
<th>Direct Losses</th>
<th>Million US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barracks</td>
<td>31.2</td>
</tr>
<tr>
<td>Ammunition Depots</td>
<td>5.3</td>
</tr>
<tr>
<td>Motor Vehicle Depots</td>
<td></td>
</tr>
<tr>
<td>and Supply Areas</td>
<td>11.0</td>
</tr>
<tr>
<td>Airfields</td>
<td>1.9</td>
</tr>
<tr>
<td>Radar and Communications Sites</td>
<td>2.9</td>
</tr>
<tr>
<td>SAM Sites</td>
<td>10.4</td>
</tr>
<tr>
<td>Naval Bases</td>
<td>1.9</td>
</tr>
<tr>
<td>Aircraft</td>
<td>53.0</td>
</tr>
<tr>
<td>Naval Craft</td>
<td>4.8</td>
</tr>
<tr>
<td>Miscellaneous Armament</td>
<td>32.0</td>
</tr>
<tr>
<td>Reconnaissance</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL, Direct Losses** | 154.4 |

**TOTAL**

- **Economic** | 343.4 |
- **Military** | 154.4 |
- **TOTAL** | 497.8 a |

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a. Of the total, $13.0 million is estimated to have been expended to date on the repair of damaged and destroyed bridges and $28.0 million is estimated for complete restoration of bridges damaged or destroyed.

b. Losses for agricultural crops through 1967 were arbitrarily attributed entirely to the indirect effect of the bombing. An unknown part of these losses is in fact due to weather and other natural causes. Crop losses for 1968 have not been attributed to the bombing, even though bombing during the first quarter may have adversely affected planting.

c. Excluding the cost of damage by US naval operations along the coast of southern North Vietnam.

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J-4 1
J-5 1
J-6 1
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NMC 3

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DCSOPS 1
ACSFOR 1
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AGSI-CI 1
AGSI-Eastern 1
STAG 1
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CHIEF OF NAVAL OPERATIONS 2
NAVINTCOM 1
NAVINUSER 1
NFCIO 1
92P 1
9216

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CHIEF OF STAFF 2
ACSI (AFNIN) 1
AFINDE 6
AFNIRAB 1
AFISI (Spec Investigation) 1
AUL (Air Univ Library) 2

MARINE CORPS:
COMMANDANT 1
G-2 1

CINCPAC 2
CINPACAF 10
CINCUSARPAC 1
CINCPACFLT 2
COMUSMACV 1
7AF 2
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SAC 544 1
CINCTAC 1
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