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THE EFFECTS OF THE ROLLING THUNDER PROGRAM ON THE
MANUFACTURING INDUSTRIES OF
NORTH VIETNAM



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NSA review completed

The Effects of the Rolling Thunder Program on the Manufacturing Industries
of North Vietnam

SUMMARY

The manufacturing industries of North Vietnam have suffered relatively little damage from air strikes in 1966. Although attacks against the coal treatment plant at Cam Pha and the Viet Tri Paper Mill have had an important impact on coal exports and the production of paper, the remainder of the manufacturing sector has emerged unscathed. Moreover, there is no evidence that the Rolling Thunder Program has forced large-scale industry to either disperse facilities or curtail production. In fact, the manufacturing capability of North Vietnam has been augmented by a stepped up rate of imports of machinery and equipment from the Communist countries. There is no evidence, however, that the manufacturing section of North Vietnam has converted to the production of military hardware.

Imports of machinery and equipment have played an especially important role in the support of the transportation system of North Vietnam, and in the improvement of the military communications capability. Along with transportation equipment itself, the Communist countries have increased deliveries of spare parts, machinery for the repair and maintenance of transportation equipment, and construction equipment for the reconstruction and repair of line of communication. Such imports have supplemented an already existing capability in the North Vietnamese machine building industry for the production of spare parts and simple machinery. The sharp increase in the import of telecommunications equipment almost certainly reflects an effort to upgrade military communications.

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The increased program of aid associated with the military effort, however, has not been at the expense of economic aid in general. The number of Communist aid projects has actually increased significantly, and although some of these projects such as machine building shops clearly have a potential military role, others -- chemical, mining, glass, and food products -- are just as clearly non-military in nature.

Attacks against selected machine building plants in North Vietnam -- the Hanoi Engineering Plant for example -- would delay recovery from the damage inflicted by the Rolling Thunder program. Destruction of North Vietnam's few major manufacturing facilities outside of the machine building sector would be of little value, other than from the standpoint of reducing enemy morale, in the reduction of the North Vietnamese military capability. Even the destruction of the large machine building plants would not be crucial, inasmuch as much of the repair capacity is already dispersed. Furthermore, the apparent scope of recent aid agreements suggests that the Communist countries will continue to provide North Vietnam with both replacements for essential damaged equipment, and equipment enabling North Vietnam to continue its own repair and maintenance.

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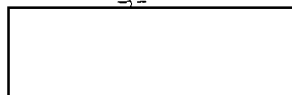
I. Current Activity in North Vietnamese Manufacturing Facilities

A. Photographic Evidence

A detailed study of representative major modern industrial installations in North Vietnam shows no appreciable change in the level of production activity at these installations during the period of Rolling Thunder. In only one plant, the Hanoi Vehicle Repair and Assembly Plant was it possible to discern a significant decrease in productive activity in recent months and this apparent reduction could reflect the dispersal of part of the plant's facilities to other areas. Photography gave no firm evidence of the dismantling and moving away of significant amounts of production equipment from large plants. Not even the Nam Dinh Textile Mill, which has repeatedly been reported to have been dismantled, showed signs of such dismantlement. On the other hand no new construction was evident in the photography of the plants studied. A summary of the photographic analysis is given below in Table 1.

B. Dispersal of Industry

Despite the heavy emphasis given in the North Vietnamese press to the claim that industry has been dispersed, it is extremely doubtful that any serious attempt has been made to dismantle major industrial plants and set up the equipment again in scattered areas. Technical constraints would probably prohibit any effective dispersal of such facilities as the fertilizer or rubber plants. Such plants cannot be economically subdivided and even a plant with homogeneous equipment such as in a spinning mill cannot be subdivided without the



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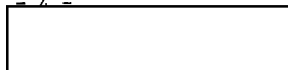


installation of necessary ancillary equipment at each of the new locations.

Furthermore, it is even likely that many of the large number of small machine shops and repair installations already scattered throughout North Vietnam are being consolidated and strengthened by additional equipment. The Hanoi Machine Tool Plant, the prime candidate for dispersal in the machine building industry, reportedly has expanded its facilities in 1966 and has opened a shop in another location as well.

That production is in fact to continue at the larger plants is further suggested by the provisions made for the protection of workers and equipment. Most large industrial facilities have many foxholes nearby and trenches radiating from the plant area for the protection of personnel. Extensive shelter systems of this type are evident in photography of the Hanoi Chemical Fertilizer Plant, Hanoi Vehicle Repair and Assembly Plant, the Nam Dinh Textile Plant, the Thai Nguyen Iron and Steel Combine, and the Phosphate Fertilizer and Cement Plants in Haiphong. A number of factories have reportedly resettled their employees and families in housing away from the plant. Sandbags or brick walls have been installed in the main interior of some plants to minimize damage of equipment in case of a direct hit.

Most of the dispersal that has occurred in industry is believed to consist of the resettlement of light and handicraft-type industry. The relocation of this type of industry would serve both to meet the demands of evacuees for goods, services and employment opportunities, and to provide for protection of such production.

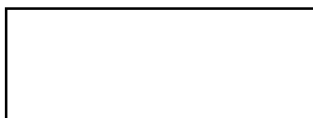


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In addition to the resettlement of small, light and handicraft shops away from urban areas and the aforementioned consolidation of many of the smallest machine and repair shops the Vietnamese are probably also building small new industrial shops away from urban areas as a means of developing a degree of regional self-sufficiency. A network of small machine building shops, for example, is being established based in part on the indigenous manufacture of simple production machinery, and in part on the import of simple production machinery. Such small shops are probably being installed in existing buildings in many instances.



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II. Capability of North Vietnamese Manufacturing Industries to Support the War

A. Introduction

The only manufacturing industry in North Vietnam which is capable of providing significant assistance to the military effort is machine building. The chemical industry manufactures only small quantities of tires, pharmaceuticals, and some chemicals used in the production of munitions. The explosives industry itself provides only a fraction of the country's current military needs. The Thai Nguyen Iron and Steel Plant currently is producing only pig iron, most of which is going for export. The rest of the small manufacturing sector is devoted to production for the consumer and, except for the manufacture of military clothing and rations, has little military potential.

B. Machine Building

Before 1960 North Vietnam had a very limited capability to produce modern or even semi-modern machinery. Most of its machine building output consisted of crude agricultural implements, simple water pumps, and spare parts for repair. Production then was typical of the machinery output of any under-developed country -- simple in design, of low capacity, and of poor quality. The product-mix of North Vietnam began to show an increase in complexity in the early 1960's. By 1963 North Vietnam was claiming production of replacement parts for "intricate" machinery, belt conveyors, and air compressors. By 1964 the Hanoi engineering plant, a Soviet aid project, was producing modern lathes, and other plants were producing DC motors and more complex pumps for the mining

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industry. References were also made in the press to precision-mold castings, 120-ton "pieces of machinery", and high pressure hose, all examples of an improving technology. In 1965 the DRV claimed to have completed its second locomotive, a rail motor car and "hundreds of tons of spare parts for tractors, diesel motors and mechanical pumps." Table 2 shows the progress of the North Vietnamese machine building industry as reflected in press reports.

Perhaps the most important facet of North Vietnam's machine building industry, with respect to support of the war, has been its experience in the maintenance of the transportation system. This experience, together with extensive support from its Communist allies (see below) has enabled North Vietnam to provide extensive maintenance for a hard pressed fleet of vehicles. The experience of the small motor vehicles installation in Nam Ha Province probably is at least partly representative of that at other such facilities. This shop was dispersed out of the city and 40 percent of the repair workers were reassigned to serve truck convoys. The workers have resorted to various means of improvisation, including cannibalization, to service the convoys. At the same time, the cadres and skilled workers reportedly trained over 100 students as lathe operators, fitters, etc.

Claims that machine building plants have converted to production for agriculture are difficult to believe. There has always been a relatively heavy emphasis on the production of farm implements -- in 1964 such equipment accounted for 40 percent of machine building output. Today during a period when its stock of railroad rolling equipment, trucks, power grid, and POL

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storage facilities is under strong air attack it is almost inconceivable that the machine building facilities of North Vietnam would be converting to farm machinery production or even that business as usual is being carried on.

It would seem equally unlikely, however, that machine building has converted any significant capacity to the production of military hardware.

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[REDACTED] small quantities of carbines, grenades, bangalore torpedoes and other simple hardware have been produced in North Vietnam. However, the ease of importing weapons should discourage any serious desire on the part of the regime to produce modern weapons in sizeable quantities.

The production of spares and the general maintenance of locomotives, trucks, construction equipment, and industry in general is the present priority task of North Vietnam's machine building industry. Its total machine building capability is still rudimentary but many of today's priority tasks resulting from Rolling Thunder are similar to many of the tasks performed by machine building, under less pressing circumstances, during the past six or more years.

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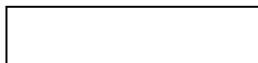


Table 2

Reported Machinery Production in North Vietnam, 1957-1966

1957-60	1961	1963	1964	1965	1966
Brick presses Farm implements Mechanical pumps Ventilators Motor launches Locomotive repair Truck and engine repairs	Cement mixers Farm implements Equipment for: Brick factories Rice mills Tug and river boats Railroad cars Internal combustion engines Air compressors Transformers Diesel engines Welding machines	Belt conveyors Farm implements Began production of springs, jacks, measuring devices, replacement parts or intricate machinery Development of electric hammer Transformers	T-620, T-630, 1K62 (Soviet-type) lathes Milling machines DC motors for trolley cars Pumps for agriculture and mining "120-ton piece of machinery" Filter presses Valves Fans Crushing machines High pressure hose Precision-mold castings	Hundreds of tons of spare parts for tractors, diesel motors, mechanical pumps Transformers for pump- ing stations Water pipe, 62,000 meters Rail motor car DRV's second locomotive	Electric generators, 15 KW Electric motors Switchboards Diesel engines Auto accessories T613 lathes, M120 universal milling machines Circuit breakers Water pumps

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The Ha Bac Nitrogen Fertilizer Plant , situated 2 NM north of Bac Giang (Phu Lang Thuong) , is a major Chicom aid project ~~which~~ ^{and} a potential producer of components for military explosives.

At first stage of construction may be completed and the plant may be capable of producing 100,000 tons per year of ammonium nitrate-- an intermediate for TNT and other military explosives.

III. Communist Aid to North Vietnam in Machinery and Equipment

A. Introduction

Communist aid to North Vietnam in machinery and equipment has been vital to the support of the war effort. Along with transport equipment, the Communist countries have provided substantial quantities of equipment for construction, communication, and maintenance -- all of which are valuable to the military effort and to the maintenance of the civilian economy. Furthermore, increased quantities of machinery and equipment have apparently been made available for both new and continuing aid projects which are not military-associated. Table 3 describes the trend in 1959-65 in North Vietnamese imports of machinery and equipment from the USSR.

B. Deliveries from the USSR

DRV imports of machinery from the USSR increased from \$25.1 million in 1964 to \$47.6 million in 1965. Imports in 1965 were 32 percent higher than the previous peak of Soviet imports which occurred in 1963. Although total machinery imports from the USSR by the DRV are still small when compared to machinery imports of an industrial nation, DRV imports are impressive in view of the small industrial base of North Vietnam. The value of Soviet machinery imported by North Vietnam in 1965 was 64 percent greater than that of North Korea although the latter country has many times the industrial capacity of North Vietnam.

An analysis of Soviet exports of machinery to the DRV in 1965 shows that a large share of the imports can be related to a war-supporting role. As shown in Table 4, spare parts for motor vehicles, trucks, power equipment, and excavators and road building equipment comprised an important share of

Table 3

North Vietnam Imports of Machinery from the USSR, 1959-65

	Millions of US\$						
	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>
Total imports	19.9	24.4	41.3	54.7	56.7	47.7	74.9
Imports of machinery	5.9	11.9	19.6	31.4	34.0	25.3	48.0
Imports as percent of total	29.4	48.5	47.2	57.5	60.1	53.2	64.1

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[redacted]

imports of machinery into the DRV other than "complete enterprises". Truck cranes, winches, and hoisting equipment, were also imported in significant quantities. Exclusive of complete enterprises, more than one-third of North Vietnam's imports from the USSR in 1965 can be related to the maintenance, repair and expansion of the transportation and power sectors of the economy, the two sectors of the economy under heavy attack by Rolling Thunder. Moreover,

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[redacted] some small "complete enterprises" -- by far the most important category of North Vietnamese imports -- consist of repair shops, and manufacturing facilities that probably also have war-supporting capabilities, such as vehicle repair.

At the same time, however, there were substantial increases in the import of other commodities not directly related to the support of transportation and power. The import of mining equipment in 1965 increased by 428 percent compared to 1964, pumps and compressors by 923 percent, and oil well drilling equipment by 337 percent. Furthermore, much of the machinery being imported

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under the category "complete enterprises", is

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[redacted] going to major Soviet aid projects in mining, electric power, and civilian manufacturing.

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[redacted] imports of machinery by North Vietnam increased
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markedly in 1965 and [redacted] imports have increased even more in 1966. [redacted] 25X1

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[redacted]

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As shown in Table 4, a large share of the increase in North Vietnam

imports of machinery can be related to maintaining and improving the transportation

sector of the DRV. The great increase in the import of trucks from numerous

Communist countries [redacted] shows the

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imports of equipment well suited for repairing all kinds of transport equipment 25X1

[redacted]

railroads and port facilities. Import trends [redacted] are presented

in Table 5. The significance of imports, by commodity, is discussed below.

1. Machine Tools

In 1965 and 1966 substantial quantities of machine tools were

imported by North Vietnam. The largest share of these imports can be identified

as machine tools appropriate for the repair of all kinds of motor vehicles, 25X1

construction equipment and other industrial equipment. [redacted]

[redacted]

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[REDACTED] 25X1

[REDACTED] 25X1

Some large, heavy duty machine tools are also being imported.

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[REDACTED]

been identified. This equipment would be appropriate only for a relatively large installation, possibly the Hanoi Railroad Equipment Plant or the Haiphong Railroad Equipment Plant. [REDACTED] observed would be

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appropriate for only an established industrial plant and would be most useful in the production of some spares. Other machine tools, centerless grinders and a few automatics, are appropriate only for a well established plant such as the Hanoi Engineering Plant, hence/^{suggesting} sizeable production runs of at least spare parts. Some of the machine tools [REDACTED] could be used

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for military hardware production. However, the overall volume and mix of the machines being imported is much more suggestive of spare parts production and repair in small dispersed shops, including quartermaster repair shops.

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2. Telecommunications

In the pre-Rolling Thunder period the level of telecommunications imports into North Vietnam was relatively modest. Imports were intended for the maintenance and improvement of existing facilities. In 1965 an increasing emphasis on military equipment became apparent. However, the import of 15,000 conventional radio broadcasting receivers indicated some consumer needs were still being met. In 1966, however, both the level and mix of telecommunications imports by North Vietnam changed radically. The quantity of telecommunications for which North Vietnam either has attempted to contract, or in fact received, is without precedent. To a predominant degree telecommunications sought in 1966 are well suited for military purposes. Additionally, large quantities of copper with a telecommunications capability have been imported. Most of this equipment very likely is or will be used to assist the restoration and extension of logistical and transportation facilities and for outright military use.

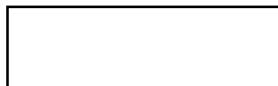
3. Power Equipment

Over 400 mobile generators are estimated to have been imported in 1965, with a total capacity of about 12,000 kw. Imports came from the USSR, Hungary, Rumania, Czechoslovakia and Poland. Imports in 1966 of mobile generators have continued at the same high rate as in 1965. Relatively few transformers have been imported and there has been no increase in transformer imports in 1966. Many



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Imports of aluminum alloy cable increased dramatically between 1964 and 1966. In 1966 about 450 tons has been imported from the USSR and Eastern Europe. About 3,250 tons has been imported from Free World countries. Most of this cable is not appropriate for cross country power transmission. It is suitable for low voltage lines, 1 kv to 10 kv.

4. Tractors

No Soviet tractors were imported in 1964 compared to [redacted] 25X1

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25X1 [redacted] upwards of 100 tractors were imported in 1965. Although many of them were agricultural tractors there is some evidence that they were used for non-agricultural uses.

Imports in 1966 have continued at about same level as 1965. Several dozen large tracklaying tractors suitable for construction or logging work were imported. At least 150 agricultural tractors equipped with 4-wheel drive [redacted] 25X1

25X1 [redacted] These would lend themselves to transport work particularly where roads are bad.

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Table 5

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1965 -- In 1965 the level of telecommunications imports increased over 1964 but was not unusually high. However, an increasing emphasis on military equipment became apparent -- manifest

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1966 -- In 1966 both the level and mix of telecommunications imports by North Vietnam has changed radically. The quantity of telecommunications for which North Vietnam either has attempted to contract, or in fact has received, is without precedent. To a predominant degree, such telecommunications as has been sought thus far this year is well-suited for military purposes. Of most importance, are 30,000 kilometers of military field wire (valued at approximately \$1 million), and ten, 10-kilowatt transmitters, and one hundred, 15-watt transceivers (valued collectively at \$275,000). Additionally, large quantities of copper cable with a presumed telecommunications capability have been imported. Most of this equipment very likely is or will be used to assist the restoration/extension of logistical and transportation facilities and for outright military use.

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D. Aid Projects to North Vietnam

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Analysis of [] Communist aid projects indicates that

rather than tapering off since the inception of US air attacks the number of

such projects has increased substantially during 1964-66.* This is shown in

the following tabulation which summarizes the number of Soviet and European

Satellite projects identified as having been in progress during the period:

	<u>1964</u>	<u>1965</u>	<u>1965-66*</u>	<u>1966</u>
USSR	23	26	38	49
Eastern European Countries	9	10	--	11

* Observed at some time during Jan 1965 - Feb 1966.

The nature of many projects is unknown. Many of these are the responsibility of Tekhnoeksport and can consist of geological surveys, airfields, sports and educational facilities as well as projects in the light industrial, building and pharmaceutical industries. Some of the unidentified projects observed in 1965 and 1966, however, could be war-supporting installations hastily ordered and shipped to North Vietnam to engage in repair or war-support production. Rumania has agreed to supply five regional machine shops which will be capable of repairing trucks and other machinery -- East Germany has apparently consented to supplying an automotive repair shop. Numerous projects from 1964 onwards have been concerned with generating and transmitting electric power.

On the other hand there are numerous aid projects continuing into 1966 which are expanding mining and industry in general. For example, the Vang Danh coal mine, the Cam Pha coal washing plant and a sulfuric acid shop have been receiving equipment from the Communist countries, with relative consistency through the period. Among the light industries, food processing and cold storage installations have been progressing fairly steadily. Moreover, during October, Hanoi sent

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representatives to Poland and Communist China to examine methods and techniques

for installing rolled steel capacity and making other improvements in iron and

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steel production. [redacted] the regime still intends to complete

the Thai Nguyen Iron and Steel Plant -- North Vietnam's only iron and steel complex.

There has been evidence of a slowdown in only one major industrial project.

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[redacted] This curtailment may have been the result

of a reallocation of scarce manpower resources needed elsewhere.

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