AICHI ORDNANCE PLANT

DAMAGE ASSESSMENT TABLE

90.20 - 198

Building No. USSBS	JTG	CIU	OAS	Bldg. Area	Structural (1000s sq. ft) A	JTG	CIU	OAS		Superficial (1000s sq. ft) A	JTG	CIU	OAS		Removed (1000s sq. ft) A	R	R
25	25	5	5	9.8	8.7	4.8	3.0	3.4			7.8						
26a	26a	13b		2.3	2.3	3.1	2.2										
26b		13a	13	1.3	1.3		8.4	3.0									
26c	26b			6.1	6.1	8.3											
27a	27a	12b		3.2	3.2	2.8	2.7										
27b	27b	12a	12	1.5		0.4	2.7	1.1									
27c	27c			0.9	0.9	0.8											
29	29	11	11	13.5	13.5	3.0	2.5	7.8			2.2						
30	30	38a		1.7													
31	31a	36	36	43.2	20.3	24.0				22.9	9.0						
	31b					6.0					4.4	30.0					
32	32	37	37	13.1	7.1	4.3		13.7		6.0	8.3	16.0					
33a	33a	38b	38	5.8	1.9	5.7		13.5		3.9	11.0	25.0	8.8				
33b	33b			16.0	12.2	6.3				3.8	2.7						
33c				0.6													
33d				0.6													
34	34a			5.0	5.0	2.4											
	34b	6a				8.5	7.8										
35a	35a	6b	6	1.1	1.1	3.4	8.4	15.0									
35c		6c		0.5	0.5		3.5										
35b	35b			1.0	1.0	2.1											
36	36			4.5	4.5	6.5											
	37a					21.0				26.5	12.8	50.0					
37a	37b	10h		62.6	36.1	12.4	17.0				9.5						
	37c					11.5				24.8	35.2	40.0					
37b	37d	10g		40.4	15.6	8.0	3.0										
39c	39c	10f		4.9	4.9		7.5										
39d	39b	10d		7.2	7.2		11.0						4.5				
39e	39a		10	4.5	4.5	6.3		325.8		63.5	63.4						
39a	39d			66.6	3.1	8.6											
	39c					7.2					9.0	70.0					
	39e	10a				16.6				89.1	34.8	147.0					
39b	39f	10b		201.7	112.6		47.0				65.0	4.0					
	39g	10c				69.3					6.7						
	39h									45.9	50.5	24.0					
38a	38a	7a		70.5	24.6	26.2	20.0			13.9		46.0	30.4				
38b		7b	7	13.9				47.8									

AICHI ORDNANCE PLANT

DAMAGE ASSESSMENT TABLE

90.20 - 198

Building No. USSBS	JTG	CIU	OAS	Bldg. Area	Structural (1000s sq. ft) A	JTG	CIU	OAS		Superficial (1000s sq. ft) A	JTG	CIU	OAS		Removed (1000s sq. ft) A	R	R
		7c										1.4					
40a				0.2						0.2							
40b	40	39	39	3.1	3.1	4.6											
41c	39j	40	40	1.1	1.1	0.5					2.5						
41a	41a	41	41	2.6						2.6	6.1						
41d	41b			0.6	0.6	1.2	18.6					19.0					
41b	41c	42	42	2.3	0.7	3.4											
42	42a	43	43	3.0		6.1				3.0							
	42b										0.4						
43	43	9a		3.6	0.3												
44a	44	9b		12.5							31.5						
44b				18.7													

90.20-198 AICHI ORDNANCE PLANT

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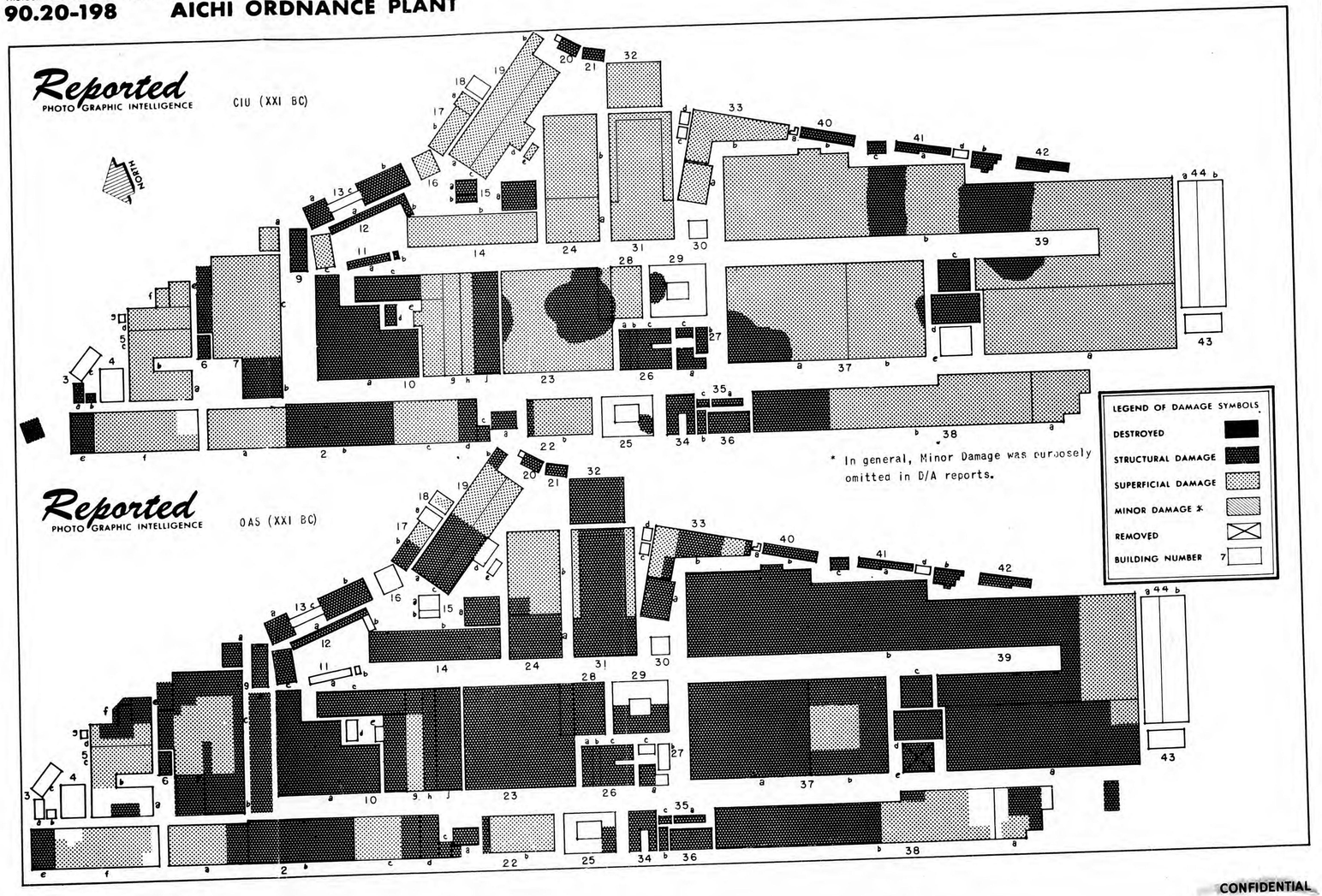

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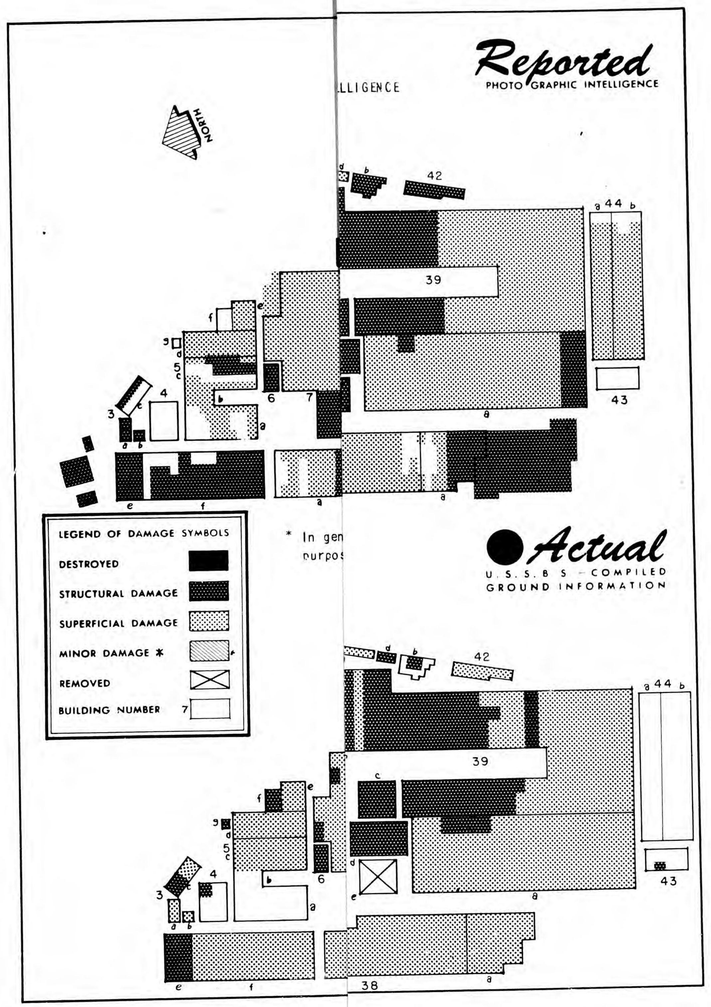
NANCE PLANT 90.20 - 198



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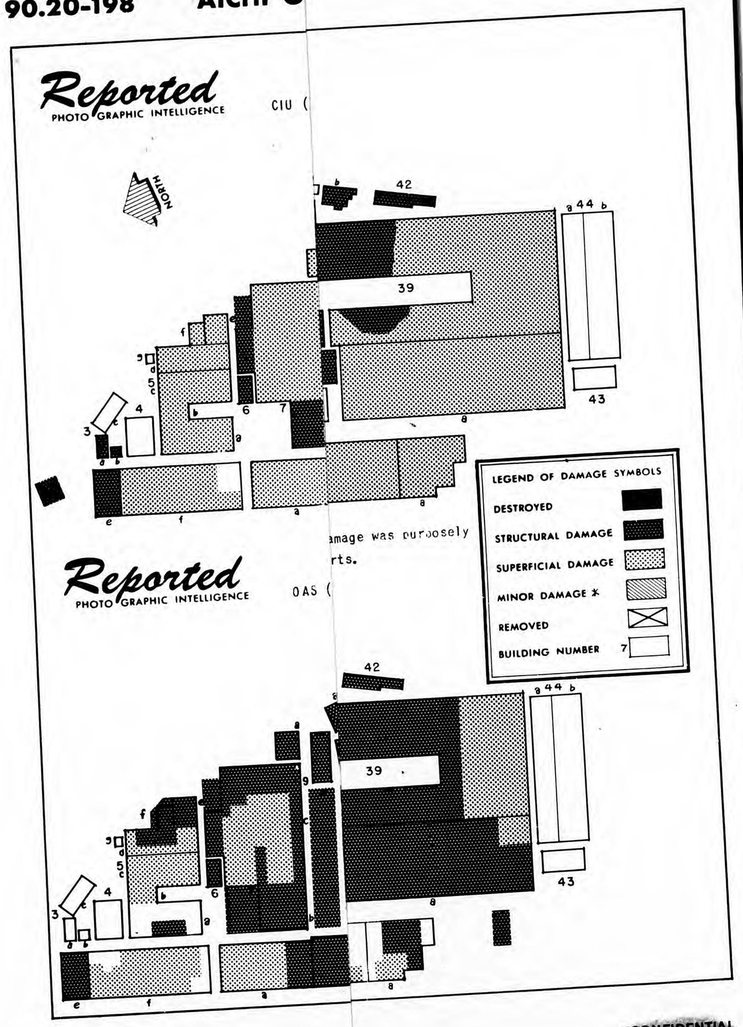

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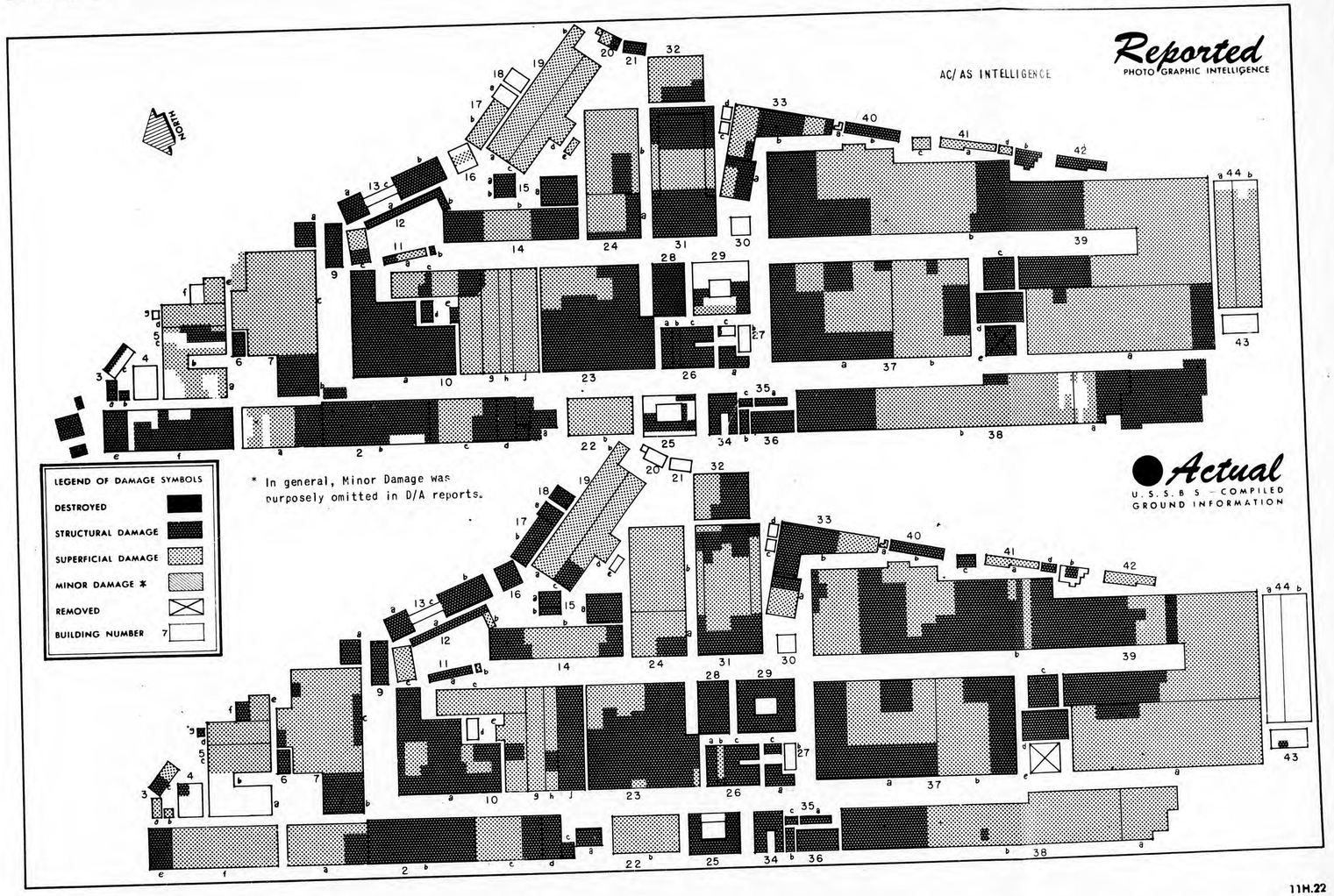

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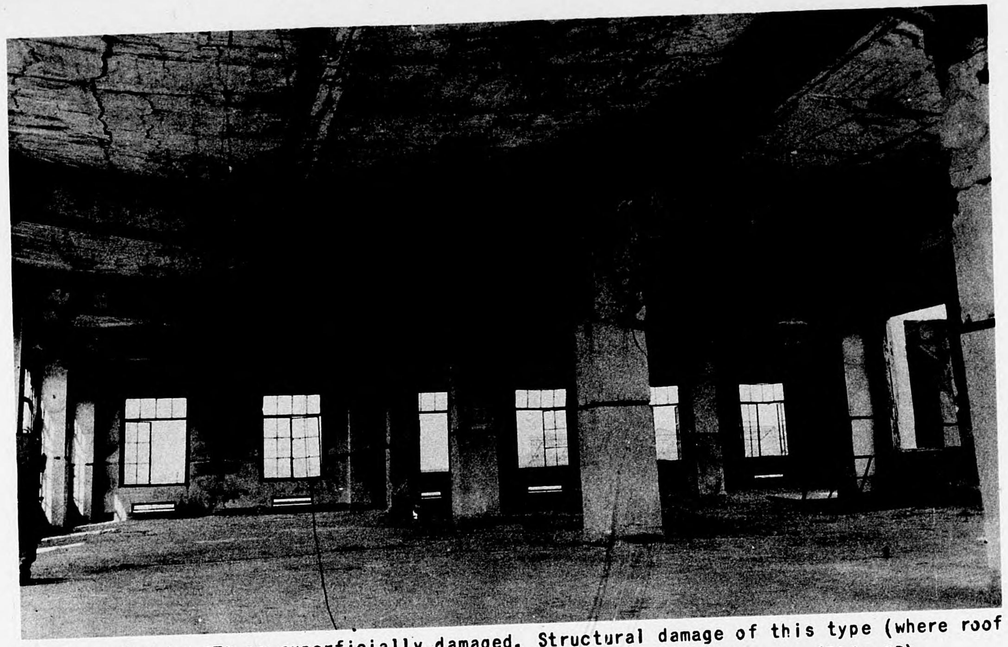
AICHI ORDNANCE PLANT 90.20 - 198



A Reported by JTG as superficially damaged. Structural damage of this type (where roof appears undisturbed from the air) is almost impossible to detect. (Bldg 2B)

B Reported by CIU as torpedo testing but actually a narrow gauge service track. Interpreter overlooked real torpedo testing (which was partially housed) and in attempting to confirm ground information chose this installation as the most reasonable. (Bldg 14B)

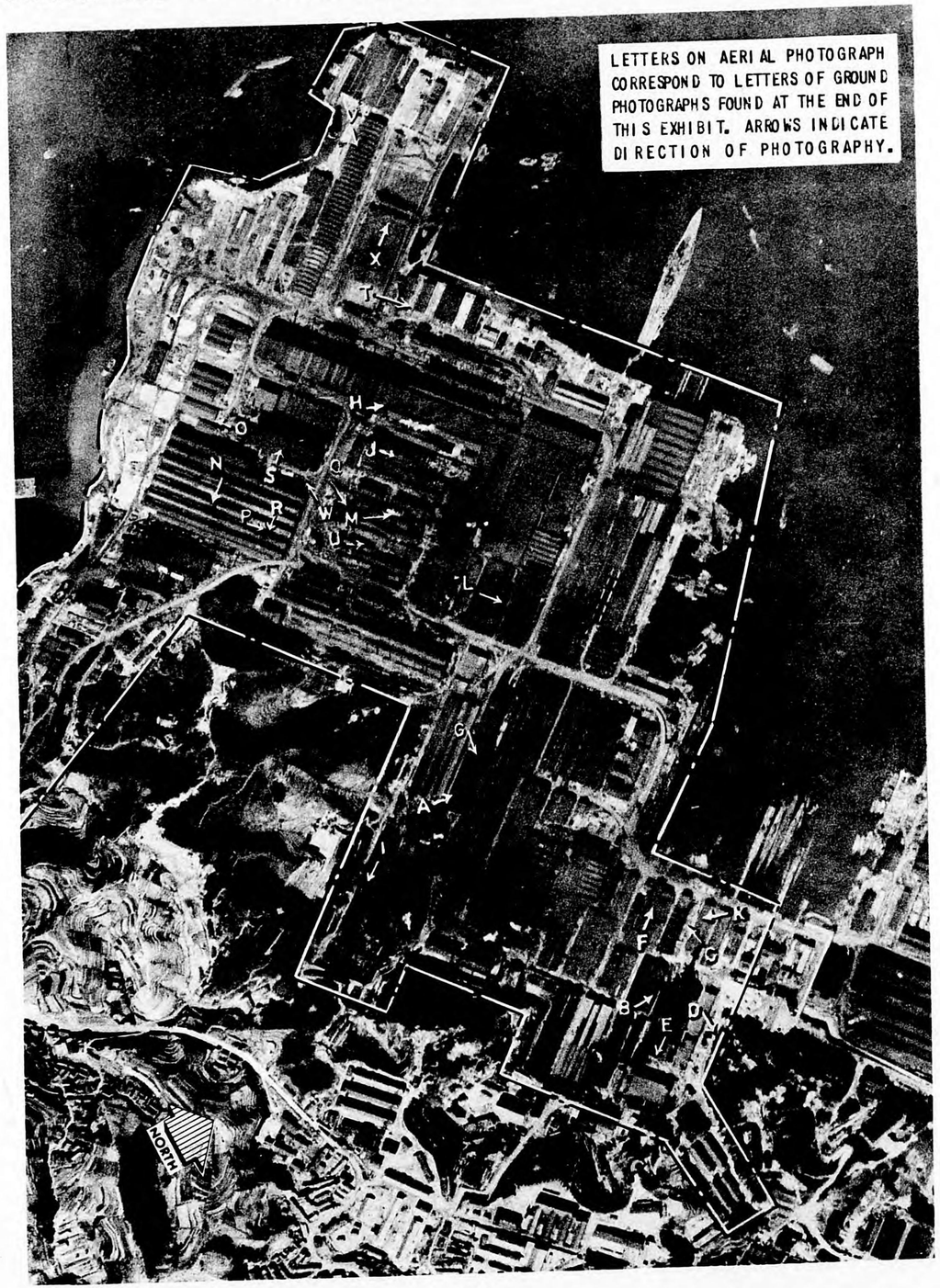
EXHIBIT J
KURE NAVAL ARSENAL
90.30-657 A

LAT. 34° 13 ' N - LONG. 132° 32 ' E

KURE, JAPAN

See Exhibit P for abbreviations used in this exhibit.

90.30-657 A KURE NAVAL ARSENAL



KURE NAVAL ARSENAL 90.30 - 657 A

1. DESCRIPTION OF TARGET

a. The Kure Naval Arsenal was the principal arsenal for the Japanese Navy. The plant produced in its four major departments (as was reported): (1) armor plate, (2) ordnance (naval guns, bombs, and shell casings), (3) torpedoes, (4) electrical and radio equipment.

b. The arsenal is located 2 miles south of Kure City on Kure Wan.

c. The plant comprises 122 listed structures with a total built-up area of approximately 3,840,000 square feet.

2. SUMMARY

a. Interpretation of building functions was only fair, although the bulk of the important buildings were correctly or nearly correctly identified. Of a total of 122 structures, field data are available on 110, and of these:

(1) 63 were identified correctly.
(2) 14 were identified as having similar occupancy.
(3) 13 were unidentified.
(4) 20 were identified incorrectly.

b. Interpretation of structural types was poor. Out of 123 buildings and subdivisions checked in all construction type categories, 70 were correct. Inaccurate interpretation of cranes and their capacities was the source of much of the error. Interpretation of combustibility was good. Of 122 buildings and subdivisions checked, 93 were correct.

c. Damage assessment was fairly accurate, although there was considerable variance between reported and actual damage for a number of individual buildings. The amount of structural damage in particular, was underestimated. Table I summarizes the damage situation.

TABLE I

	ACTUAL Sq Ft	REPORTED Sq Ft
Destroyed	224,900	250,100
Structural Damage	570,600	411,515
Superficial Damage	1,760,200	2,217,895
Total Damage	2,555,700	2,879,510

3. SOURCE OF DATA

a. Reported

(1) AC/AS Intelligence F/A and S/A Report #62, 25 June 1945

(2) CIU (XXI BC) D/A Report #149, 27 June 1945

b. Field Data

(1) USSBS (G-2, PIC) field notes, Japanese blue prints, building areas, and other data.

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90.30-657 A KURE NAVAL ARSENAL

4. FUNCTIONAL ANALYSIS

a. Use of Plant

Reported: Manufacture of naval ordnance, armor plate, torpedoes, electrical and radio equipment.

Actual: As reported.

b. Boundaries

(1) Plant boundaries were correct as reported.

(2) Several building boundaries were in error.

c. Building Identification (F/A Table)
Note: Buildings 1-54 comprise the adjoining Kure Naval Shipbuilding Yard, (90.30 - 657 A)

d. Summary of Tabulation

TABLE 2

	TOTAL BUILDINGS	No. Bldgs	%
F/A ACCURACY FACTOR	Correct	63	57
	Of Similar Occupancy	14	13
	Unidentified	13	12
Total Plant 67	Incorrect	20	18
	Total	110	100

e. Remarks

(1) Reliable detailed ground information was available on certain sections of the arsenal (in the torpedo department, for example) and contributed much to the accuracy of the analysis.

(2) Reported building outlines were often incorrect. In several instances, separate buildings were shown as parts of adjoining buildings, or a single building was shown as more than one building.

(3) Buildings of similar structural types, e.g., storage, small shops, mess halls, etc., were frequently incorrectly identified.

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KURE NAVAL ARSENAL 90.30 - 657 A

FUNCTIONAL ANALYSIS TABLE

KURE NAVAL ARSENAL — 90.30 - 657A

BUILDING NUMBER		PRIMARY FUNCTION REPORTED	PRIMARY FUNCTION ACTUAL	EVALUATION JTG CORRECT	JTG SIMILAR	JTG UNIDENT	JTG WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
JTG		JTG										
55		Office Type Bldg	Design & Drafting Dept	x								85
	a	Office Type Bldg	Design & Drafting Dept									
	b	Office Type Bldg	Storage (Electrical Equip)		x							85
56		1. Ships Articifer										
		2. Drafting										
57		Office Type Bldg (Drafting)	Electrical Shop				x					0
58		Office Type Bldg	Electrical Bldg				x					0
59		Shop	Electrical Shop (Manufacturing & Repair)	x								85
60		Power Plant (Turbo-Generator)	Steam-Elec. Power House	x								100
61		Warehouse	School (For Arsenal Tech)				x					15
62		Warehouse	School (For Arsenal Tech)				x					15
63		Warehouse	Recreation Bldg & Lecture Hall				x					15
64		Shop (Elec. Apparatus Finishing)	Electrical Equip. Assembly	x								100
65		Machine Shop	Elec. Shop (Repair and Assembly Motors & Gen'tors		x							85
66		Shop (Elec. Appar. Finish.)	Machine Shop	x								100
67		Shop (Machine Shop with Pressing & Molding)	Elec. Equip. Assembly		x							85
68		Shop	Offices and Storage		x							70
69		Shop (Carpenter)	Shed (Storage)		x							78
	a	Shop (Blacksmith)	Metal Shop - Training									
	b		Apprentices									
70		Shops	Storage				x					70
	a											
	b											
71		Shops	Tool Making Shop (Torpedo Works)	x								85
	a											
	b											

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KURE NAVAL ARSENAL

FUNCTIONAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG		FUNCTION ACTUAL	EVALUATION JTG CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
71 c															
d															
e															
72			Shop (Torpedo Mechanisms)		Shop making parts for torpedo motors	x								100	
73			Shop (Torpedo Materials Section)		Testing shop for torpedo motors	x								100	
74			Shop (Torpedo Mechanisms)		Machine Shop (Torpedo Works)	x								100	
a															
b															
c															
75			Shop (Torpedo Mechanisms)		Machine Shop (Torpedo Works)	x								100	
76			Shop (Torpedo Mechanisms)		Plating & Bending Pipes (High Press. Torpedo Lines)	x								100	
a															
b															
c															
77			Casting Plant		Casting & Welding Works	x								100	
a															
b															
c															
d															
e															
78			Shops		Torpedo Assembly Shops	x								85	
79			Shops		Warehouse - Later an office		x							70	
80			Shop		Casting Shop	x								85	
81			Shop		Storage & Craneways		x							70	
82			Unidentified		Transformer Station			x						45	
83			Shop		Paint Shop Projectiles & Bombs	x								85	
84			Shop	Crusher Shop - Crushing Casting Sand		x								85	

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KURE NAVAL ARSENAL

FUNCTIONAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG		FUNCTION ACTUAL	EVALUATION JTG CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
85			Shop		Air Compressor Bldg				x					15	
86			Shop		Forging Shop	x								85	
87			Shop		Light Ammunition Mfg	x								87	
a															
b															
c															
d															
e															
f															
g															
h			Heat Treatment & Probable Forge Facilities												
j															
k					Steam Power Plant	x								100	
88			Boiler House												
a															
b					Forging Casting	x								100	
89			Forging & Casting		Forging										
a					Casting										
b					Shop - Mfg. Projectiles	x								98	
90			Shops												
a															
b			Machine Shop Section		Offices	x								100	
91			Offices - Ordnance Hdqts		Offices										
a					Design										
b					Hdqts - Gun Section										
c															
d					Design										
e					Storage of Designs										
f					Tool Making Shop				x					85	
92			Shops (Shell Factory)												
a &b															

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KURE NAVAL ARSENAL

FUNCTIONAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG		FUNCTION ACTUAL	EVALUATION JTG CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
93			Shops (Shell Factory)		Machine Shop-Shells & Bombs	x								100	
94			Heavy Industry (Reported Gun Mount Factory)		Shops of Gun Mount Factory	x								100	
a					Apprentice Shop										
b					Ammo Storage										
c					Machining, Fitting, Assembly										
d															
e					Forging										
f															
g															
h															
i					Gun Mount Assembly										
95			Shops		Warehouse				x					15	
96			Unidentified		Offices			x						45	
a															
b															
c															
97			Shop (Reported Forge Shop)		Machine Shop		x							80	
98			Small Boiler House		Offices				x					0	
99			Forge		Heavy Forging Shops	x								100	
a															
b															
c															
d															
100			Shop		Steel Production				x					15	
a															
b															
c															
d			Overhead Crane												
101			Gasometer		Gasometer	x								100	
102			Shops (Storage Battery Plant)		Manufacture Storage Batteries for S/S	x								100	

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KURE NAVAL ARSENAL

FUNCTIONAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG		FUNCTION ACTUAL	EVALUATION JTG CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
103			Shops (Storage Battery Plant)		Batteries for Midget Subs	x								100	
104			Shops (Storage Battery Plant)		Batteries for Midget Subs	x								100	
105			Machine Shop		Heat Treatment Shop				x					8	
a															
b															
106			Heavy Industry	Steel Working Shop - Gun Turrets, Midget Sub. Ass		x								78	
a			Machine Shop	Steel Working Shop - Steel Plates for Turrets & Subs											
b			Gun - Tube Factory	Steel Working Shop - (Steel Plates)											
c			Gun - Tube Factory	Steel Working Shop - (Steel Plates)											
d			Gun - Tube Factory	Steel Working Shop - (Steel Plates)											
e			Gun - Tube Factory		Gun Turret Manufacture										
f			Gun - Turret Factory		Gun Turret Manufacture										
g			Gun - Turret Factory		Gun Turret Manufacture										
h			Gun - Turret Factory		Gun Turret Manufacture										
i			Gun - Turret Factory		Gun Turret Manufacture										
j			Gun - Turret Factory		Midget Sub Assembly										
k			Gun - Turret Factory		Midget Sub Assembly										
l			Gun - Turret Factory		Midget Sub Assembly										
m			Gun - Turret Factory		Overhead Crane										
n			Overhead Crane		Heavy Industry				x					73	
107				Steel Machining - Armour Plate, Shells & Eng. Blocks											
a				Steel Machining - Armour Plate, Shells & Eng. Blocks											
b				Steel Machining - Armour Plate, Shells & Eng. Blocks											
c			Secondary Rolling Mills		Bombs & Shell Production										
d			Secondary Rolling Mills	Machining Plate & Engine (Also Plate Cutting)											
e			Open Hearth Bldg	Machining Plate & Engine (Also Shells)											
f					Machining Plate & Engine										
g					Machining Plate & Engine										
h			Secondary Rolling Mills	Plate Rolling Cutting, Bending											
i			Secondary Rolling Mills	Engine (Mills) & Boiler Room											
k			Secondary Rolling Mills		Annealing Furnaces										
l															

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KURE NAVAL ARSENAL

FUNCTIONAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG		FUNCTION ACTUAL	EVALUATION JTG CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
107m			Open Hearth Bldg		Annealing Furnaces										
n					Steam Engines Offices, Tool Storage										
o					Rolling Mills (Armor Plate)										
108			Bldgs associated with 107		Gas Producer Bldg (Primary)			x						45	
109			Bldgs associated with 107		Gas Producer Bldg (Secondary)			x						45	
110			Machine Shop		Bomb & Shell Production	x								85	
a															
b															
c															
d					Machine Shop	x								85	
111			Shop		General Repair Shop &										
a					Torpedo Machining										
b					Boiler House				x					0	
112			Heat Treating Shop					x						45	
113			Associated with 107		Boiler House				x					0	
114			Associated with 107		Boiler House				x					0	
115			Heat Treatment Shop		Fabricating Shop (Structural Steel)	x								85	
116			Shop		Steel Columns, Beams, Girders, etc.										
a					Steel Columns, Beams, Girders, etc.										
b					Non Ferrous Metals Shop										
c															
d					Overhead Crane										
e			Overhead Crane		Laboratory (Metallurgical & Test Off.)				x					0	
117			Small Shop		Gas Producer Bldg			x						45	
118			Bldg associated with 120		Electric Steel Furnaces			x						45	
119			Bldg associated with 120				x							85	
120			Forge & Casting Plant		Forging Shop										
a					Steel Production (Open) Hearths										
b					Charging Room										
c															
d															

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KURE NAVAL ARSENAL

FUNCTIONAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG		FUNCTION ACTUAL	EVALUATION JTG CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
120e					Storage										
f			Overhead Crane		Overhead Crane-Ingot Yard										
121			Associated with Bldg 120		Annealing Furnaces				x					45	
122			Associated with Bldg 120		Gas - Producer Bldg				x					45	
a															
b									x					45	
123			Associated with Bldg 120		Mess Hall										
a					Scrap Yard										
b			Overhead Crane		Steel Prod. - Open Hearths	x								100	
124			Open Hearth & Prob. Elect.	Furn. Bldg											
a															
b															
c															
d															
e															
f															
g															
h															
j															
k															
l			Overhead Crane												
m					Metallurgical Laboratory					x				15	
125			Small Shop		Coal & Ore Storage		x							100	
126			Coal & Ore Yard		No Data										
127			Plant Maintenance Shops		No Data										
128			Plant Maintenance Shops		No Data										
129			Plant Maintenance Shops												
a															
b					No data										
130			Plant Maintenance Shops		No data										
131			Plant Maintenance Shops												

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KURE NAVAL ARSENAL

FUNCTIONAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG		FUNCTION ACTUAL	EVALUATION JTG CORRECT	SIMILAR	UNIDENT	WRONG	EVALUATION F/A ACCURACY FACTOR CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR JTG	
132			Plant Maintenance Shops		No data										
133			Plant Maintenance Shops		No data										
134			Plant Maintenance Shops		No data										
a															
b															
c															
d															
e															
135			Boiler House		Boiler House & Storage	x								100	
136			Associated with Bldg 140		Gas Producer Bldg			x						45	
137			Open Hearth Bldg		#3 Steel Manuf Plant	x								100	
a															
b															
c			Overhead Crane												
d															
e															
138			Machine Shop		Gun Barrel Machine Shops	x								85	
a					Offices, Tool Cribs, Mainte.										
b					Gun Barrel Machining										
c					Gun Barrel Machining										
d					Gun Barrel Machining										
e					Gun Barrel Machining										
f					Gun Barrel Machining										
g					Heavy Machining										
h					Storage Yard - Gun Barrels										
i															
k			Gantry												
139			Large Shop		Gun Liner Fitting & Annealing	x								85	
140			Shop		Repair Shop - Precision Instruments- Gas Producer Building				x					50	

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KURE NAVAL ARSENAL

FUNCTIONAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG		FUNCTION ACTUAL	EVALUATION JTG CORRECT	SIMILAR	UNIDENT	WRONG	EVALUATION F/A ACCURACY FACTOR CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR JTG	
					Annealing Furnaces		x							70	
141			Small Shop		Storage	x								85	
142			Warehouse		Storage	x								85	
143			Warehouse		Electric Power House	x								85	
144			Boiler House												
a															
b					Machine Shop (Shells)	x								80	
145			Prob. Machine Shop		Storage	x								85	
146			Warehouse		Storage	x								85	
147			Warehouse		Storage	x								85	
148			Storage Sheds		Storage	x								85	
149			Storage Sheds			x								100	
150					Floating Crane										
a			Floating Crane		Floating Crane										
b			Floating Crane		Storage Yard	x								85	
151			Storage Yard												
a			Hammerhead Crane		Warehouse	x								85	
152			Warehouse												
153			Warehouse		Pump House - Air Compressors				x					15	
154			Warehouse												
155			Warehouse		Machine Shop	x								85	
156			Machine Shop		Boring & Shaping of Torpedo Cases										
a															
b															
c					Torpedo Assembly & Repair				x					45	
157			Unidentified		Shop Machining										
a					Testing										
b					Assembly										
c					Repair Shop										
d					Shipping Room										
e					Office										
f															

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FUNCTIONAL ANALYSIS TABLE

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BUILDING NUMBER (JTG)	PRIMARY FUNCTION REPORTED (JTG)	PRIMARY FUNCTION ACTUAL	EVALUATION JTG CORRECT	JTG SIMILAR	JTG UNIDENT	JTG WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR JTG
157g	Fuel Oil Pier										
158	Storage Type Bldg	Torpedo Testing Office								x	15
159	Storage Type Bldg	Boiler Room								x	15
160	Storage Type Bldg	Plating Shop								x	15
a											
b											
c											
161	Coal Yard	Coal Yard	x								100
a	Offices										
b	Overhead Cranes	Overhead Cranes									
c	Overhead Cranes	Hammerhead Crane									
d	Hammerhead Crane	Hammerhead Crane									
e	Hammerhead Crane										
162	Office & Storage Type Bldg	Repair & Storage Sheds	x								76
163	Office & Storage Type Bldg	Repair & Storage Sheds	x								78
164	Office & Storage Type Bldg	Repair & Storage Sheds	x								78
165	Office & Storage Type Bldg	Repair & Storage Sheds	x								78
166	Office & Storage Type Bldg	Repair & Storage Sheds	x								78
167	Warehouse	Garage & Mess Hall			x						70
168	Prob. Office										
169	Storage Type Sheds	Storage & Repair	x								85
170	Storage Type Sheds	Storage & Repair	x								85
171	Storage Type Sheds	Storage & Repair	x								85
172	Storage Type Sheds	Storage & Repair	x								85
173	Storage Type Sheds	Storage & Repair	x								85
174	Unidentified	Warehouse				x					45
175	Storage Yard	Storage Yard	x								100
a	2 - Hammerhead Cranes	2 Hammerhead Cranes									
b	Fuel Oil Pier	Fuel Oil Pier									
c	Fuel Oil Pier	Fuel Oil Pier									
176 a&b	100T and 150T Cranes										

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5. STRUCTURAL ANALYSIS

a. Check on Scale Measurement

(1) Linear dimensions were 98 per cent correct.

(2) Area figures were 92 per cent correct based on Japanese figures of 31 sample buildings.

b. S/A (See S/A Table)

c. Summary of Tabulation

(1) Construction Types

TABLE 3

Construction Type	No. Bldgs	No. Corr	% Corr
A1.1	1	1	100
A1.2	1	0	0
A2.3	10	6	60
B1	27	19	71
B2	20	2	10
D	30	27	90
E1	9	5	56
E2	19	9	47
F1	4	0	0
F2	1	0	0
S	1	1	100
Total	123	70	57

(2) Combustibility

TABLE 4

Building Combustibility	No. Bldgs	No. Corr	% Corr
Combustible (C)	49	35	71
Non-Combustible (N)	67	54	81
Fire-Resistant (R)	6	4	67
Total	122	93	76

d. Remarks

(1) "A" Category: Most of the buildings were correctly identified as being single story buildings. The greatest error was in reporting cranes where none existed.

(2) "B" Category: The greatest error was in not reporting cranes where they were present. When cranes were reported, their capacity was generally overestimated.

(3) "D" Category: The greatest error was in reporting the number of floors.

(4) "E" Category: The greatest errors were in reporting the number of floors, and in reporting load-bearing wall buildings as frame structures.

(5) In computing most building areas, Japanese figures were used. On some minor buildings where Japanese figures were not available, the reported areas were used.

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STRUCTURAL ANALYSIS TABLE

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BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED in ft.	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED
55	9.9	11.2							C	C		
a	1.6	3.4	1	2		12	W	Lt	C	C	E-2	E-2
b	8.3	7.8	2	3		12	W	Lt	C	C	F-1	E-2
56	17.5	12.6	2	2		12	W	Lt	C	C	F-1	E-2
57	11.3	11.0	2	2		12	W	Lt	C	C	F-2	E-2
58	11.1	11.0	2	2		12	W	Lt	C	C	F-1	E-2
59	8.5	9.0	3	3		20	Conc	46"Conc	R	R	E-1	E-1
60	48.8	53.6		1					N			
a		5.9	2			20	SM		N		E-2	
b		13.3	1			45	SM		N		B-1	
c		13.0	2			40	SM	Lt	N	N	E-2	A-2.3
d		3.9				25	SM		N		E-2	
e		2.8	1			25	SM		N		E-2	
f	7.8	7.6	1			80	Conc	46"Conc	N	N	A-1.2	A-2.3
g	6.9	7.1	3			75	SM				A-1.1	
61	8.2	9.8	2	2			SM	Lt	C	C	E-2	E-2
a	4.1	4.9				35						
b	4.1	4.9				35						
62	7.8	9.8	2	2		35	SM	Lt	C	C	E-2	E-2
a	3.9	4.9										
b	3.9	4.9										
63	15.3	10.0	2	2		27	SM	Lt	C	C	E-2	E-2
64	19.7	22.0	3	3		20 x22	Conc	46"Conc	R	R	F-1	E-1
65	17.4	15.9							N	N		
a	3.1	3.6	2	2		45	SM	Lt	N	N		E-2
b	14.3	12.3	2	3		26 x60	SM	Lt	N	N	B-1	B-2
66	26.8	27.6							C	N		
a	17.9	18.4	Mezz	1		80	SM/W	Lt	C	N	B-2	B-2
b		9.2	2	1		40	W	Lt	C	N	E-2	B-2
67	8.8	9.9	2	1		45	SM	Lt	N	N	D	D
68	10.7	11.1	2	1		60	SM	Lt	C	N	E-2	A-2.3

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STRUCTURAL ANALYSIS TABLE

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BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED
69	12.5	13.1							C			
a	3.1	3.8	2	1		30	W	Lt	C	C	D	D
b	9.4	9.3	1	1		60	W	Lt	C	N	D	D
70	9.2	11.0							C	C		
a	3.2	4.3	1	1		45	W	Lt	C	C	D	D
b	6.0	7.7	1	1		45	W	Lt	C	C	D	D
71	25.4	26.7	1	1								
a		1.8	1			40	W	Lt	C	N	B-2	D
b		1.8	1			40	W		C			
c	5.3	5.6	1			20	W		C			
d	13.7	14.4	1			45	W	Lt	C	N		B-1
e	2.9	3.1	1			15	W		C			
72	12.7	12.1	1	1		55	SM	Lt	N	N	A-2.3	A-2.3
73	8.5	9.0	2	1		45	SM	Lt	N	N	E-2	D
74	55.0	61.4		1			SM	Lt	N	N	B-2	B-1
a		56.6	1-1/42			48			N			
b		2.4	1			30			N			
c		2.4	1			30			N			
75	35.8	37.0	1	1		48	SM	Lt	N	N	B-2	B-1
76		16.4		1				Lt	N	C	A-2.3	A-2.3
a		4.3	1			25	SM		N			
b		10.0	1			27	SM		N			
c		2.1	1			15	SM		N			
77	89.2	80.4							C			
a		16.5	1	1		100x28	W	Lt	C	N	B-1	B-1
b		1.7	1	1		30	W		C			
c		18.0	1			45	W	Lt	C	N	B-1	B-2
d		28.2	1	1		50	SM		C			
e		16.0	1	1		40	SM		C			
78	40.0	39.6	1	1		60	W/ SM	Lt	C	N	B-2	A-2.3
79	9.9	9.9	1	1		45	W	Lt	C	N	D	D
80	7.8	7.4	3	2		40	SM	Lt	N	C	E-2	E-2

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STRUCTURAL ANALYSIS TABLE

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BUILDING NUMBER	1000'S OF SQ. FT PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED
81												
a	9.6	10.2	1	1		60	SM	LT	N	N	B-2	B-2
b												
82	1.4	2.4	1	2		40	SM	LT	N	C	D	E-2
83	13.5	13.8	1	1		55	SM	LT	N	N	B-2	A-2.3
84	4.0	5.0	1	1		45	SM	LT	N	C	D	D
85	3.5	3.6	1	1		45	W/T	LT	C	C	D	D
86	7.0	7.0	1	1		45	SM	LT	N	C	D	D
87	82.2	89.5	1						N			
a		10.0	1			42	SM		N		A-1.1	
b		4.4	1			55	SM		N		A-1.3	
c		6.4	1			20	SM		N			
d		12.5	1			50	SM	LT	N	N		A-2.3
e		6.6				40						
f		6.8				40						
g		8.5				50						
h		11.0				5						
j		12.1				55		LT		L	B-2	B-1
k		11.0				50						
88	5.3	8.0	1	1			SM	LT	N	N	D	D
a		1.2				15						
b		6.8				65						
89	22.0	19.7		1					C	N		
a		15.3	1			45	W	LT			D	B-1
b		4.4	2			30	W	LT			E-1	B-1
90	158.0	99.1	1	1			SM	LT	N	N	B-2	B-1
a		57.7				37						
b		35.4				37 x 20						
91	33.7	35.3		2				LT	Mixed	C	E-2	E-2
a	10.6	7.6		2		45	SM		N	C		
b		3.3		2		12			R	C		
c	14.0	11.5		3		12	W		C	C		

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BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED
91d	2.1	1.8		2		14	SM		N	C		
e	with C	3.6		3		12	SM		N	C		
f	7.1	7.5		3		12	W/T		C	C		
92	55.0	56.5	1	1			SM	LT	N	N	B-2	A-2.3
a		23.4				60						
b		33.1				42						
93	47.0	48.8	1	1		42	SM	LT	N	N	B-2	A-2.3
94	232.0	239.3	1	1			SM	LT	N	N		
a	13.4	6.3				50			N	N	E-2	B-1
b		14.8				45			N	N	A-2.3	A-2.3
c	57.6	59.0				50			N	N	B-1	B-1
d	46.0	47.2				45			N	N	B-1	B-1
e	8.8	9.0				45			N	N	B-1	B-1
f	44.4	45.4				40			N	N	B-1	B-1
g	4.3	4.4				40			N	N		B-1
h	26.0	26.6				45			N	N	B-1	B-1
j	32.7	23.6				23			N	N	B-1	A-1.1
95	22.1	21.2	3	1		80	SM	LT	N	N	E-2	B-1
96	16.5	15.3	3						R	R		
a	4.6	4.3		2		22	Conc 8"	Conc 4'6"	R	R	E-1	E-1
b	8.3	7.7		2		18		"	R	R	E-1	E-1
c	3.6	3.3		3		18		"	R	R	E-1	E-1
97	78.0	81.4	1	1		52	SM	LT	N	N	B-1	B-1
98	2.1	2.4		1		30		LT		N	D	D
99	109.1	110.1	1	1			SM	LT	N	N	B-1	B-1
a	35.0	35.4				60						
b		20.2				45						
c	73.7	18.0				40						
d		17.0				85						
e		19.5				30						
100	38.4	36.4	1	1			SM	LT	N	N	B-1	B-1
a		5.1				30						

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STRUCTURAL ANALYSIS TABLE

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BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA			NUMBER OF FLOORS			SIZE OF BAY		ROOF MATERIAL			COMBUSTIBILITY OF BUILDING			CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG		ACTUAL	REPORTED JTG		ACTUAL	REPORTED	ACTUAL	REPORTED JTG		ACTUAL	REPORTED JTG		ACTUAL	REPORTED
100b	30.2	28.5					61.1'	60								
c		2.8						35,								
d																
101		3.8			1				S	LT		N	N		S	S
102	17.7	18.0		1	1			60	W	LT		C	N		B-2	A-2.3
103	4.8	6.9		1	1			55	W	LT		C	N		B-2	D
104	5.4	5.0		2	2			22	Conc	45" Conc		R	R		E-1	E-1
105	26.4	26.2		1	1				SM	LT		N	N		B-2	A-1.1
a		23.8						24								
b		2.4						20								
106	418.9	422.5		1	1				SM	LT		N	N		B-1	B-1
a		80.5						48								
b		36.8						55								
c		50.3						75								
d		40.2						60								
e		25.6						35								
f		5.3						35								
g		70.0						70								
h		61.0						45								
j		24.6						30								
k		3.3						25								
l		16.1						70								
m		8.8						70								
n																
107	622.0	618.5		1					SM	LT		N	N			B-1
a	5.5	10.5		1	1		30'	30	SM							B-1
b	33.2	33.2		1	1			38	SM						B-1	B-2
c	36.0	32.4		1	1		120'	110	SM							A-1.1
d		20.2		1	1			26	SM						B-1	B-2
e	106.0	91.5		1	1		50, 50, 70	62	SM						B-1	B-1
f	with "o" 195.0	100.6		1	1		90	38	SM						B-1	B-2
g	16.0	17.6		1	1		45	45	SM							

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BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA			NUMBER OF FLOORS			SIZE OF BAY		ROOF MATERIAL			COMBUSTIBILITY OF BUILDING			CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG		ACTUAL	REPORTED JTG		ACTUAL	REPORTED	ACTUAL	REPORTED JTG		ACTUAL	REPORTED JTG		ACTUAL	REPORTED
107h	18.7	19.5		1	1		50	50	SM							B-2
j	57.4	60.9		1	1			65	SM						B-1	B-2
k	16.4	16.0		1	1			45	SM						A-2.3	B-2
l	8.7	8.8		1	1			36	SM							B-2
m	94.0	92.8		1	1			80	SM						A-2.3	B-1
n	35.0	33.6		1	1		42	40	SM							B-1
o	with "f" 195.0	80.9		1	1			46	SM							B-1
108	13.7	16.6		2	1			45	SM	LT		N	N		E-2	B-1
109	4.8	5.4		1	1			35	SM	LT		N	N		E-2	D
110	21.2	24.6							SM			N	N		B-2	
a		16.2		2	2			40	SM	LT					B-2	E-2
b		2.9		2	2			33	SM	LT						E-2
c		20.2		1	1			26	SM	LT						A-1.1
d		3.3		1	2			33	SM	LT						E-2
111	51.6	51.7		1	1				SM	LT		N	N			A-2.3
a		7.5						30	SM	LT					B-2	A-2.3
b		44.2						65	SM	LT					B-1	A-2.3
112	10.5	10.6		1	1			45	SM	LT		N	N		A-2.3	A-2.3
113		12.6		1	1			45	SM	LT		N	N			A-2.3
114		11.3		1	1			45	SM	LT		N	N			A-2.3
115	11.4	11.0		1	1			50	SM	LT		N	N		A-2.3	B-2
116	58.1	61.2			1					LT		N	N			B-1
a	22.7	23.7		1				95	SM	LT		N	N		B-1	B-1
b	17.8	19.7		1				50	SM	LT		N	N		B-2	B-1
c	17.3	3.6		2			3	23	SM	LT		N	N		A-2.3	B-1
d		14.2						45		LT		N	N			B-1
e																
117	2.6	6.3		2	1			45	W	LT		C	N		E-1	D
118	6.7	7.0		1	1			45	SM	LT		N	N		D	D
119	7.2	6.9		1	1			55	SM	LT		N	N		B-2	D
120	46.6	52.9			1				SM	LT		N	N		B-1	B-1
a		12.0		1				60	SM	LT		N	N		B-1	B-1

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BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED
120b		9.0	2			45	SM	LT	N	N	B-1	B-1
c		23.8	2			48	SM	LT	N	N	B-1	B-1
d		4.8	1			30	SM	LT	N	N	B-1	B-1
e		3.3	1			55	SM	LT	N	N	B-1	B-1
f												
121	7.4	6.3	1	1		28	SM	LT	N	N	D	D
122	7.4	9.5	2	1		45	SM	LT	N	N	D	D
a	2.1	2.7										
b	5.3	6.8										
123	10.7	10.6	2	1			SM	LT	N	N	D	A-2.3
a		7.7&2.9				45&30						
b												
124	155.0	164.4	1	1			SM	LT	N	N	B-1	B-1
a		5.0	1			25	SM	LT	N	N		B-1
b		39.1	1			45	SM	LT	N	N		B-1
c		42.1	1			55	SM	LT	N	N		B-1
d		30.6				40		LT	N	N	B-1	B-1
e		2.0	1			25	SM	LT	N	N		B-1
f		5.1	1			30	SM	LT	N	N		B-1
g		6.0	1			30	SM	LT	N	N		B-1
h		13.3	1			45	SM	LT	N	N		B-1
i		13.3	1			45	W	LT	C	N		B-1
k	7.0	7.9	1			30	SM	LT	N	N		B-1
l												
m	3.9	5.6		1		30		LT		N		D
125	4.7	6.0		3		12		LT		C		E-2
127		6.6		1		30		LT		C		D
128		5.0		2		12		LT		C		E-2
129		7.4		1				LT		C		D
a		4.5				45						
b		2.9				- 30						
130		6.3		1		30		LT		C		D

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STRUCTURAL ANALYSIS TABLE

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BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED
131		6.3		1		50		LT		C		D
132		4.3		1		45		LT		C		D
133		4.8		1		30		LT		C		D
134		23.1		1		45		LT		C		A-2.3
a		5.6				17						
b		5.6				17						
c		5.6				17						
d		2.7				17						
e		3.6										
135	3.8	4.3	1	1		45	SM	LT	N	N	D	D
136	10.0	10.4	2	1		45	SM	LT	N	N	E-2	A-2.3
137	44.0	22.2	1	1			SM	LT	N	N		B-1
a		15.2	1			12x95	SM		N		B-1	B-1
b		7.0	2			45	SM		N		B-1	B-1
c												B-1
d												B-1
e												B-1
138	273.0	296.6	1	1			SM	LT	N	N	B-1	B-1
a	13.0	14.4	1			25	SM		N	N	B-1	B-1
b	38.0	42.0	1		54	60	SM		N	N	B-1	B-1
c	38.0	42.0	1		54	60	SM		N	N	B-1	B-1
d	38.0	42.0	1		54	60	SM		N	N	B-1	B-1
e	38.0	42.0	1		54	60	SM		N	N	B-1	B-1
f	38.0	42.0	1		54	60	SM		N	N	B-1	B-1
g	38.0	42.0	1		54	60	SM		N	N	B-1	B-1
h		5.9	1			20	SM		N	N	B-1	B-1
i		24.3	1			60	SM					
k									N	N	B-1	B-1
139	27.3	30.9	1	1		27x95	SM	LT	N	N	E-2	B-1
140		20.4	2	1		60	SM	LT	C		C	
140			2				W		N	C	D	D
141		9.0	1	1		46	SM	LT				

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KURE NAVAL ARSENAL 90.30 - 657 A

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STRUCTURAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED
142		7.7	1	1		45	W/SM	LT	C	C	D	D
143		17.6	1	1		48	W/SM	LT	C	C	A-2.3	A-2.3
144	9.4	16.7	2								E-1	
a		6.3		1		45	12" Conc	LT	N	C		D
b	9.4	10.4	2	1		95		4' 6"	R	R		A-2.3
145	28.2	28.8	1	1		23	SM	LT	N	C	A-1.1	A-1.1
146		8.8	1	1		40	W/SM	LT	C	C	D	D
147		12.0	1	1		65	W/SM	LT	C	C	A-2.3	A-2.3
148		9.0		1		50	W	LT	C	C		D
149		4.2		1		30	W	LT	C	C		D
150												
a												
b												
151												
a												
152		9.4		1		55		LT				D
153		8.4	1	1		60	W	LT	C	C	D	D
154		8.4	1	1		60	W/SM	LT	C	C	D	D
155		10.4		2		32		LT		C		E-2
156	82.6	97.0	1				SM	LT	N	N	B-2	B-1
a		86.9	1	1		95x24	SM		N			
b		4.5	1	1		20	SM		N			
c		5.6	1	1		20	SM					
157	89.9	83.6	1	1			SM	LT	N	N	B-2	B-1
a	7.4	6.9				55	SM		N	N	B-2	B-1
b	23.8	24.0				80	SM		N	N	B-2	B-1
c	23.8	18.0				60	SM		N	N	B-2	B-1
d	17.1	17.9				55	SM		N	N	B-2	B-1
e	6.6	5.6				30	SM		N	N	B-2	B-1
f	11.2	11.2				46	SM		N	N	B-2	B-1
g												
158	11.5	12.5	2	2		12	SM	LT	N	C	E-2	E-2

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KURE NAVAL ARSENAL

STRUCTURAL ANALYSIS TABLE

90.30 - 657A

BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED	ACTUAL	REPORTED JTG	ACTUAL	REPORTED JTG	ACTUAL	REPORTED
159	11.3	12.5	2	2		12	SM	LT	N	C	E-2	E-2
160		13.0	1	1		40	W/SM	LT	C	C	D	D
a		6.8										
b		4.4										
c		1.8										
161				1		30	W	LT	C	C		D
a		5.1										
b												
c												
d												
e						13	W	LT	C	C		E-2
162	13.1	6.0	1	2		40	W	LT	C	C	D	D
163		2.4	1	1		13	W	LT	C	C		E-2
164	6.7	6.0	1	2		13	W	LT	C	C		E-2
165	13.1	12.0	1	2		12 to14	W	LT	C	C		E-2
166	13.1	6.0	1	2		45	W	LT	C	C	E-2	E-2
167	17.4	15.3	2	2		40	W	LT	C	C		D
168	7.2	6.4	1	1		30	W	LT	C	C	D	D
169	2.7	2.4	1	1		40 15	W	LT	C	C	D	D
170	4.4	3.9	1	1		30	W	LT	C	C	D	D
171	4.4	3.9	1	1		22	W	LT	C	C	D	D
172	4.4	3.9	1	1		45	W	LT	C	C	D	D
173	3.0	2.7	1	1		35	W	LT	C	C		A-2.3
174	16.5	17.5										
175												
a												
b												
c												
176												
a												
b												

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6. DAMAGE ASSESSMENT

a. D/A (See D/A Table)

b. Summary of Tabulation

TABLE 5

	ACTUAL		REPORTED	
	Sq Ft	% Dam	Sq Ft	% Dam
Total Building Area	3,841,000		3,995,200	
Damage				
Destroyed	224,900	6	250,100	6.3
Structural	570,600	15	411,515	10.3
Superficial	1,760,200	46	2,217,895	55.4
Total Damage	2,555,700	67	2,879,510	72

In general, Minor Damage was purposely omitted in D/A reports.

c. Remarks

(1) While the total damage assessment is fairly accurate, the reported and actual figures on structural damage for many individual buildings are not always in close agreement.

(2) Inherent limitations to photographic interpretation account for the underestimate of the amount of structural damage. For example, the cutting of a column by a direct hit would not be observed if the roof structure were still intact.

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DAMAGE ASSESSMENT TABLE

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BUILDING NUMBER	BUILDING AREA (1000'S SQ. FT.)	STRUCTURAL (1000'S SQ. FT.) ACTUAL	STRUCTURAL (1000'S SQ. FT.) REPORTED	SUPERFICIAL (1000'S SQ. FT.) ACTUAL	SUPERFICIAL (1000'S SQ. FT.) REPORTED	MINOR * (1000'S SQ. FT.) ACTUAL	MINOR * (1000'S SQ. FT.) REPORTED	DESTROYED (1000'S SQ. FT.) ACTUAL	DESTROYED (1000'S SQ. FT.) REPORTED
JTG									
55	9.9	9.9	11.2						
a	1.6								
b	8.3	6.9	8.4	1.5					
56	17.6	5.1	7.35						
57	11.3								
58	11.1								
59	8.5		32.2	13.4					
60	48.8	} 6.5							
a									
b									
c									
d									
e	7.8								
f	6.9					7.8			
g	8.2				.98	6.9			
61	4.1				.98				
a	4.1								
b	7.8								
62	3.9								
a	3.9								
b	15.3								
63	19.7			4.6			5.3		
64	17.4								
65	3.1			4.6					
a	14.3		1.5	2.7	5.9				
b	26.3								
66	17.9			2.7					
a			1.5						
b	8.8								
67	10.7								
68	12.5								
69	3.1								
a								4.9	

*In general, Minor Damage was purposely omitted in D/A reports.

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KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER	BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			DESTROYED (1000'S SQ. FT.)		
JTG	1000'S SQ. FT.	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
b	9.4												
70	9.2	9.2											
a	3.2	3.2				2.15							
b	6.0	6.0	3.85			1.93							
71	25.4	16.4	25.7		3.7								
a													
b													
c	5.3	5.3											
d	13.7	8.2			3.7								
e	2.9	2.9											
72	12.7	5.6			7.1								
73	8.5												
74	55.0												
a													
b													
c													
75	36.0												
76													
a													
b													
c													
77	39.2					9.0							
a					18.4								
b					1.9								
c					5.2								
d													
e													
78	40.0												
79	9.9												
80	7.8							7.8					
81					9.5								
a	9.5				9.5	10.2							
b													

*In general, Minor Damage was purposely omitted in D/A reports.

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KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER	BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			DESTROYED (1000'S SQ. FT.)		
JTG	1000'S SQ. FT.	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
82	1.4										1.4	2.4	
83	13.5	2.7			10.6	13.8							
84	4.0								5.0				
85	3.5	0.6											
86	7.0												
87	82.2	36.9	12.5		12.2	21.9							
a						10.0							
b						4.4							
c						6.4							
d		23.6	12.5		12.2								
e													
f													
g						1.1							
h													
j		8.3											
k								5.3	8.0				
88	5.3												
a													
b									19.7				
89	22.0				3.6								
a													
b					94.0			7.2					
90	108.0	7.2				51.93							
a			5.77						32.4			35.3	
b						9.0							
91	33.7	4.8											
a	10.6	2.5			4.3								
b											11.2		
c	14.0										2.1		
d	2.1												
e	WITH "C"	2.3									7.1		
f	7.1												
92	55.0	19.5			34.5	56.5							

*In general, Minor Damage was purposely omitted in D/A reports.

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KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER	BUILDING AREA 1000'S SQ. FT.	STRUCTURAL (1000'S SQ. FT.) ACTUAL	STRUCTURAL REPORTED	STRUCTURAL REPORTED	SUPERFICIAL (1000'S SQ. FT.) ACTUAL	SUPERFICIAL REPORTED	SUPERFICIAL REPORTED	MINOR * (1000'S SQ. FT.) ACTUAL	MINOR REPORTED	MINOR REPORTED	DESTROYED (1000'S SQ. FT.) ACTUAL	DESTROYED REPORTED	DESTROYED REPORTED
JTG													
a													
b													
93	47.0	1.8			45.2	48.8							
94	232.0	46.0			138.0	223.1		1.7					
a	~~13.4~~	5.1			~~7.6~~	6.3		0.8					
b						14.8							
c	57.6	9.3	4.0		47.5	55.0							
d	45.0	6.6			39.4	47.2							
e	8.3	1.9			5.9	9.0		0.9					
f	44.4	13.3			37.3	48.0							
g	4.3					4.4							
h	26.0	3.4			22.6	26.6							
i	32.7	5.4			27.2	11.8							
95	22.1	18.0	21.2								4.2		
96	16.5	2.0			4.0								
a	4.6		~~12.0~~										
b	8.3												
c	3.6												
97	78.0	14.3	20.0		62.1	61.4					2.1	2.4	
98	2.1												
99	109.1	13.3	13.75		95.0	82.5							
a	35.0	5.0			30.0								
b													
c	~~73.7~~	~~8.8~~			~~65.0~~								
d													
e													
100	38.4	6.9	1.32		31.5	34.58							
a													
b	30.2												
c													
d													
101											17.7	18.0	
102	17.7												

*In general, Minor Damage was purposely omitted in D/A reports.

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KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER	BUILDING AREA 1000'S SQ. FT.	STRUCTURAL (1000'S SQ. FT.) ACTUAL	STRUCTURAL REPORTED	STRUCTURAL REPORTED	SUPERFICIAL (1000'S SQ. FT.) ACTUAL	SUPERFICIAL REPORTED	SUPERFICIAL REPORTED	MINOR * (1000'S SQ. FT.) ACTUAL	MINOR REPORTED	MINOR REPORTED	DESTROYED (1000'S SQ. FT.) ACTUAL	DESTROYED REPORTED	DESTROYED REPORTED
JTG													
103	4.8	4.1	6.1		0.7			5.4					
104	5.4		0.5										
105	26.4	26.4	26.2										
a													
b													
106	418.9	23.9	15.6		181.8	198.7							
a						20.0			20.0				
b			9.2			16.61			11.0				
c						40.3			10.0				
d						27.2			13.0				
e			5.1			12.8							
f			1.3			4.0							
g						35.0							
h						30.5							
j						12.3							
k													
l													
m													
n													
107	622.0	134.5			361.2	488.0							
a	5.5	4.5			1.0								
b	33.2				16.6	8.3			4.15				
c	36.0	2.2			15.0	24.3							
d						10.0							
e	106.0	32.8			68.1	78.5		4.3	13.0				
f	WITH "O" 195.0	26.8			82.4	88.1							
g	16.0	5.3			10.7	17.6							
h	18.7	3.4			13.3				19.5				
j	57.4	19.2			38.2	45.9			15.0				
k	16.4	3.0			13.5	16.0							
l	8.7				8.7	8.8							
m	94.0	13.6			80.4	92.8							
n	35.0	23.7	16.8		11.3	16.8							

*In general, Minor Damage was purposely omitted in D/A reports.

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KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER	BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			DESTROYED (1000'S SQ. FT.)		
JTG	1000'S SQ. FT.	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
o	WITH "f"	WITH "f"			WITH "f"	80.9							
108	13.7	4.7			5.4	10.0			2.5				
109	4.8	1.5			3.3							1.8	
110	21.2				21.2	21.3			18.6				
a													
b													
c													
d													
111	51.6	2.6			39.0	49.0							
a	7.6	0.8			5.0								
b	44.0	1.8			34.0								
112	10.5	3.5	2.65		2.6	7.91			10.0				
113	14.1					2.6			11.3				
114	14.0				1.8								
115	11.4	2.1			9.6	11.0							
116	58.1	32.7	61.2		25.1								
a	22.7	15.1			7.6								
b	17.8	8.9			8.9								
c	} 17.3	} 8.7			} 8.6								
d													
e													
117	2.6	1.3			0.7	1.6		0.6	4.7				
118	6.7							1.1				6.9	
119	7.2	3.6			3.6								
120	46.6		2.45			24.0			26.5				
a		} 2.9			} 11.2								
b													
c													
d													
e													
f													
121	7.4				4.2	0.8			5.5				
122	7.4				7.4				9.5				

*In general, Minor Damage was purposely omitted in D/A reports.

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KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER	BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			DESTROYED (1000'S SQ. FT.)		
JTG	1000'S SQ. FT.	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
a	2.1				2.1								
b	5.3				5.3								
123	10.7											10.6	
a		9.3											
b													
124	155.0	3.8			54.3	90.4		96.9	74.0				
a													
b													
c													
d													
e													
f													
g													
h													
j													
k	7.0												
l													
m	3.9							1.8					
125	4.7	2.8									1.9	6.0	
127	NONE												
128	NONE												
129	NONE												
a													
b													
130	NONE												
131	NONE												
132	NONE												
133	NONE											4.8	
134	23.1		11.6									11.6	
a													
b													
c													
d													

*In general, Minor Damage was purposely omitted in D/A reports.

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KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER	BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			DESTROYED (1000'S SQ. FT.)		
JTG	1000'S SQ. FT.	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
e											3.8	4.3	
135	3.8	3.8										7.8	
136	10.0	2.9											
137	44.0				44.0								
a									10.1				
b									4.7				
c													
d													
e													
138	273.0	31.5	34.0		171.6	172.3			34.0				
a	13.0	4.4			8.6								
b	38.0	2.7											
c	38.0	2.7											
d	38.0	6.8			163.0			9.5					
e	38.0	9.5											
f	38.0	5.4											
g	38.0												
h													
j													
k													
139	27.3	7.4			19.9	23.2							
140	5.1		20.4		5.1						9.0	9.0	
141	9.0										7.7	7.7	
142	7.7					5.8					17.6	17.6	
143	17.6												
144	9.4												
a													
b	9.4												
145	28.2	10.4			17.8						8.8	8.8	
146	8.8										12.6	12.0	
147	12.6												
148	9.0	4.5			4.5								
149	4.2												

*In general, Minor Damage was purposely omitted in D/A reports.

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KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER	BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			DESTROYED (1000'S SQ. FT.)		
JTG	1000'S SQ. FT.	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
152	9.4										8.4	8.4	
153	8.4										6.3	6.3	
154	8.4										10.4	10.4	
155	10.4												
156	82.6	3.1	21.5		79.5	43.6			8.3				
a													
b													
c													
157	89.3	11.4			8.9	15.0			5.0				
a	7.4	5.0			2.5								
b	23.8	3.2			3.2								
c	23.8	3.2			3.2								
d	17.1												
e	6.6												
f	11.2												
g													
158	11.5												
159	11.3											3.25	
160						3.25							
a	13.0	4.85											
b													
c													
161												5.1	
a													
b													
c													
d													
e													
162	13.1										13.1	6.0	
163	2.4										6.7	6.0	
164	6.7										13.1	12.0	
165	13.1										13.1		
166	13.1												

*In general, Minor Damage was purposely omitted in D/A reports.

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11J34

KURE NAVAL ARSENAL

DAMAGE ASSESSMENT TABLE

90.30-657A

BUILDING NUMBER		BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			DESTROYED (1000'S SQ. FT.)		
JTG		1000'S SQ. FT.	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
167		17.4										5.86	5.1	
168		7.2										7.2	6.4	
169		2.7										2.7		
170		4.4										4.4		
171		4.4										4.4	3.9	
172		4.4										4.4		
173		3.0										3.0	2.7	
174		16.5										16.5	17.5	

*In general, Minor Damage was purposely omitted in D/A reports.

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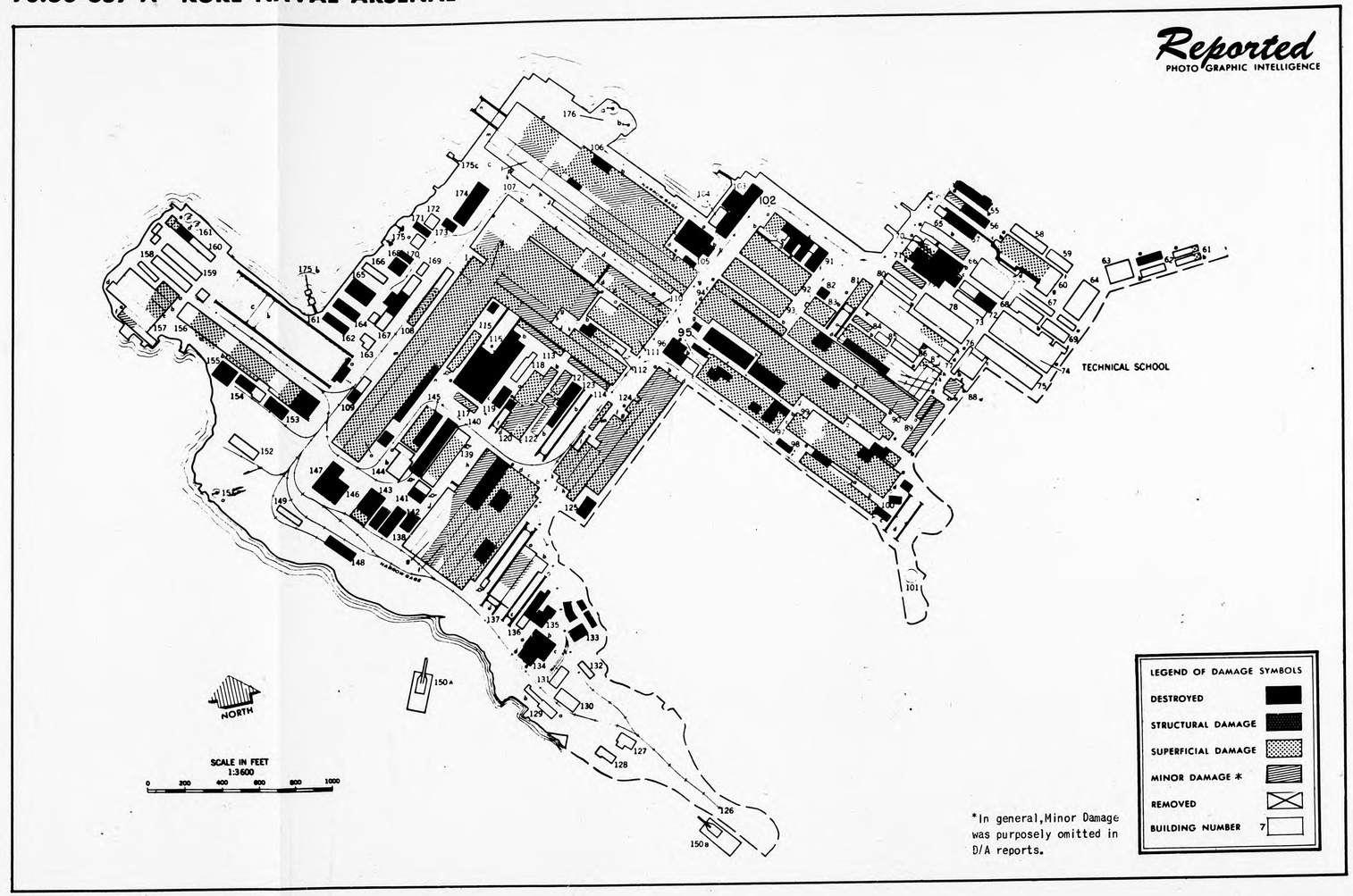
90.30-657 A KURE NAVAL ARSENAL



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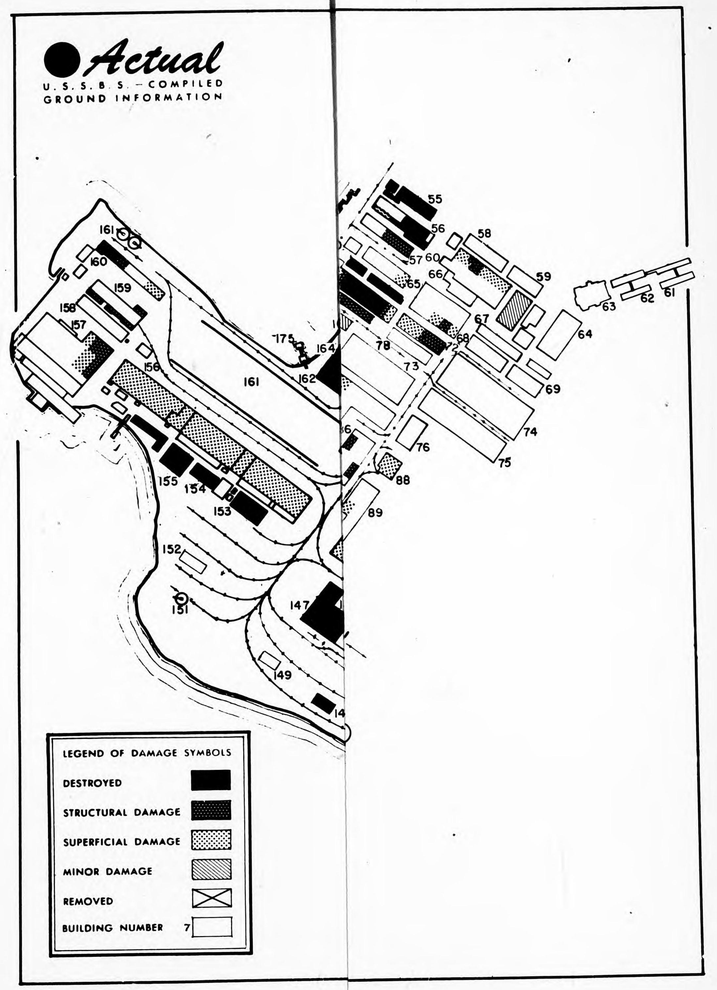
AL ARSENAL 90.30 - 657 A



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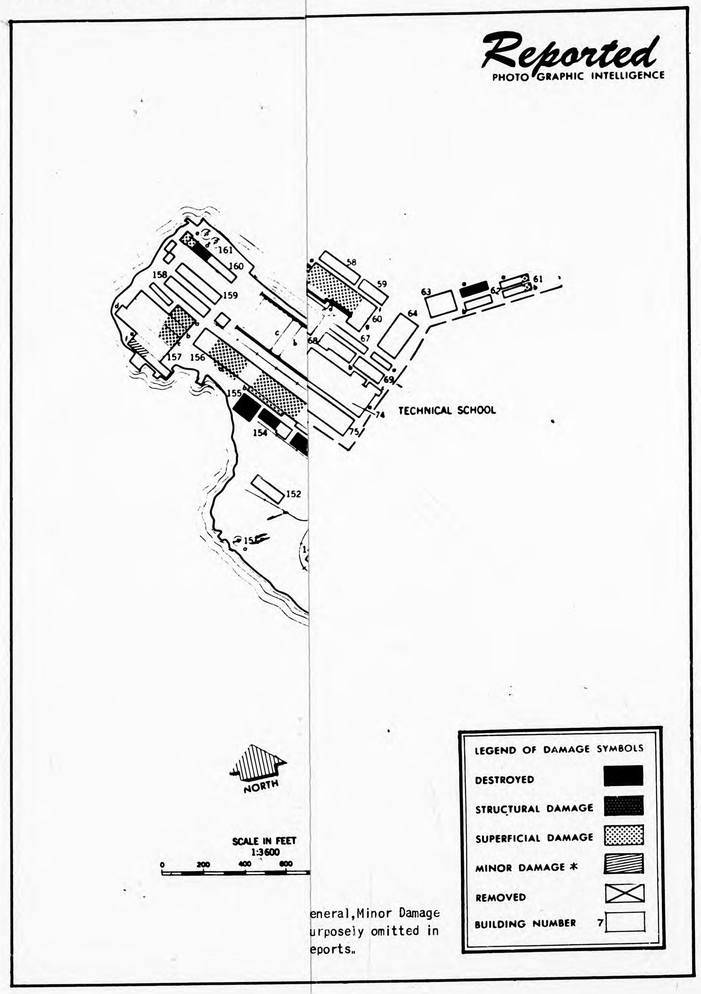

eneral, Minor Damage
urposely omitted in
eports.

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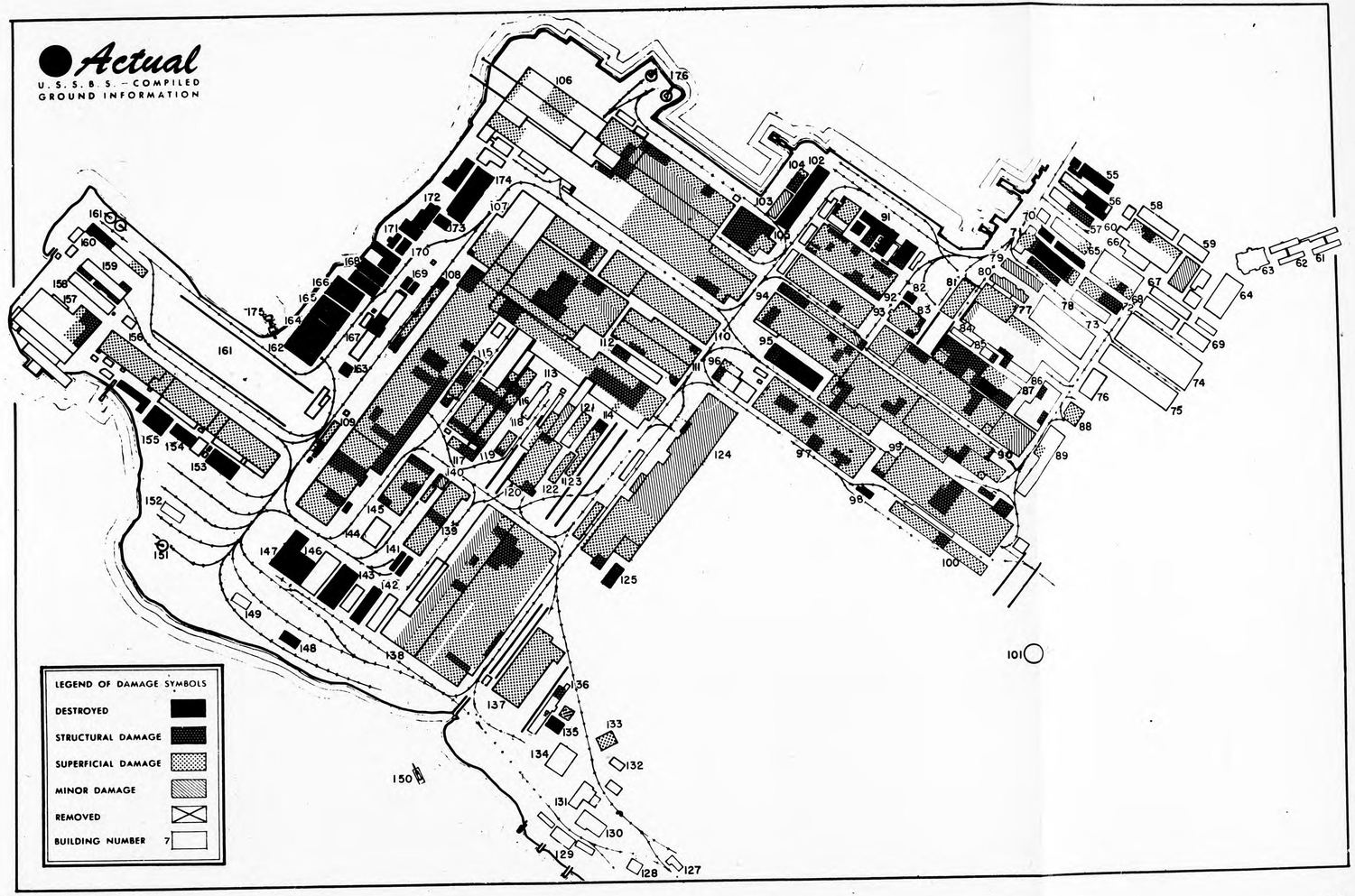
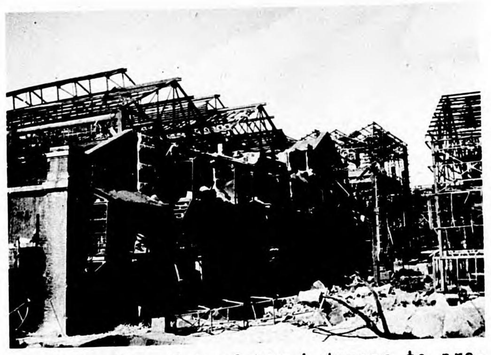
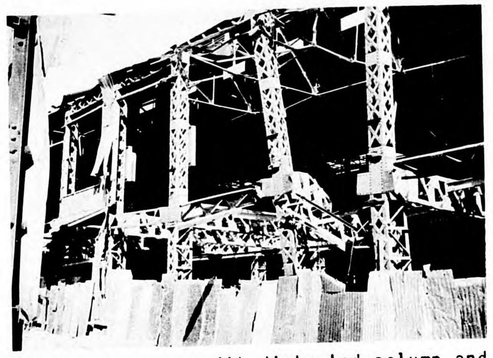


CONFIDENTIAL

KURE NAVAL ARSENAL 90.30-657 A



A Exterior view of blast damage to precision instrument shop. (East end of bldg 97)

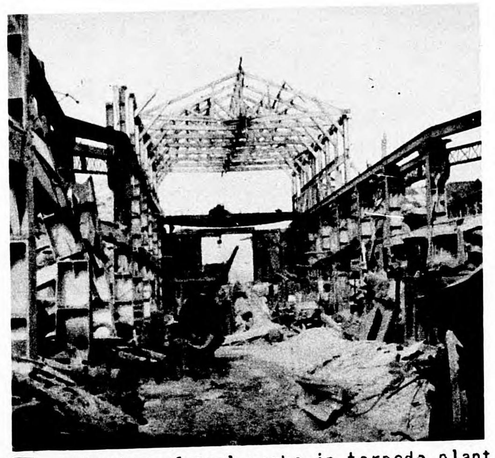


B Machine shop with distorted column and beams. This type of structural damage not visible in vertical photographs. (Southeast corner of bldg 66)

C Damage to 18 inch walls and wood roof structures. (Inside of east end of bldg 56 looking toward bldg 57)

D Severe internal structural damage to power house. (Bldg 60-a,b)

E Interior of power house showing fallen gantry with two turbines in background. (Bldg 60-b looking east)



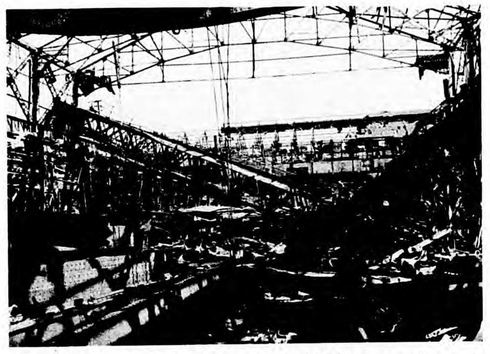
F Interior of tool works in torpedo plant Notice damage to cast-iron gantry supports. (Bldg 71)

90.30-657 A KURE NAVAL ARSENAL

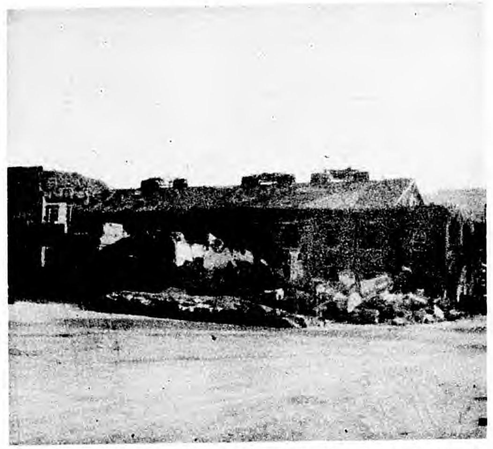
G Precision instrument machine shop showing interior structural damage of type frequently not visible from vertical photographs. (Bldg 87. Northwest portion)

H Extreme structural collapse of framing. (East bay of bldg 107 n)

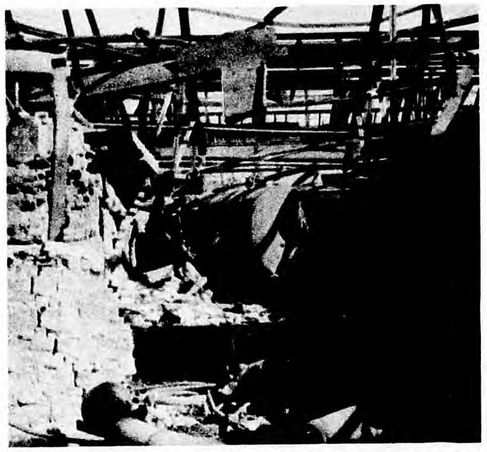
I General view of covered gantry showing roof damage which is predominately superficial. (Bldg 100)



J Gutted interior and fallen gantry in heavy structures fabricating shop. (Bldg 116)

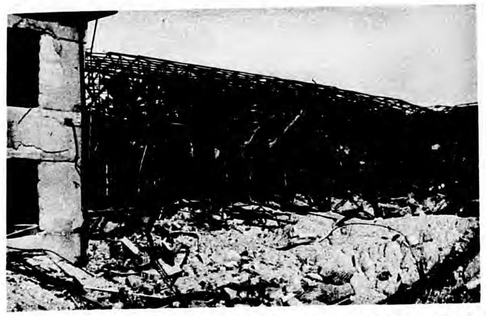


K Drafting department in foreground, showing masonry structure completely demolished. (Bldg 55-a)



L Damage caused by a direct hit on boilers, brickwork and structural members. (Bldg 112)

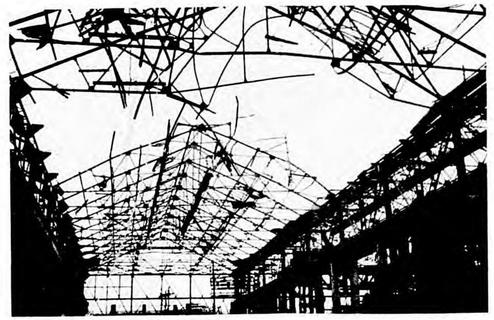
KURE NAVAL ARSENAL 90.30 - 657 A



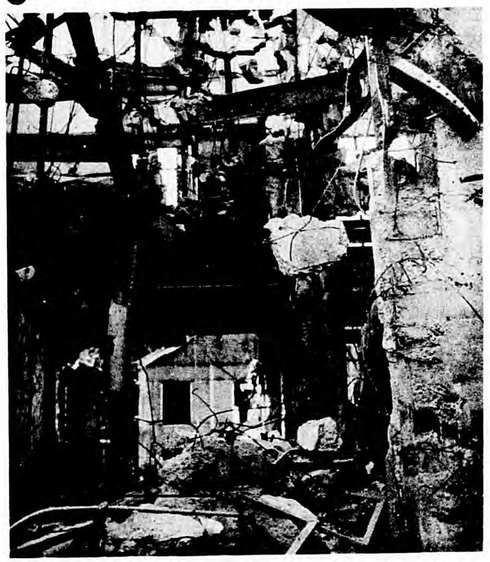
M Twisted framework of non-ferrous metals shop. Note bomb crater in foreground. (Bldg 116 b,c. Bldg 117 on left)

N Blasted beam and gantry rail in bay (f) of gun barrel shop. (Bldg 138)

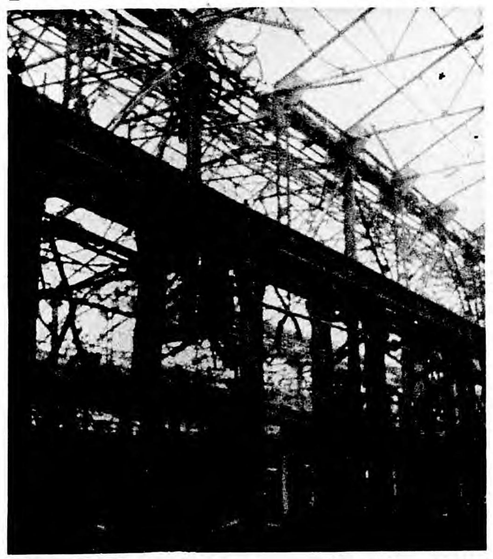
O Scattered brickwork of annealing furnaces resulting from a direct hit. (Bldg 141)



P Destruction of roof framing and covering to bay (d) of gun barrel shop. (Bldg 138)



Q Interior of Metallurgical laboratory. This damage was caused by two direct hits.



R Destroyed column in gun barrel machine shop. This type of structural damage is not visible from vertical photographs. (Bldg 138 - bay f)

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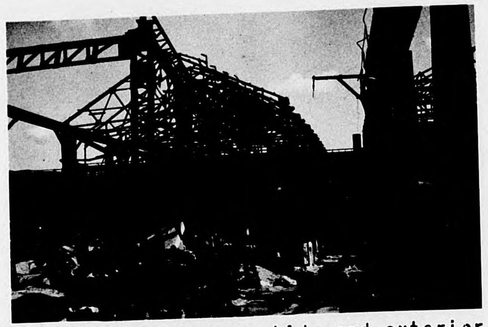
90.30-657 A KURE NAVAL ARSENAL

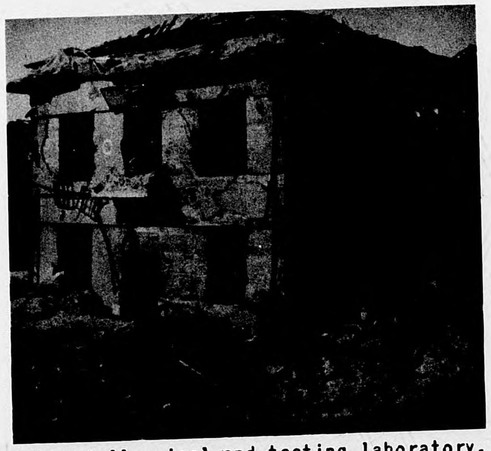
S Direct hit upon top of column of gun liner shop. (Bldg 139 - South side)

T Wrecked gantry crane over coal yard. (Bldg 161)

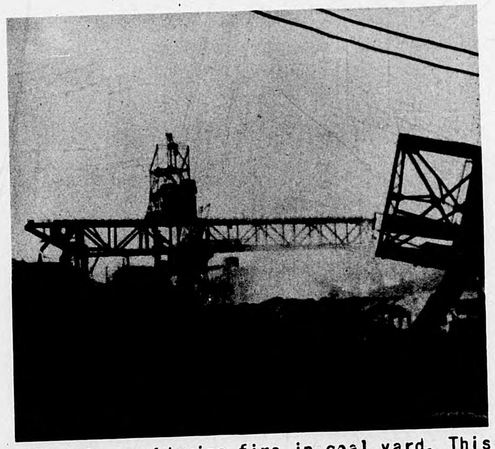


U Electric furnace bldg and exterior gantry. The bldg was reported 100% structurally damaged but investigation revealed only $\frac{1}{4}$ of the bldg sustained this damage. Note structural damage to gantry in foreground. (Bldg 119)

V Exterior of torpedo case shaping shop showing blast effect on bldg cover. This type damage generally interpreted correctly. (Bldg 156)



W Metallurgical and testing laboratory. This reinforced concrete bldg was rocked from its foundations by a heavy concentration of bombs at Northeast corner. (Bldg 117).



X Note smoldering fire in coal yard. This has been burning since the June 22 raid, when it had been ignited by bombs. (Bldg 161)

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EXHIBIT K

NIPPON VEHICLE MANUFACTURING CO.

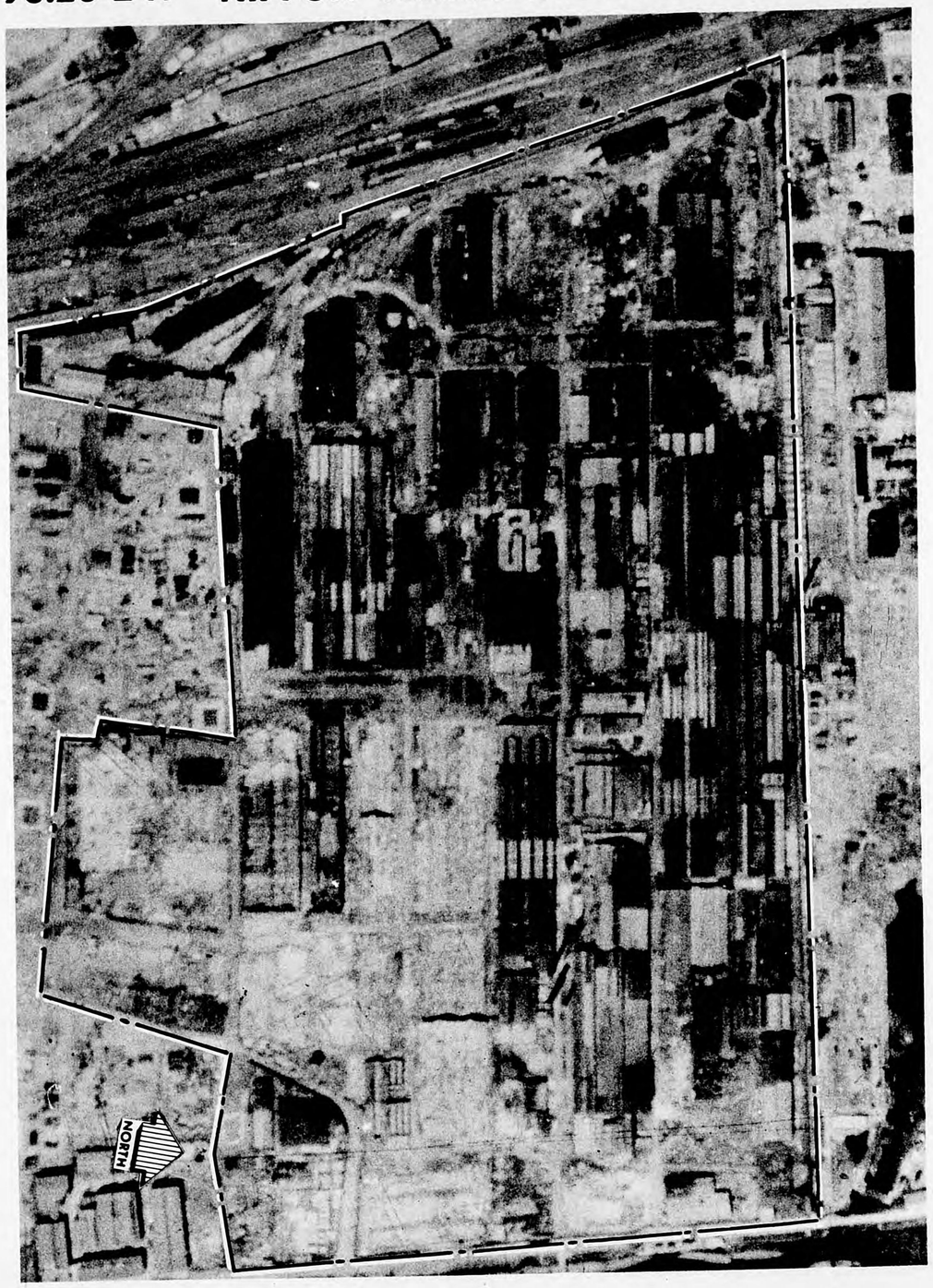
90.20-241

LAT. 35° 07'N - LONG. 136° 54'E

NAGOYA, JAPAN

See Exhibit P for abbreviations used in this exhibit.

90.20-241 NIPPON VEHICLE MANUFACTURING CO.



NIPPON VEHICLE MANUFACTURING CO. 90.20-241

1. DESCRIPTION OF TARGET

a. Nippon Vehicle Manufacturing Co. (Japan Rolling Stock Manufacturing Co., Ltd.), Nagoya was the second largest manufacturer of boilers, railroad cars and locomotives in Japan before the war.

b. The plant is located between the east branch of the Hori River and the Tokkaido Mainline Railroad, south of the Atsuta branch of the Nagoya Arsenal, approximately 3 miles northeast of Nagoya Harbor and 3¼ miles south east of the Nagoya Railroad Station.

c. The plant comprises 48 listed buildings and has a built-up area of approximately 814,000 square feet.

2. SUMMARY

a. The interpretation of building functions was only fair. Of a total of 48 buildings:

(1) 18 were identified correctly
(2) 9 were identified as having similar occupancy
(3) 6 were unidentified
(4) 15 were identified incorrectly

b. The structural analysis was good. The comparison, however, was made on only 21 buildings on which comparable data were available. The interpretation of the combustibility was very accurate: 16 out of a total of 17 combustible buildings were reported as such. Determination of structural materials was also accurate.

c. The limited damage assessment report checks very closely with field data, as shown in Table

TABLE I

	ACTUAL Sq Ft	REPORTED Sq Ft
Structural Damage	54,600	55,700
Superficial Damage	232,700	213,200
Total Damage	287,300	268,900

3. SOURCE OF DATA

a. Reported

(1) AC/AS Intelligence Building Construction Analysis, 17 April 1945
(2) AC/AS Intelligence Limited Damage Report #41, 10 July 1945

b. Field Data

(1) USSBS (G-2, PIC) field notes including Japanese damage and production data.

90.20-241 NIPPON VEHICLE MANUFACTURING CO.

4. FUNCTIONAL ANALYSIS

a. Use of Plant

Reported: Railroad car and locomotive manufacture, possible tank manufacture.

Actual: Railroad car, locomotive and accessories manufacture.

b. Boundaries

Interpretation of plant boundaries was fairly accurate. Found to be associated with the plant and not reported as such were a group of 9 buildings (a foundary, 4 machine shops, an apprentice school, and several smaller buildings) which were located on the opposite side of an adjacent canal. There was no physical connection between the two groups of buildings.

c. Building Identification (F/A Table)

d. Summary of Tabulation:

TABLE 2

F/A ACCURACY FACTOR

Total Plant 64.6
Primary Buildings 83.5

	PRIMARY BUILDINGS No. Blogs	PRIMARY BUILDINGS %	TOTAL BUILDINGS No. Bldgs	TOTAL BUILDINGS %
Correct	6	67	18	37.5
Of Similar Occupancy	2	22	9	18.7
Unidentified	0	—	6	12.5
Incorrect	1	11	15	31.3
Total	9	100	48	100.0

c. Remarks

The character of many buildings in this plant was such that their use could be readily changed without affecting their appearance, thereby making identification by photographic interpretation alone rather difficult.

NIPPON VEHICLE MANUFACTURING CO. 90.20-241

FUNCTIONAL ANALYSIS TABLE

NIPPON VEHICLE MANUFACTURING COMPANY — 90-20-241

BUILDING NUMBER	PRIMARY	REPORTED FUNCTION	ACTUAL FUNCTION	EVALUATION: CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
1		Prob. Car Shed	Car Shed	x								95
2		Storage	Kitchen & Dining Room				x					15
3		Storage	Car Shed		x							70
4		Boiler Shop	Machine Shop		x							85
5		Boiler & Boiler Tube Shop	R. R. Car Assembly				x					85
6	x	Freight Car Assembly	R. R. Car Assembly	x								100
7	x	Passenger Car Assembly	Paint Shop				x					0
8		Finishing, Painting Etc.	Locomotive Boiler Shop				x					70
9	x	Passenger Car Assembly	R. R. Car Assembly	x								100
10		Prob. Offices	Storage-Bicycles					x				20
11		Photo Room & Mess Hall	Administration	x				x				10
12		Offices	Dining Room-Workers			x						100
13		Unidentified	Dispensary	x								45
14		Reported Medical Ctr	Offices						x			100
15		Unidentified	Offices					x				45
16		Timber Storage	Carpenter Shop	x								0
17		Woodworking Shop	Lumber Drying Bldg							x		100
18		Unidentified	Carpenter Shops					x				45
19-20		Storage	Pattern Shop (Wood)					x				15
21		Storage	Carpenter & Lumber Cutting	x								15
22		Saw Mill	Wood Working Shop	x								100
23		Woodworking Shop	Machine Shop	x				x				100
24(a) (b)		(a) Boiler House (b) Prob. Storage	(a) Boiler House (b) Sand Removal	x				x				60
25	x	Car Assembly Shop	R. R. Car Assembly	x								85
26	x	Passenger Car Assembly	Plate Shop	x								100
27	x	Metal Work Shop	Storage Bldg	x								100
28		Storage Bldgs	Pipe Storage	x								100
29		Storage	Boiler Shop			x						85
30		Passenger Car Shed	Storage			x						85
31		Storage & Drafting	Storage	x								100
32-33		Storage										

[redacted]

FUNCTIONAL ANALYSIS TABLE

NIPPON VEHICLE MANUFACTURING COMPANY — 90-20-241

BUILDING NUMBER	PRIMARY	REPORTED FUNCTION	ACTUAL FUNCTION	EVALUATION: CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
34		Storage	Warehouse Office		x							70
35		Storage	Machine Shop				x					15
36	x	Heavy Shop	Forge		x							85
37		Prob. Trans. or D.C. Converters	Compressors-Air		x							85
38		Storage	Dining Room									15
39		Unidentified	Sand Casting (Foundry)			x						45
40	x	Foundry	Foundry	x								100
41		Storage	Storage	x								100
42		Storage	Machine Shop				x					15
43		Storage	Scrap Recovery			x						70
44		Unidentified	Machine Shop				x					45
45		Prob. Misc. Storage	Boiler Shop				x					20
46	x	Prob. Assembly of Cars Or Locomotives - Machining	Machine Shop	x								80
47		Pass: Car or Locomotive Shed	Track Shop				x					25
48		Unidentified	Boiler Shop				x					45
49		Turntable	Turntable	x								100

[redacted]

5. STRUCTURAL ANALYSIS

a. Check on Scale Measurement

Building 8 was measured to determined scale check. Linear dimensions were 97 percent correct.

b. S/A (See S/A Table)

c. Summary of Tabulation

(1) Construction Type

TABLE 3

Construction Type	No. Bldgs	No. Corr	% Corr
Wood Frame (W)	14	13	93
Steel Frame (S)	6	4	67
Reinforced Concrete (R/O)	1	0	0
Total	21	17	81

(2) Combustibility

TABLE 4

Building Combustibility	No. Bldgs	No. Corr	% Corr
Combustible (C)	17	16	94
Non-Combustible (N)	3	3	100
Fire-Resistant (R)	1	0	0
Total	21	19	91

[redacted]

[redacted]

90.20-241 NIPPON VEHICLE MANUFACTURING CO.

STRUCTURAL ANALYSIS TABLE

90-20-241

NIPPON VEHICLE MANUFACTURING COMPANY

BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
	ACTUAL	REPORTED	ACTUAL	REPORTED JT3	ACTUAL	REPORTED	ACTUAL	REPORTED JT3	ACTUAL	REPORTED JT3	ACTUAL	REPORTED
1			1	1			SM/W	C	C	C	W	W
2			2	1			SM/W	C	C	C	W	W
3			2	1			SM/W	C	C	C	W	W
4			1	1			SM/W	C	C	C	W	W
5			1	1			SM/W	C	C	C	W	W
6			1	1			SM/W	C	C	C	W	W
8	20,000	19,800	1	1			N	N	C	C	S	S
9			1	1			SM/W	C	C	C	S	W
20			1	1			SM/W	C	C	C	W	W
22			1	1			W	N	C	N	W	W
25			1	1			SM	N	N	N	S	S
27			1	1			SM/W	C	C	C	W	W
28			2	1			T/W	C	C	C	W	W
30			1	1			W&SM	C	C	C	W	W
36			1	1			SM	N	N	N	S	S
37			2	1			C	N	R	N	S	S
38			2	1			SM/W	C	C	C	W	W
39			1	1			W&SM	C	C	C	W&S	W
40			1	1			SM	N	N	N	S	S
42			1	1			W&CA	C	C	C	W	W
44			1	1			W&CA	C	C	C	W	W

[redacted]

[redacted]

NIPPON VEHICLE MANUFACTURING CO. 90.20-241

6. DAMAGE ASSESSMENT

a. D/A (See D/A Table)

b. Summary of Tabulation

TABLE 5

	ACTUAL		REPORTED	
	Sq Ft	% Dam.	Sq Ft	% Dam
Total Building Area			813,600	
Damage				
Structural	54,600	6.7	55,700	6.8
Superficial	232,700	28.6	213,200	26.2
Total Damage	287,300	35.3	268,900	33

In general, Minor Damage was purposely omitted in D/A reports.

c. Remarks

Three attacks were made on this plant: 8 January 1945, 17 May 1945, and 26 June 1945. Only the first two, however, were considered in the AC/AS Intelligence report. Therefore, damage data for the first two raids only were considered in the tabulation.

[redacted]

NIPPON VEHICLE MANUFACTURING COMPANY

DAMAGE ASSESSMENT TABLE

90-20-241

BUILDING NUMBER	BUILDING AREA 1000'S SQ. FT.	STRUCTURAL (1000'S SQ. FT.) ACTUAL	STRUCTURAL (1000'S SQ. FT.) REPORTED	STRUCTURAL (1000'S SQ. FT.) REPORTED	SUPERFICIAL (1000'S SQ. FT.) ACTUAL	SUPERFICIAL (1000'S SQ. FT.) REPORTED	SUPERFICIAL (1000'S SQ. FT.) REPORTED	(1000'S SQ. FT.) ACTUAL	(1000'S SQ. FT.) REPORTED	(1000'S SQ. FT.) REPORTED	REMOVED (1000'S SQ. FT.) ACTUAL	REMOVED (1000'S SQ. FT.) REPORTED	REMOVED (1000'S SQ. FT.) REPORTED
7	15.2	15.2	15.2										
8	19.8	3.5	-		16.3	16.5							
9	26.1	6.0	6.0		20.1	20.1							
10	7.4	7.4	3.9			3.5							
11a-b	5.3	4.5	4.5		-	-							
c	1.3	-	-		-	-							
12	7.3	7.3	7.3										
13	5.2	5.2	5.2										
14	6.5	6.5	6.5										
15	7.0	7.0	7.0										
16	7.8	7.8	7.8										
17	7.2	7.2	7.2										
18	5.9	5.9	2.0		-	1.9							
21	3.6	3.6	3.6										
22	28.0	28.0	28.0										
23	31.8	31.8	31.8										
24a	6.3	-	0.3		3.1	-							
b	6.3	6.3	6.3										
c	3.1	3.1	3.1										
26	23.6	23.6	23.6										
30a	8.0	8.0	-										
b	5.0	1.3	-										
31	13.5	13.5	13.5										
32	4.2	4.2	4.2										
33	4.4	4.4	4.4										
36	36.8	-	-		4.5	4.1							
43	3.9	3.9	3.9										
46	126.7	13.5	11.5		10.0	9.6							
48	19.0	4.0	4.0		-	-							

NOTE: Bldgs. not listed here were listed as having no visible damage.

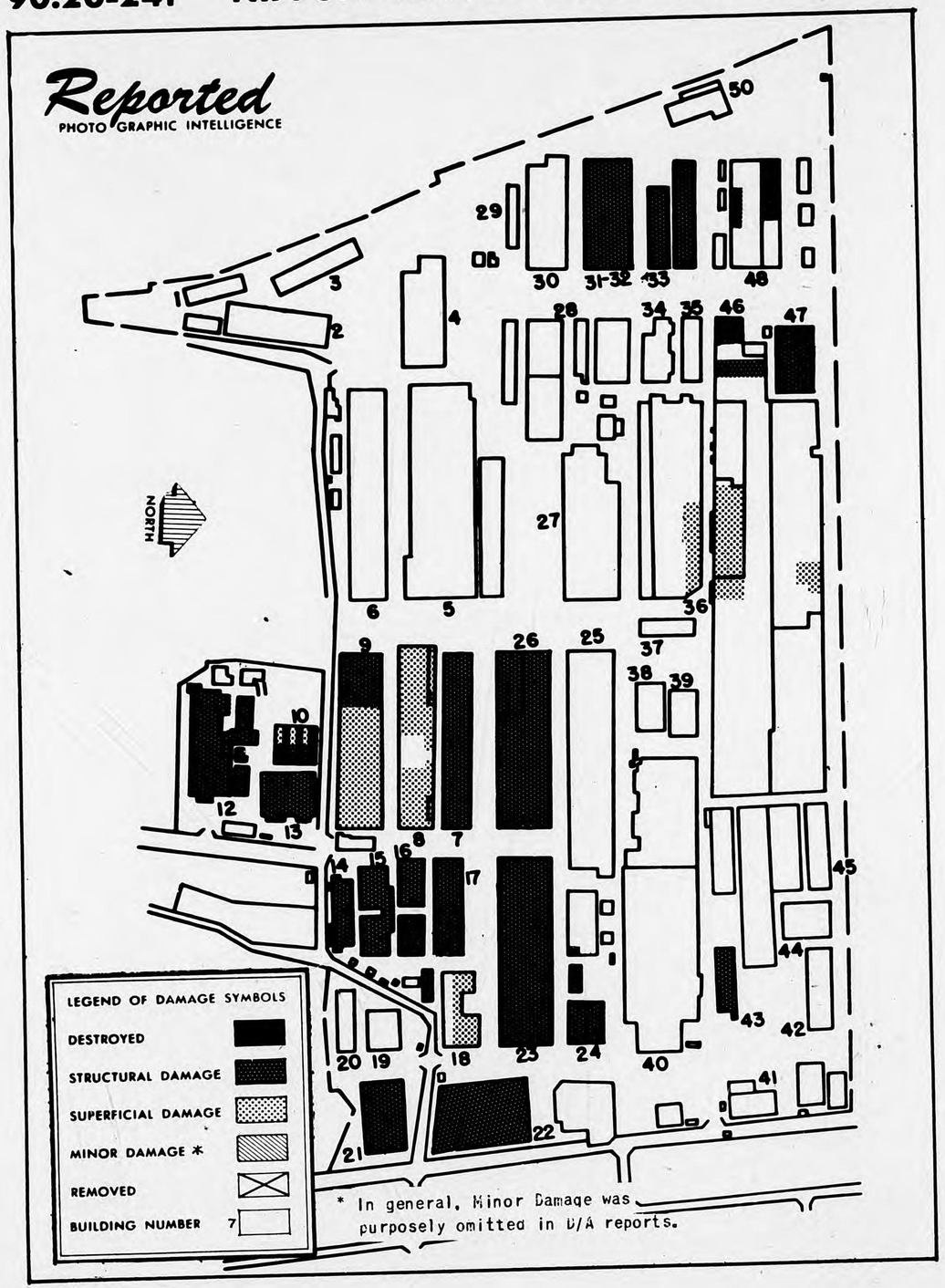
PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS

EXHIBIT K

90.20-241 NIPPON VEHICLE MANUFACTURING CO.

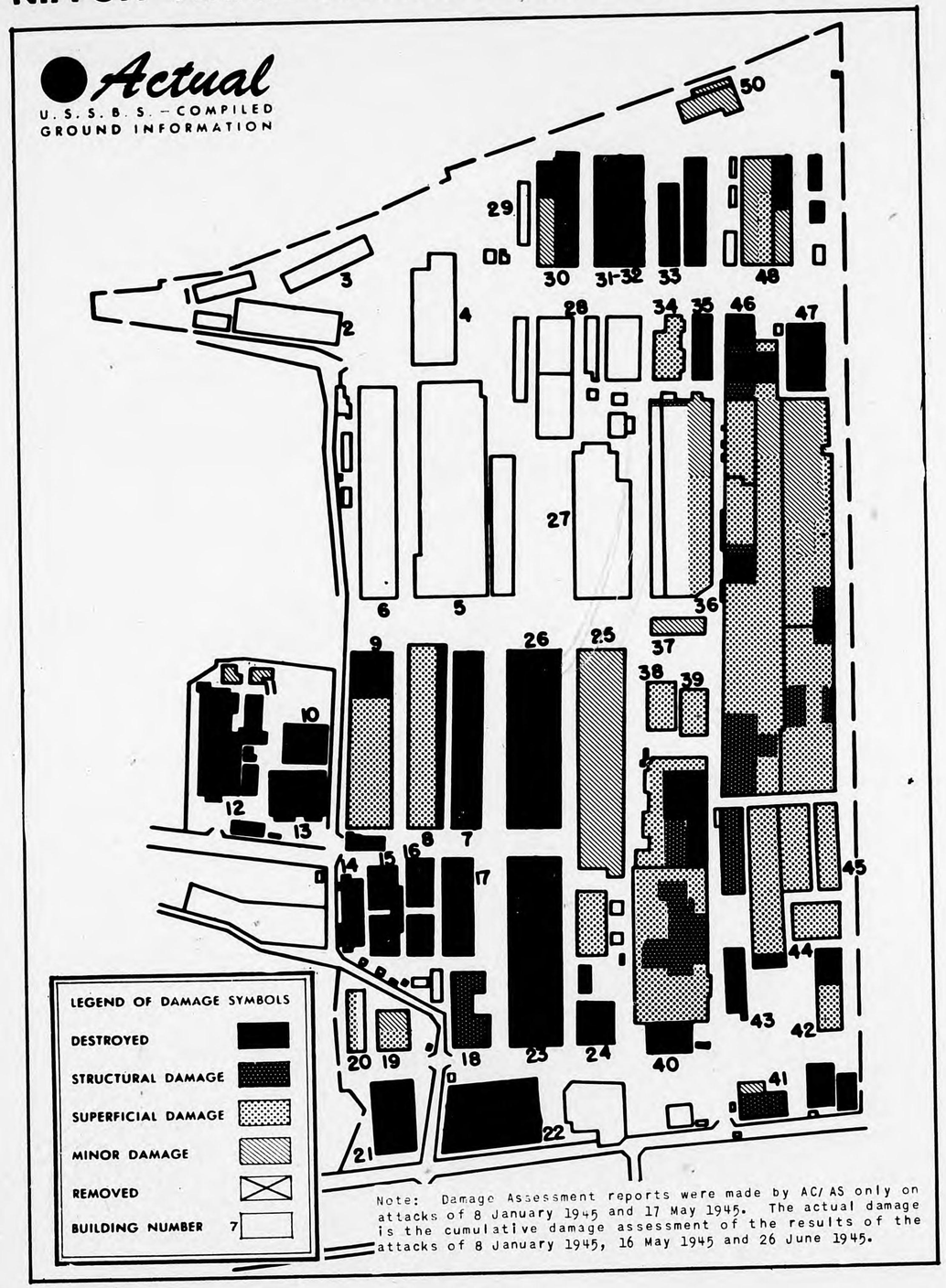
11K.09

90.20-241 NIPPON VEHICLE MANUFACTURING CO.



* In general, Minor Damage was purposely omitted in D/A reports.

NIPPON VEHICLE MANUFACTURING CO. 90.20-241



Note: Damage Assessment reports were made by AC/AS only on attacks of 8 January 1945 and 17 May 1945. The actual damage is the cumulative damage assessment of the results of the attacks of 8 January 1945, 16 May 1945 and 26 June 1945.

EXHIBIT L
SUMITOMO METAL INDUSTRY CO.
& SUMITOMO ALUMINUM CO.
90.25 - 263 A

LAT. 34° 40'N - LONG. 135° 26'E

OSAKA, JAPAN

See Exhibit P for abbreviations used in this exhibit.

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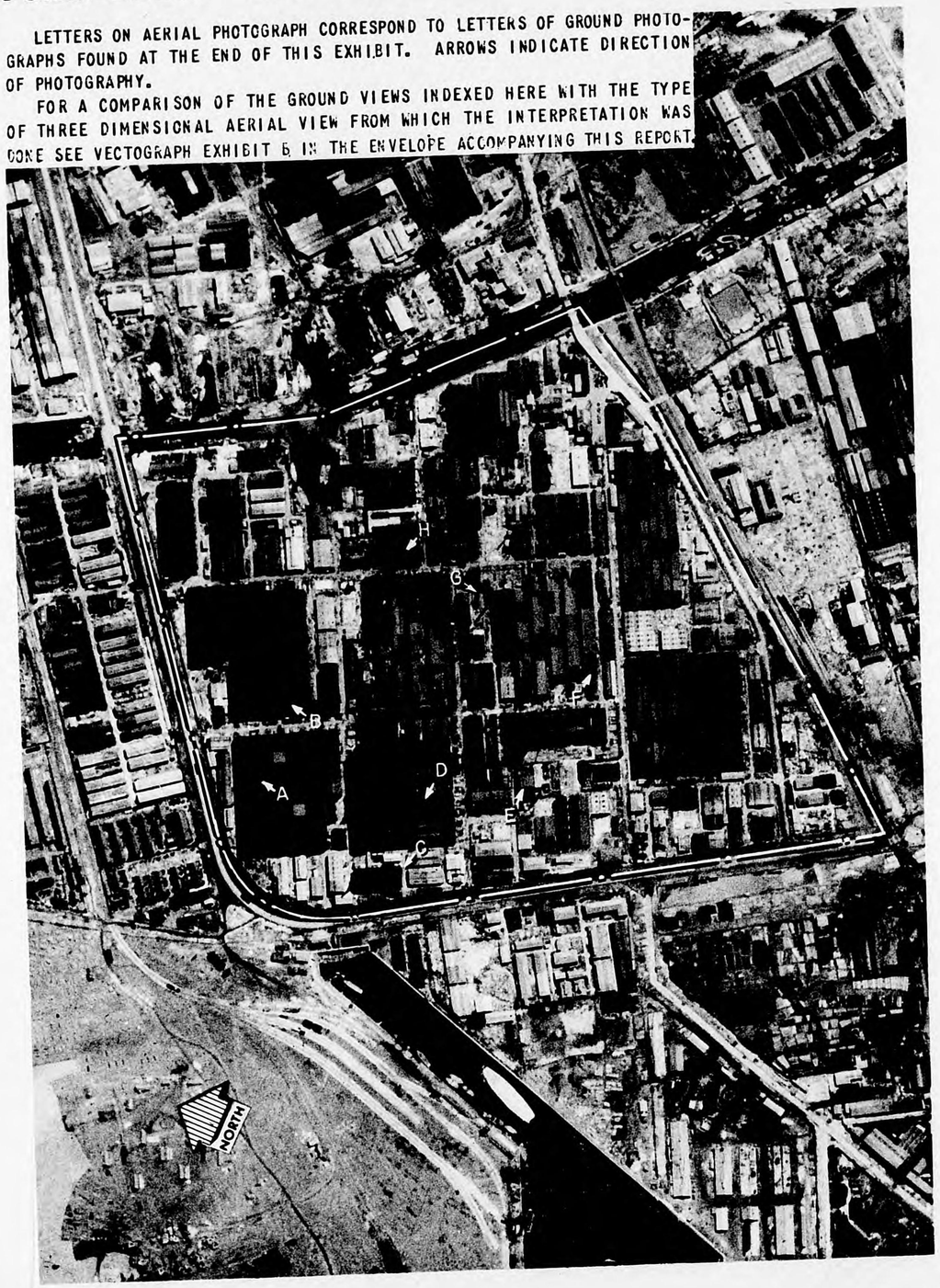
90.25-263A SUMITOMO METAL INDUSTRY CO.

LETTERS ON AERIAL PHOTOGRAPH CORRESPOND TO LETTERS OF GROUND PHOTOGRAPHS FOUND AT THE END OF THIS EXHIBIT. ARROWS INDICATE DIRECTION OF PHOTOGRAPHY.

FOR A COMPARISON OF THE GROUND VIEWS INDEXED HERE WITH THE TYPE OF THREE DIMENSIONAL AERIAL VIEW FROM WHICH THE INTERPRETATION WAS DONE SEE VECTOGRAPH EXHIBIT 6 IN THE ENVELOPE ACCOMPANYING THIS REPORT.



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SUMITOMO METAL INDUSTRY CO. 90.25-263A

1. DESCRIPTION OF TARGET

a. This target (also known as the Sumitomo Sakurijima Plant and the Sumitomo Light Metal Industry Co., Osaka Plant) was one of the four or five large producers of propellers for Japanese combat aircraft. In addition, it accounted for large quantities of copper, aluminum, and duralumin products essential to aircraft production. It was one of the prime targets in the Osaka Area.

b. The plants are located in northwestern Osaka, north of and near the mouth of the Aji River.

c. The two plants comprise 121 listed structures with a built-up area of approximately 2,200,000 square feet.

2. SUMMARY

a. Functional analysis of the primary buildings was good. The overall interpretation of building functions was, however, less accurate because of too much guess work as to the functions of secondary buildings. Of 103 buildings having comparable data there were:

(1) 24 identified correctly
(2) 42 identified as having similar occupancy
(3) 12 unidentified
(4) 25 identified incorrectly

b. The structural analysis was good, particularly with regard to building combustibility. Errors in the interpretation of the number of floors per building accounted for most errors in the construction types. In that category 70 out of 97 buildings were correctly analyzed. For combustibility, 85 out of 95 buildings were correct.

c. No damage assessment was made.

3. SOURCE OF DATA

a. Reported.

(1) AC/AS Intelligence F/A Report #191, 30 June 1945.
(2) AC/AS Intelligence Building Construction Analysis.

b. Field Data.

(1) USSBS (G-2 PIC) field notes.

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4. FUNCTIONAL ANALYSIS

a. Use of Plant.

Reported: Production of sheets, plates, tubes, bars, castings, and forgings of non-ferrous metals and alloys. Possible aircraft propeller production.

Actual: As reported. The northern plant produced light metal products; the southern plant produced propellers.

b. Boundaries.

As reported. The two plants were separated by the road just north of buildings #111 and #62.

c. Building identification (F/A Table).

d. Summary of Tabulation.

TABLE I

F/A ACCURACY FACTOR

Total Plant 60
Primary Buildings 73

	PRIMARY BUILDINGS		TOTAL BUILDINGS	
	No. Bldgs	%	No. Bldgs	%
Correct	13	43	24	23
Of Similar Occupancy	12	40	42	41
Unidentified	2	7	12	12
Incorrect	3	10	25	24
Total	30	100	103	100

e. Remarks.

Most of the primary buildings were correctly or nearly correctly analyzed for function. Analysis of secondary buildings was much less accurate due to a tendency to to call any unknown building "storage" or "workshop".

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SUMITOMO METAL INDUSTRY CO. 90.25-263A

FUNCTIONAL ANALYSIS TABLE

SUMI TOMO METAL INDUSTRY CO.
SUMI TOMO ALUMINUM CO.

90.25 - 263A

BUILDING NUMBER		FUNCTION				EVALUATION							
		REPORTED		ACTUAL									F/A ACCURACY FACTOR
AC/AS	PRIMARY	AC/AS			CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	
1		Stores or Workshops		Warehouse-Tools & Equipment		x							78
2		Stores or Workshops		Warehouse-Tools & Equipment		x							78
3		Stores or Workshops		Warehouse-Tools & Equipment		x							78
4		Stores or Workshops		Warehouse-Tools & Equipment		x							78
5		Stores or Workshops		Warehouse-Tools & Equipment		x							78
6		Stores or Workshops		Warehouse-Tools & Equipment		x							78
7		Stores or Workshops		Warehouse-Tools & Equipment		x							45
8		Unidentified		Air Compressor			x						85
9		Unidentified Workshop		Woodwashing (Soda)	x								70
10		Engineering Workshop		Rolling Mill - Aluminum Sheet		x							
11		Stores or Workshops		(Not determined)									78
12		Stores or Workshops		Woodwashing (Soda)	x								78
13	x	Stores or Workshops		heat Treatment - Nitrate	x								78
14		Stores or Workshops		Woodwashing					x				15
15	x	Unidentified Workshop		Sub Station									
16		Stores		(Not determined)									
17	x	Probable Rolling Mill		Pipe Manufacture (Extrusion)	x								80
18		Stores		Finished products storage		x							85
19		Stores		(Not determined)									
20	x	Foundry		Pipe Manufacture - Also Wire									70
21		Stores		Storage - Tool and Equipment		x							85
22	x	Machine Shop		Maintenance & Repair Bldg		x							70
23		Stores		Storage - Raw Material		x							85
24		Stores		Storage - Raw Material		x							85
25		Stores		Storage - Raw Material		x							85
26		Unidentified Workshops		Vehicle Maintenance									70
27		Unidentified Workshops		Crating Manufacture									70
28		Unidentified Workshops		Mess Hall									15
29		Unidentified		Storage - Finished Product									45
30		Warehouse		Shipment - Finished Product									70
31	x	Foundry		Copper Smelter									85

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SUMITOMO METAL INDUSTRY CO.
SUMITOMO ALUMINUM CO.

FUNCTIONAL ANALYSIS TABLE

90.25 - 263A

BUILDING NUMBER AC/AS		PRIMARY	FUNCTION REPORTED AC/AS		FUNCTION ACTUAL	EVALUATION CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
32			Unidentified		Not determined										
33			Unidentified		Not determined										
34		X	Foundry		Copper Smelter	x								85	
35		X	Stores or Workshop		Storage - Raw Material		x							78	
36		X	Unidentified		Ingot Pouring-Billet Making			x						45	
37		X	Unidentified		Ingot Pouring-Billet "			x						45	
38		X	Unidentified Workshop		Ingot Pouring-Billet "	x								85	
39		X	Foundry or Forge		Ingot Pouring-Billet "	x								100	
40		X	Machine Shop		Cleaning of Ingots & Treatment		x							70	
41		X	Unidentified Workshops		Cleaning of Ingots	x								85	
42			Unidentified Workshops		Offices		x							70	
43		X	Unidentified Workshops		Steam Boiler Room				x					15	
44			Unidentified Workshops		Office		x							70	
45		X	Unidentified Workshops		Experimental Laboratory	x								85	
46		X	Machine Shop or Assembly		Extrusion		x							70	
47			Stores		Equipment Testing				x					15	
48			Stores												
49			Office or Stores		Offices		x							85	
50			Office		Office	x								100	
51			Unidentified						x					45	
52			Stores or Workshop												
53			Stores or Workshop		Mess Hall - Office Workers				x					15	
54			Stores or Workshop		(Part of Bldg 56)				x					15	
55			Stores or Workshop												
56			Office or Stores		Main Office			x						85	
57			Office or Stores		Research Laboratory			x						70	
58		X	Machine Shop		Maintenance & Repair			x						70	
59			Office												
60			Office		Research Laboratory			x						70	
61			Stores or Workshop		Storage			x						78	
62		X	Machine Shop or Assembly		Blade Plant (70% Steel, 30% wood)			x						78	

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PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS EXHIBIT L
90.25-263 A SUMITOMO METAL INDUSTRY CO.

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SUMITOMO METAL INDUSTRY CO.
SUMITOMO ALUMINUM CO.

FUNCTIONAL ANALYSIS TABLE

90.25 - 263A

BUILDING NUMBER AC/AS		PRIMARY	FUNCTION REPORTED AC/AS		FUNCTION ACTUAL	EVALUATION CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
63			Unidentified		Warehouse			x						45	
64			Stores or Workshop		Mess Hall				x					15	
65			Stores or Workshop		Mess Hall				x					15	
66			Stores or Workshop		Mess Hall				x					15	
67			Stores or Workshop		Warehouse		x							78	
68			Small Workshop		Warehouse		x							70	
69			Possible Furnace House		Warehouse				x					10	
70			Possible Furnace House		Warehouse - Raw Material				x					10	
71			Stores or Workshop		Storage-Tools & Equipment		x							78	
72			Stores or Workshop		Storage-Tools & Equipment		x							78	
73			Stores or Workshop		Storage-Tools & Equipment		x							78	
74		X	Probable Rolling Mill		Copper Rolling Mill	x								95	
75		X	Stores or Workshop		Heat Treatment		x							78	
76			Stores or Workshop		Air Compressor				x					15	
77		X	Stores or Workshop		Sub Station				x					15	
78			Stores or Workshop												
79		X	Probable Rolling Mill		Copper Extrusion	x								95	
80			Stores or Office		Mess Hall				x					15	
81			Unidentified Workshops		Mess Hall & Dispensary				x					15	
82		X	Unidentified Workshops		Manufacture - Brass Ammo. Casing	x								85	
83		X	Composite Workshop - Rolling Mill		Foundry		x							70	
84		X	Unidentified Workshop		Foundry	x								85	
85			Stores												
86			Stores or Workshop		Roller Storage		x							78	
87			Unidentified		Locker Rm. - Women				x					45	
88			Unidentified Workshop		Water Treatment - Washing	x								85	
89			Unidentified Workshop		Water Treatment - Washing	x								85	
90		X	Unidentified Workshop		Plate Shaping - Angle - Channel	x								85	
91			Office or Stores		Labor Office		x							78	
92			Office or Stores												
93			Unidentified					x						45	

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EXHIBIT L PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS
SUMITOMO METAL INDUSTRY CO. 90.25-263A

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90.25-263 A SUMITOMO METAL INDUSTRY CO.

FUNCTIONAL ANALYSIS TABLE

SUMITOMO METAL INDUSTRY CO.
SUMITOMO ALUMINUM CO.

90.25 - 263A

BUILDING NUMBER AC/AS	PRIMARY	FUNCTION REPORTED AC/AS	ACTUAL	EVALUATION CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR %
94	X	Engineering Workshop	Aluminum Plate Shop	x								85
95	X	Probable Boiler House	Boiler House	x								95
96		Stores or Workshop	Office - Employees TimeCard								x	15
97		Stores or Workshop	Guard House								x	15
98		Stores or Workshop										
99		Stores or Workshop	Locker Room								x	15
100		Stores or Workshop										
101		Stores or Workshop										
102		Stores or Workshop	Storage-Bearings-Accessories	x								78
103		Unidentified								x		45
104		Stores or Workshop										
105		Stores or Workshop	Labor Office					x				15
106		Stores or Workshop	Labor Office					x				15
107		Stores or Workshop	Office - Time Card					x				15
108		Stores or Workshop	Guard House					x				15
109		Stores or Workshop	Lockers					x				15
110		Unidentified	Scrap Assembly				x					45
111	X	Machine Shop or Assembly	Accessory Plant		x							78
112		Stores or Workshop	Mess Hall					x				15
113		Stores or Workshop	Baths					x				15
114		Stores or Workshop	Warehouse - Supplies		x							73
115		Unidentified	Office - Shop Supervisors				x					45
116		Unidentified Workshop	Tool Making Plant	x								85
117		Unidentified	Guard House				x					45
118		Unidentified Workshop	Tool Making Plant	x								85
119		Stores or Workshop	Experimental Shop-Propeller Testing		x							78
120		Stores	(Not part of plant)									
121		Stores	(Not part of plant)									

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SUMITOMO METAL INDUSTRY CO. 90.25-263A

5. STRUCTURAL ANALYSIS

a. Check on Scale Measurement.

Linear dimensions were 8 per cent greater than reported.

b. S/A (See A/A Table).

c. Summary of Tabulation.

(1) Construction type

TABLE 2

Construction Type	PRIMARY BUILDINGS No. Bldgs	PRIMARY BUILDINGS No. Corr	PRIMARY BUILDINGS % Corr	TOTAL BUILDINGS No. Bldgs	TOTAL BUILDINGS No. Corr	TOTAL BUILDINGS % Corr
A1.1	2	2	100	2	2	100
A1.3	1	1	100	1	1	100
A2.3	7	7	100	9	8	88
B2	12	5	42	14	6	43
D	5	5	100	49	46	94
E2	1	1	100	22	7	32
Total	28	21	75	97	70	72

(2) Combustibility

TABLE 3

Building Combustibility	PRIMARY BUILDINGS No. Bldgs	PRIMARY BUILDINGS No. Corr	PRIMARY BUILDINGS % Corr	TOTAL BUILDINGS No. Bldgs	TOTAL BUILDINGS No. Corr	TOTAL BUILDINGS % Corr
Combustible (C)	4	2	50	67	63	94
Non-combustible (N)	23	20	87	26	21	81
Fire-Resistant (R)	2	1	50	2	1	50
Total	29	23	79	95	85	90

d. Remarks.

The chief error in the structural analysis was in reporting the number of floors of the smaller buildings, which resulted in a misclassification of building types.

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SUMITOMO METAL INDUSTRY CO.
SUMITOMO ALUMINUM CO.

STRUCTURAL ANALYSIS TABLE

90.25-263A

BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
AC/AS A2	ACTUAL	REPORTED AC/AS	ACTUAL	REPORTED AC/AS	ACTUAL	REPORTED	ACTUAL	REPORTED AC/AS	ACTUAL	REPORTED AC/AS	ACTUAL	REPORTED
1		4.1		1				LT		C		D
2		5.8	1	1			W	LT	C	C	D	D
3		2.1	1	1			W	LT	C	C	D	D
4		2.6	1	1			W	LT	C	C	D	D
5		3.6	1	1			W	LT	C	C	D	D
6		1.6	2	1			W	LT	C	C	E2	D
7		5.2	2	1			W	LT	C	C	E2	D
8		2.3	1	1			W	LT	C	C	D	D
9		2.8	1	1			W	LT	C	C	D	D
10		122.7	1	1			CI/SF	LT	N	N	B2	B2
11		2.4		1				LT		C	D	D
12		7.4	1	1			W	LT	C	C	D	D
13		1.0	1	1			CI/SF	LT	N	C	D	D
14		2.7	1	1			W	LT	C	C	D	D
15		4.8	1	1			CI/SF	LT	N	C	D	D
16		5.4		1				LT		C		D
17		170.8	1	1			CI/SF	LT	N	N	B2	B2
18		12.3	1	1			W	LT	C	C	D	D
19		3.6		1				LT		C		D
20		25.3	1	1			CI/SF	LT	N	N	B2	B1
21		3.8	1	1			W	LT	C	C	D	D
22		35.6	1	1			CI/SF	LT	N	N	B2	A1.1
23		5.2	1	1			W	LT	C	C	D	D
24		5.2	1	1			W	LT	C	C	D	D
25		5.2	1	1			W	LT	C	C	D	D
26		2.0	1	1			W	LT	C	C	D	D
27		5.8	1	1			W	LT	C	C	D	D
28		8.7	1	1			W	LT	C	C	D	D
29		1.6	1	1			W	LT	C	C	D	D
30		12.6	1	1			W	LT	C	C	D	D
31		18.8	1	1			CI/SF	LT	N	N	B2	B1

EXHIBIT L PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS

90.25-263 A SUMITOMO METAL INDUSTRY CO.

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SUMITOMO METAL INDUSTRY CO.
SUMITOMO ALUMINUM CO.

STRUCTURAL ANALYSIS TABLE

90.25-263A

BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA		NUMBER OF FLOORS		SIZE OF BAY		ROOF MATERIAL		COMBUSTIBILITY OF BUILDING		CONSTRUCTION TYPE	
AC/AS A2	ACTUAL	REPORTED AC/AS	ACTUAL	REPORTED AC/AS	ACTUAL	REPORTED	ACTUAL	REPORTED AC/AS	ACTUAL	REPORTED AC/AS	ACTUAL	REPORTED
32		0.7		1				LT		C	D	D
33		0.7		1				LT		C	D	D
34		12.8	1	1			CI/SF	LT	N	N	B2	B2
35		26.7	1	2			CI/SF	LT	N	C	B2	E2
36		3.8	1	1			CI/WF	LT	C	C	A2.3	A2.3
37		3.8	1	1			W	LT	C	C		A2.3
38		12.6	1	1			/SF	LT	N	N	A2.3	A2.3
39		11.6		1				LT		N		B2
40		10.0	1	1			W	LT	C	N	A2.3	A2.3
41		12.3	1	1			/SF	LT	N	N	A2.3	A2.3
42		7.3		1				LT		C		D
43		15.4	1	1			CI/SF	LT	N	N	A2.3	A2.3
44		4.2	1	1			W	LT	C	C	D	D
45		9.0	2	3			Conc	Conc	R	R	E2	E2
46		63.4	1	1			CI/SF	LT	N	N	A1.1	A1.1
47		4.0	2	3			CI/WF	LT	C	C	E2	E2
48		1.1		1				LT		C		D
49		6.1	2	3			CI/WF	LT	C	C	E2	E2
50		8.8	2	3			CI/WF	LT	C	C	E2	E2
51		1.3		1				LT		C		D
52		1.7		1				LT		C		D
53		4.9	1	1			CI/WF	LT	C	C	D	D
54		0.9		1				LT		C		D
55		0.8		1				LT		C		D
56		6.1	2	3			CI/WF	LT	C	C	E2	E2
57		6.0	1	2,3			CI/SF	LT	N	C	B2	E2
58		30.0	1	1			CI/SF	LT	N	N	B2	A2.3
59		4.4		2				LT		C		E2
60		6.2	1	2			T/WF	LT	C	C	A2.3	E2
61		8.2	1	1			CI/WF	LT	C	C	D	D
62		95.7	1	1			CI/SF	LT	N	N	A1.1	A1.1
63		2.1	1	1			CA/WF	LT	C	C	D	D

EXHIBIT I PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS

SUMITOMO METAL INDUSTRY CO. 90.25-263A

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SUMITOMO METAL INDUSTRY CO.
SUMITOMO ALUMINUM CO.

STRUCTURAL ANALYSIS TABLE

90.25-263A

BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA			NUMBER OF FLOORS			SIZE OF BAY		ROOF MATERIAL			COMBUSTIBILITY OF BUILDING			CONSTRUCTION TYPE	
AC/AS A2	ACTUAL	REPORTED AC/AS		ACTUAL	REPORTED AC/AS		ACTUAL	REPORTED	ACTUAL	REPORTED AC/AS		ACTUAL	REPORTED AC/AS		ACTUAL	REPORTED
64		5.7		1	2				T/WF	LT		C	C		D	E2
65		3.8		1	1				T/WF	LT		C	C		D	D
66		5.7		2	1				CI/WF	LT		C	C		E2	E2
67		3.8		2	2				CA/WF	LT		C	C		E2	E2
68		3.8		2	1				CA/WF	LT		C	C		E2	D
69		13.2		2	1				T/WF	LT		C	N		E2	A2.3
70		14.2		2	1				T/WF	LT		C	C		E2	A2.3
71		4.8		1	1				W	LT		C	C		D	D
72		6.4		1	1				W	LT		C	C		D	D
73		4.2		1	2				W	Wood		C	C		D	E2
74		120.5		1	1				CI/SF	LT		N	N		B2	B2
75		13.6		1	1				/SF	LT		N	N		A2.3	A2.3
76		5.6		1	1				W	LT		C	C		D	D
77		4.2		1	1				Conc	LT		R	C		D	D
78		4.2			2					LT			C			E2
79		128.4		1	1				CI/SF	LT		N	N		B2	B2
80		6.1			2					LT			C			E2
81		1.8		2	1				W	Conc		C	R		E2	D
82		8.8		1	1				/SF	LT		N	N		D	D
83		99.5		1	1				CI/SF	LT		N	N		B2	B2
84		10.4		1	1				CI/SF	LT		N	N		B2	B2.3
85		1.5			1					LT			C			D
86		11.5		1	1				W	LT		C	C		D	D
87		6.2		2	1				W	LT		C	C		E2	D
88		1.5		1	1				W	LT		C	C		D	D
89		2.6		1	1				W	LT		C	C		D	D
90		25.1		1	1				CI/SF	LT		N	N		A2.3	A2.3
91		5.4		1	2				W	Wood		C	C		D	E2
92		2.5			1					Wood			C			D
93		3.0			1					Wood			C			D
94		80.4		1	1				CI/SF	LT		N	N		B2	A2.3
95		4.0		1	1				W	LT		C	N		D	D

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PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS EXHIBIT L

90.25-263 A SUMITOMO METAL INDUSTRY CO.

SUMITOMO METAL INDUSTRY CO.
SUMITOMO ALUMINUM CO.

STRUCTURAL ANALYSIS TABLE

90.25-263A

BUILDING NUMBER	1000'S OF SQ. FT. PLAN AREA			NUMBER OF FLOORS			SIZE OF BAY		ROOF MATERIAL			COMBUSTIBILITY OF BUILDING			CONSTRUCTION TYPE	
AC/AS A2	ACTUAL	REPORTED AC/AS		ACTUAL	REPORTED AC/AS		ACTUAL	REPORTED	ACTUAL	REPORTED AC/AS		ACTUAL	REPORTED AC/AS		ACTUAL	REPORTED
96		5.2		1	1				W	LT		C	C		D	D
97		3.6		1	1				W	Wood		C	C		D	D
98		2.4			1					Wood			C			D
99		40.2		1	1				CI/WF	LT		C	C		A2.3	A2.3
100		3.0			1					LT			C			D
101		4.0			1					LT			C			D
102		4.7		1	1				CA/WF	LT		C	C		D	D
103		0.9			1					LT			C			D
104		1.9			1					LT			C			D
105		1.7		2	1				/WF	LT		C	C		E2	D
106		3.4		2	1				T/WF	LT		C	C		E2	D
107		3.0		2	1				CI/WF	LT		C	C		E2	D
108		4.6		2	1				CI/WF	Wood		C	C		E2	D
109		3.1		2	1				CI/WF	LT		C	C		E2	D
110		2.1		1	1				CA/WF	LT		C	C		D	D
111		148.0		1	1				CI/SF	LT		N	N		A1.3	A1.3
112		8.1		2	1				T/WF	LT		C	C		E2	D
113		5.5		2	1				CA/WF	LT		C	C		E2	D
114		7.6		2	1				CA/WF	LT		C	C		D	D
115		1.8		1	1				T/WF	LT		C	C		D	D
116		11.8		1	1				CA/WF	LT		C	C		D	D
117		1.6		1	1				CI/SF	LT		N	C		D	D
118		5.9		1	1				T/WF	LT		C	C		D	D
119		3.9		1	1				T/WF	LT		C	C		D	D
120		4.2			1					LT			C			D
121		5.4			1					LT			C			D

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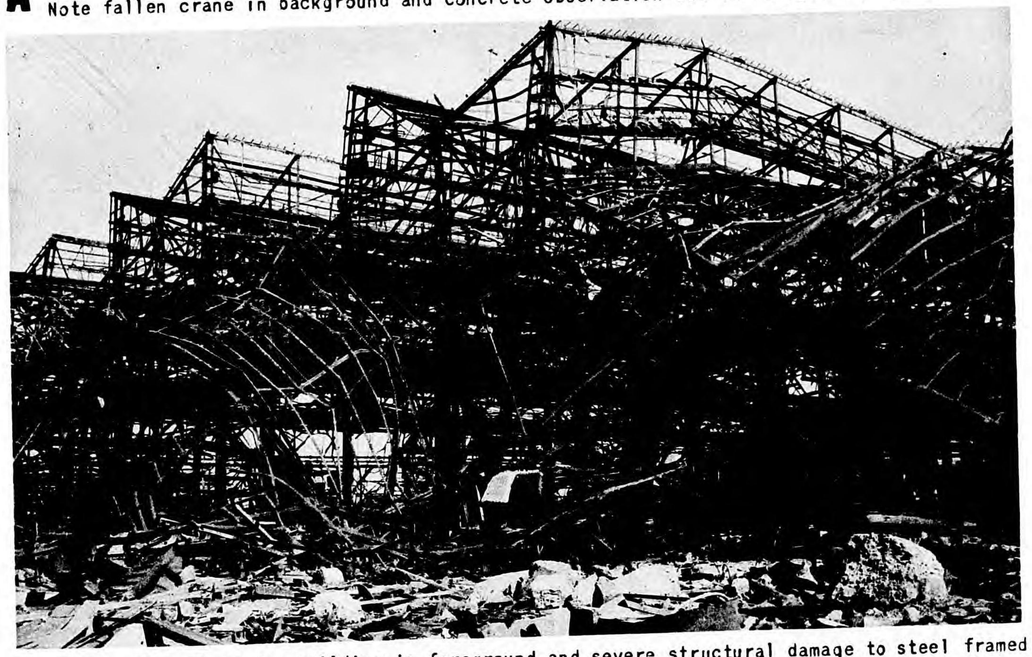
PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS EXHIBIT L

SUMITOMO METAL INDUSTRY CO. 90.25-263A

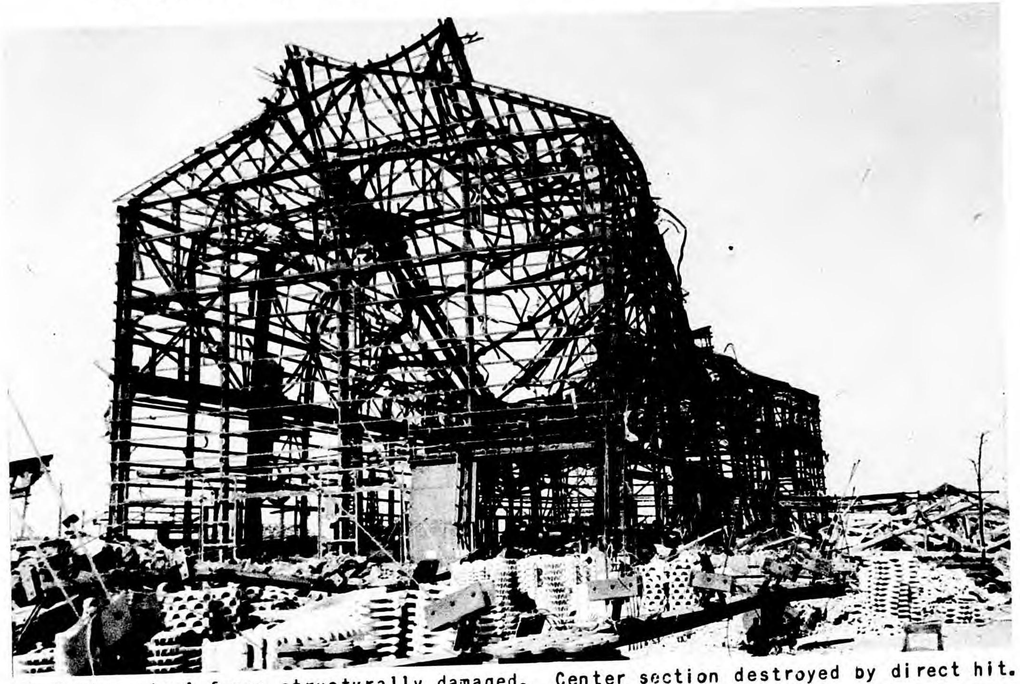
90.25-263 A SUMITOMO METAL INDUSTRY CO.

A Structural damage caused by direct hit on column and overhead traveling crane and rails. Note fallen crane in background and concrete observation box in foreground. (Bldg 10)

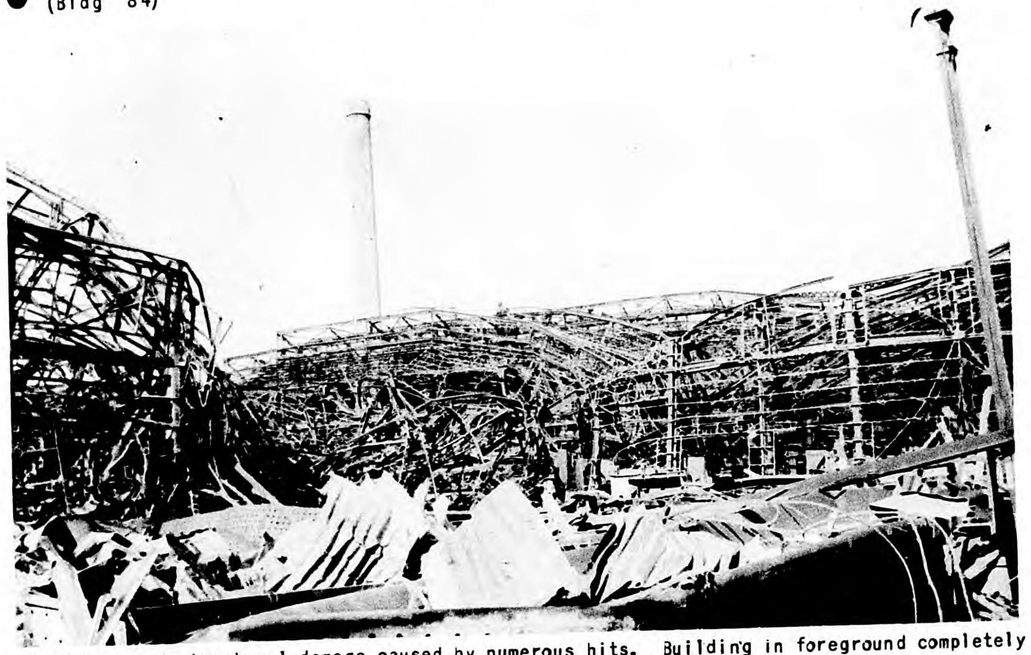


B Destruction of wooden building in foreground and severe structural damage to steel framed building caused by direct hits. (Bldg 17)

SUMITOMO METAL INDUSTRY CO. 90.25-263A



C Entire steel frame structurally damaged. Center section destroyed by direct hit. (Bldg 84)



D Widespread structural damage caused by numerous hits. Building in foreground completely destroyed. (Bldg 83)

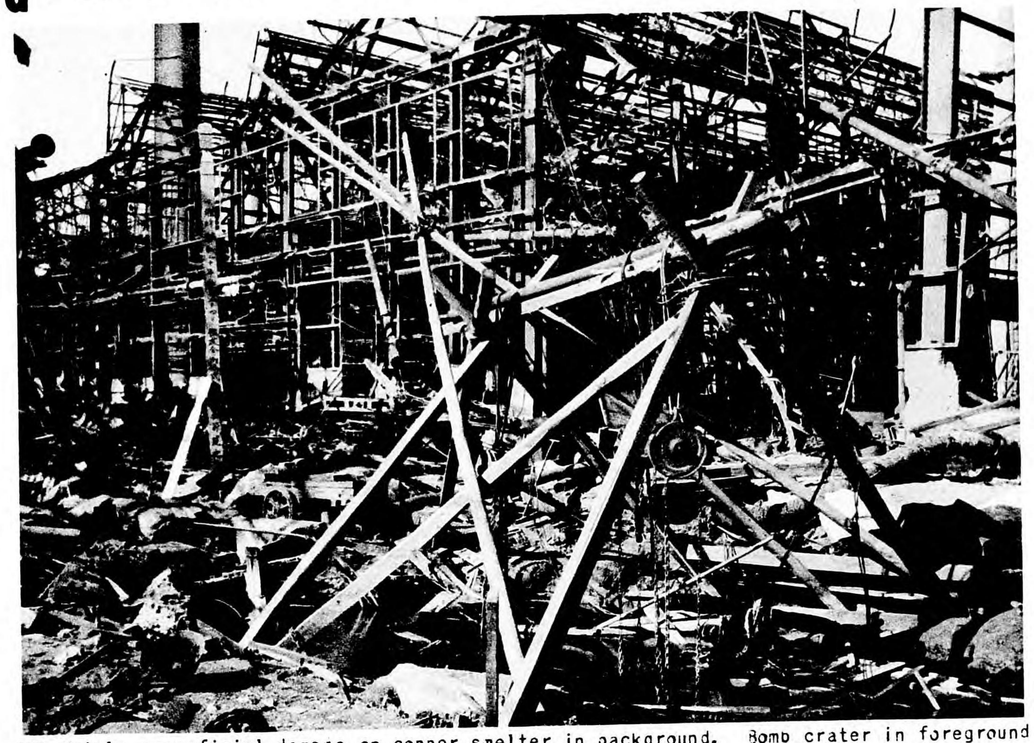
90.25-263 A SUMITOMO METAL INDUSTRY CO.

E Boiler house destroyed by a series of hits. Notice stack across boilers. (Bldg 95)

F 2 types of damage illustrated - bay at left destroyed - center bay structurally damaged - (Bldg 74)

SUMITOMO METAL INDUSTRY CO. 90.25-263A

G Damage caused by direct hits on a heavily constructed building. (Bldg 78)



H Mainly superficial damage on copper smelter in background. Bomb crater in foreground marks location of underground shelter. Wooden post on left is memorial to bodies left in shelter. (Bldg 31)

EXHIBIT M

SHOWA FERTILIZER COMPANY

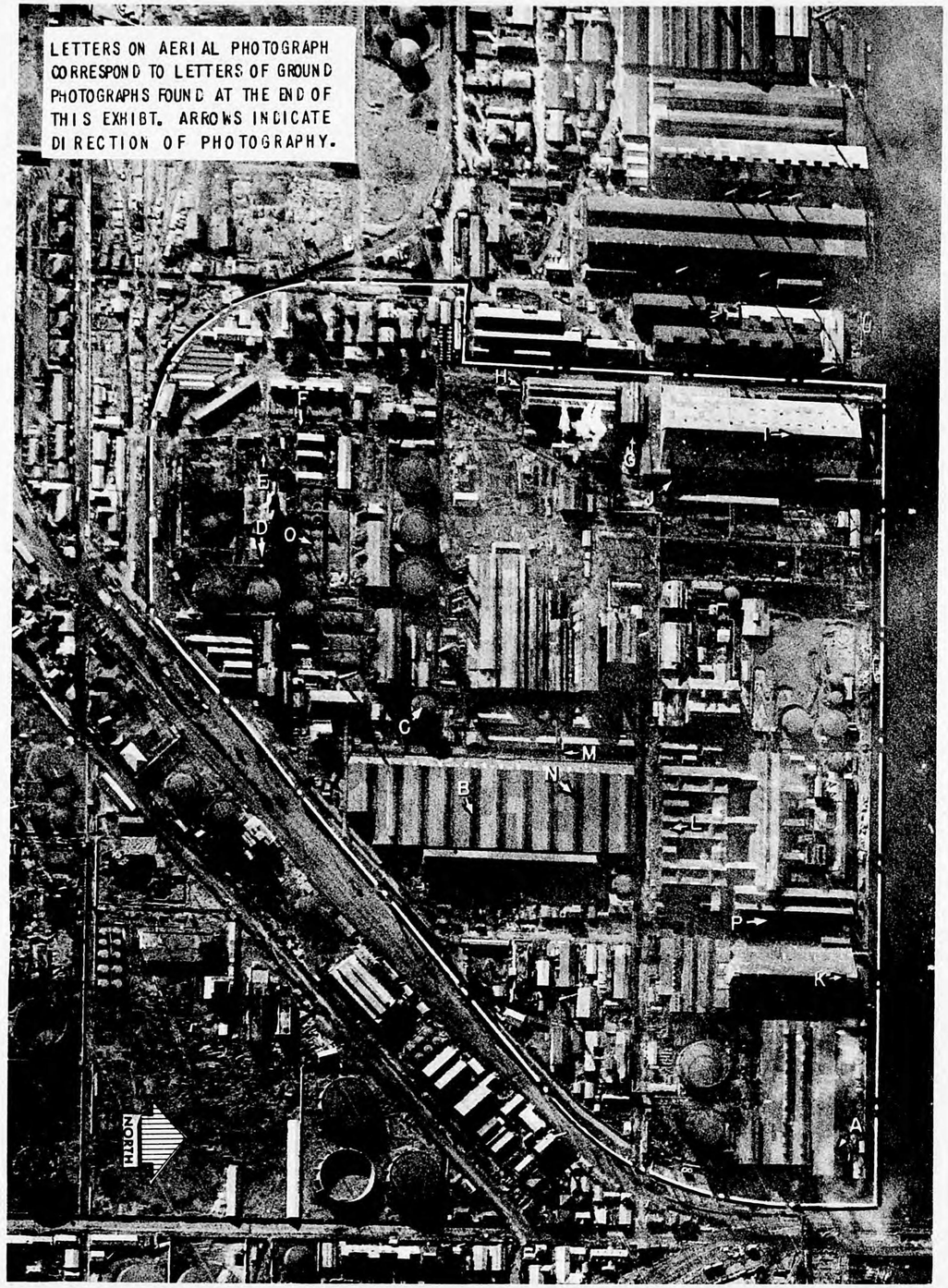
90.17-137

LAT. 35° 30 ' N - LONG. 139° 43 ' E

KAWASAKI, JAPAN

See Exhibit P for abbreviations used in this exhibit.

90.17-137 SHOWA FERTILIZER COMPANY



SHOWA FERTILIZER COMPANY 90.17-137

1. DESCRIPTION OF TARGET

a. Showa Fertilizer Co., Ltd. was one of the largest producers of ammonium sulfate fertilizer in Japan. Other important products were sulfuric acid, nitric acid, and ammonium nitrate.

b. The plant is located on reclaimed land in the highly industrialized Kawasaki Waterfront area, about 2¼ miles SSW of Kawasaki Railroad Station.

c. The plant comprises 79 listed structures.

2. SUMMARY

a. The interpretation of building functions for the entire plant was fair. For ease in reporting, the plant was divided into two parts primarily on an age basis. The older part was designated area "A", the newer, area "B".

b. The functional analysis of area "A" was based upon prewar information, and was excellent.

c. The functional analysis of area "B" was poor for the reason that, except for several correctly identified primary structures, the bulk of the buildings were unidentified. Two unidentified structures, a steam plant and an outdoor transformer yard should have been identified. The analysis of area "B" did, however, indicate considerable study of process techniques which were not easily associated with specific buildings.

d. Of the total of 79 buildings:

(1) 33 were identified correctly.
(2) 38 were unidentified.
(3) 6 were identified incorrectly.

3. SOURCE OF DATA

a. Reported.

(1) AC/AS Intelligence F/A Report #66, 28 February 1945

b. Field Data.

(1) USSBS (G-2, PIC) field notes, including blue prints and other data obtained from Japanese plant officials.

4. FUNCTIONAL ANALYSIS

a. Use of Plant.

Area "A"

Reported: Manufacture of ammonium sulfate from synthetic ammonia and sulfuric acid.
Actual: As reported.

Area "B"

Reported: Manufacture of ammonium sulfate from synthetic ammonia and sulfuric acid. Also suspected manufacture of nitric acid and ammonium nitrate.

Actual: Manufacture of ammonium sulfate from synthetic ammonia and sulfuric acid. Manufacture of nitric acid and ammonium nitrate.

b. Boundaries.

Correct as reported.

c. Building Identification (F/A Table).

d. Summary of Tabulation

TABLE 1

TOTAL PLANT
F/A ACCURACY FACTOR
Total plant 63.9
Primary buildings 81

	No. Bldgs	%
Correct	33	43
Unidentified	38	49
Incorrect	6	8
Total	77	100

TABLE 2

AREA "A"
F/A ACCURACY FACTOR
All buildings 85.3
Primary buildings 99.6

	PRIMARY BUILDINGS		ALL BUILDINGS	
	No. Bldgs	%	No. Bldgs	%
Correct	5	100	13	93
Unidentified	0	–	0	–
Incorrect	0	–	1	7
Total	5	100	14	100

TABLE 3

AREA "B"
F/A ACCURACY FACTOR
All buildings 57.2
Primary buildings 62.2

	PRIMARY BUILDINGS		ALL BUILDINGS	
	No. Bldgs	%	No. Bldgs	%
Correct	7	41	20	32
Unidentified	10	59	38	60
Incorrect	0	–	5	8
Total	17	100	63	100

e. Remarks.

(1) Reliable prewar drawings of the building layout of AREA "A" were available, and were largely responsible for the high accuracy of the functional analysis of this section of the plant.

(2) Though the overall identification of building functions of AREA "B" was poor (because of the large number of unidentified buildings) several of the primary buildings were correctly identified, principally by photographic interpretation. It appears that once the process of a chemical plant as complex as this is known, the function of a reasonable number of key buildings - and possibly of secondary buildings - may be identified, assuming sufficient study of the process involved.

(3) Two unidentified structures, a steam plant and an outdoor transformer yard, should have been identified.

SHOWA FERTILIZER CO., LTD.

FUNCTIONAL ANALYSIS TABLE

90.17 - 137

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG AREA "A"		FUNCTION ACTUAL	EVALUATION CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
1		x	Ammonia Synthesis		Ammonia Synthesis #1	x								98	
a			Synthesis		Synthesis										
b			Compressors & Poss. Synthesis		Compressors & Air Liq										
c			Air Liq & Nitrogen Separation		Air Compressors										
2			Nitrogen Gas Holder		Gasometer (Nitrogen)	x								100	
3			Hydrogen Gas Holder		Gasometer (Hydrogen)	x								100	
4			Poss. Bottling Liq. Ammonia and Ammonia		Recovery Plant for spent lubricating oil				x					10	
5			Boiler House		Removed										
6			Offices		Offices	x								85	
7			Storage		Warehouse	x								85	
8			Distilled Water Plant (Ass. with Bldg 13)		Distilled Water Plant & Air Compressor	x								100	
9		x	Ammonium Sulfate Manuf & Stor (Fertilizer)		Ammonium Sulfate Manuf & Stor (Fertilizer)	x								100	
a			Ammonium Sulfate Storage		Ammonium Sulfate Silo (Storage)										
b			Ammonium Sulfate Drying		Ammonium Sulfate Drying										
c			Ammonium Sulfate Manuf		Ammonium Sulfate Manuf										
d			Fan Room		Blower Room										
10		x	Sulfuric Acid Plant (Chamber Process)		Sulfuric Acid Plant (Chamber Process)	x								100	
a			Pump Room		Pump Room										
b			Sulfuric Acid Towers		Sulfuric Acid Towers										
c			Sulfuric Acid Towers		Sulfuric Acid Towers										
d			Sulfuric Acid Towers		Sulfuric Acid Towers										
e			Pyrites Storage		Pyrites Storage										
f			Unidentified		?										
g			Unidentified		?										
h			Unidentified		?										
j			Pyrites Burning		Pyrites Roasting										

EXHIBIT M

SHOWA FERTILIZER COMPANY

90.17-137

PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS

11M.05

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SHOWA FERTILIZER CO., LTD.

FUNCTIONAL ANALYSIS TABLE

90.17 - 137

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG AREA "A"		FUNCTION ACTUAL	EVALUATION CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
10	k		Unidentified		Glover Tower										
	l		Unidentified		Glover Tower										
	m		Unidentified		Glover Tower										
	n		Unidentified		Pump Room										
	o		Unidentified		Pump Room										
	p		Unidentified		Acid Tower										
	q		Lead Chambers		Lead Chambers										
	r		Lead Chambers		Lead Chambers										
	s		Lead Chambers		Lead Chambers										
	t		Lead Work Shop												
11			Sulfuric Acid Tank		Sulfuric Acid Tank	x								100	
12			Oxygen Gas Holder		Oxygen Gas Holder	x								100	
13		x	Water Electrolysis Plant		Water Electrolysis Plant	x								100	
14		x	D.C. Rectifiers		D.C. Rectifiers Bldg	x								100	
15			Transformer Yard		Transformer Yard	x								100	
			"AREA B"												
16			Tanks (Some for Sulfuric Acid)		Sulfuric Acid Tank	x								85	
17			Tanks (Some for Sulfuric Acid)		Sulfuric Acid Tank	x								85	
18			Tanks (Some for Sulfuric Acid)		Sulfuric Acid Tank	x								85	
19			Tanks (Some for Sulfuric Acid)		Sulfuric Acid Tank	x								85	
20			Pile Material Poss. Sulfur or Pyrites		Pyrites	x								83	
21		x	Sulfuric Acid Plant - Contact Process		Sulfuric Acid Plant - Contact Process	x								100	
22		x	Sulfuric Acid Plant - Contact Process		Sulfuric Acid Plant - Contact Process	x								100	
23		x	Sulfuric Acid Plant - Contact Process		Sulfuric Acid Plant - Contact Process	x								100	
24		x	Sulfuric Acid Plant - Contact Process		Sulfuric Acid Plant - Contact Process	x								100	
25			Sulfuric Acid Plant - Contact Process		Sulfuric Acid Plant - Contact Process	x								100	
26		x	Unidentified		Boiler House				x					45	
27		x	Unidentified		Ammonia Synthesis (Catalysis) #2				x					45	
28		x	Compressor House & Ammonia Synthesis		Air Liquefaction, Nitrogen & Gas Compression	x								93	

EXHIBIT M

SHOWA FERTILIZER COMPANY

90.17-137

PHOTOGRAPHIC INTELLIGENCE — INDUSTRIAL ANALYSIS

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SHOWA FERTILIZER CO., LTD.

FUNCTIONAL ANALYSIS TABLE

90.17 - 137

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG AREA "B"		FUNCTION ACTUAL	EVALUATION CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
29			Unidentified		Water Reservoir-Pump House			x						45	
30			Unidentified		Methanol Tank			x						45	
31			Unidentified		Storehouse			x						45	
32			Unidentified		Soda Recovery			x						45	
33			Unidentified		Carbon Dioxide Wash - Water Recovery			x						45	
34			Unidentified		Carbon Dioxide Scrubbing Tower			x						45	
35			Unidentified		Catalyst Manufacture			x						45	
36			Gas Holder (Gas ?)		Nitrogen Gas Holder	x								85	
37			Gas Conversion & CO_2 Absorbtion		Gas Converter Bldg	x								100	
38			Unidentified		Hydrogen Sulfide Absorbtion (Sulfur Removal)			x						45	
39			Unidentified		Blower Room			x						45	
40		x	Steam Plant		Boiler House	x								100	
41			Gas Plants - Prob. Water Gas		Function questionable, Bldg empty										
42			Unidentified		Gas Generator Bldg			x						45	
43			Unidentified		Oxygen Compression and Bottling			x						45	
44			Gas Holder for Water Gas		Gas Holder for Water Gas	x								100	
45			Gas Holder for Water Gas		Gas Holder for Oxygen				x					0	
46			Gas Holder for Water Gas		Gas Holder for Oxygen				x					0	
47			Fuel Piles - prob Coke		Coke Yard	x								95	
48			Unidentified		Water Gas Generator			x						45	
49			Steam Plant & Water Gas		Water Gas Generator	x								100	
50			12 Sulfur Removal Tanks		Sulfur Removal Tanks	x								100	
51			Gas Conversion & CO_2 Absorbtion		Gas Converter	x								100	
52			Gas Holders for Purified Hydrogen		Gas Holder-Converter Gas				x					0	
53			Gas Holders for Purified Hydrogen		Gas Holder-Water Gas				x					0	
54			Gas Holders for Purified Hydrogen		Gas Holder-Oxygen				x					0	

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SHOWA FERTILIZER CO., LTD.

FUNCTIONAL ANALYSIS TABLE

90.17 - 137

BUILDING NUMBER JTG		PRIMARY	FUNCTION REPORTED JTG AREA "B"		FUNCTION ACTUAL	EVALUATION CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR	
55			Unidentified		Storehouse			x						45	
56			Unidentified		Repair Shop			x						45	
57			Unidentified		Storehouse			x						45	
58			Unidentified		Storehouse			x						45	
59			Unidentified		Storehouse			x						45	
60			Unidentified		Locomotive Shop			x						45	
61			Unidentified		Water Reservoir & Pump Hse			x						45	
62			Unidentified		Laboratory			x						45	
63			Unidentified		Nitric Acid Concentration			x						45	
64		x	Unidentified		Nitric Acid Absorb Towers			x						45	
65		x	Unidentified		Ammonia Oxydation Plant			x						45	
66			Unidentified		Nitric Acid Stor & Bottl			x						45	
67			Unidentified		Office (Nitric Acid Dept)			x						45	
68		x	Unidentified		Ammonia Oxydation			x						45	
69		x	Unidentified		Ammonia Oxydation			x						45	
70		x	Unidentified		Ammonia Oxydation & Nitric Acid Concentration			x						45	
71		x	Unidentified		Nitric Acid Absorbing & Concentration Houses			x						45	
72			Unidentified		Pump House			x						45	
73			Unidentified		Water Purifying Plant Storehouse & Repair Shed			x						45	
74		x	Unidentified		Ammonium Nitrate Manuf			x						45	
75			Unidentified		Water Pump Room			x						45	
76			Unidentified		Storehouse			x						45	
77			Unidentified		Transformer Yard			x						45	
78		x	Unidentified		Blower Room - Ammonium Sulfate Liquor Tanks			x						45	
79		x	Ammonium Sulfate Manuf & Storage		Ammonium Sulfate Manuf ? Storage	x								100	
2			Ammonium Sulfate Manuf & Drying		Amm Sul Manuf Centrif Sep										

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FUNCTIONAL ANALYSIS TABLE

90.17 - 137

BUILDING NUMBER		PRIMARY	FUNCTION REPORTED	FUNCTION ACTUAL	EVALUATION CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
	JTG		JTG AREA "B"										
79	b		Ammonium Sulfate Manuf & Drying	Amm. Sul. Man. Saturation Rm									
	c		Ammonium Sulfate Manuf & Drying	Ammonium Sulfate Drier Room									
	d			Conveyor									
	e		Connected with Conveyor for Loading	Conveyor									
	f		Ammonium Sulfate Storage	Ammonium Sulfate (Fertilizer) Silo									
	g		Connected with Conveyor for Loading	Conveyor									
80			Large Stock Yards & Overhead Cranes	Coal Yard & Overhead Cranes	x								85
81			Large Stock Yards & Overhead Cranes	Storage Yard & Overhead Cranes					x				85

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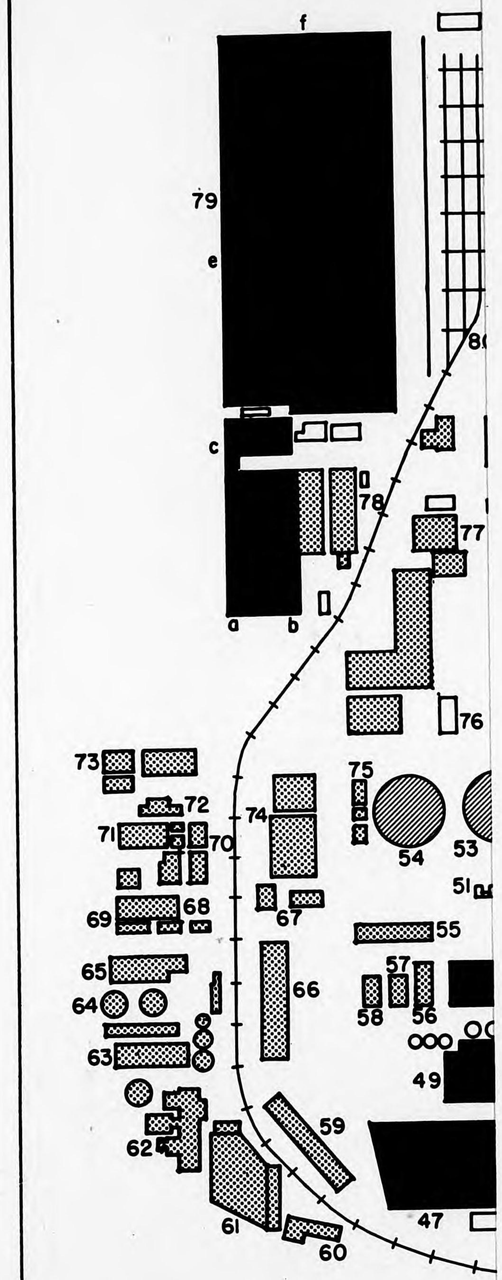
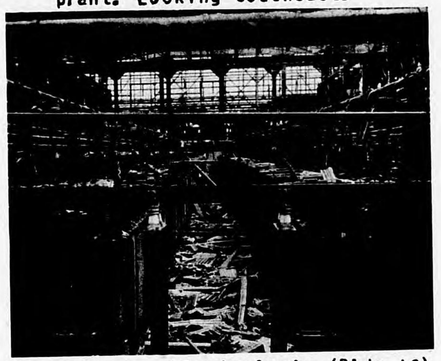


A Ammonia Synthesis Plant 1 (Bldg 1) and wrecked copper-liquor recovery plant. Looking Southeast.



B Interior Electrolysis (Bldg 13) showing electrolytic cells. Looking East.

C Ammonia Synthesis Plant 2 - Gas Compression Building (Bldg 28).
1. Carbon Dioxide Absorbing Towers (Bldg 34) - Left
2. Concrete Water Tower (Bldg 33) - Left center
3. Wrecked Nitrogen Tank (Bldg 36) - Center-Looking Northwest

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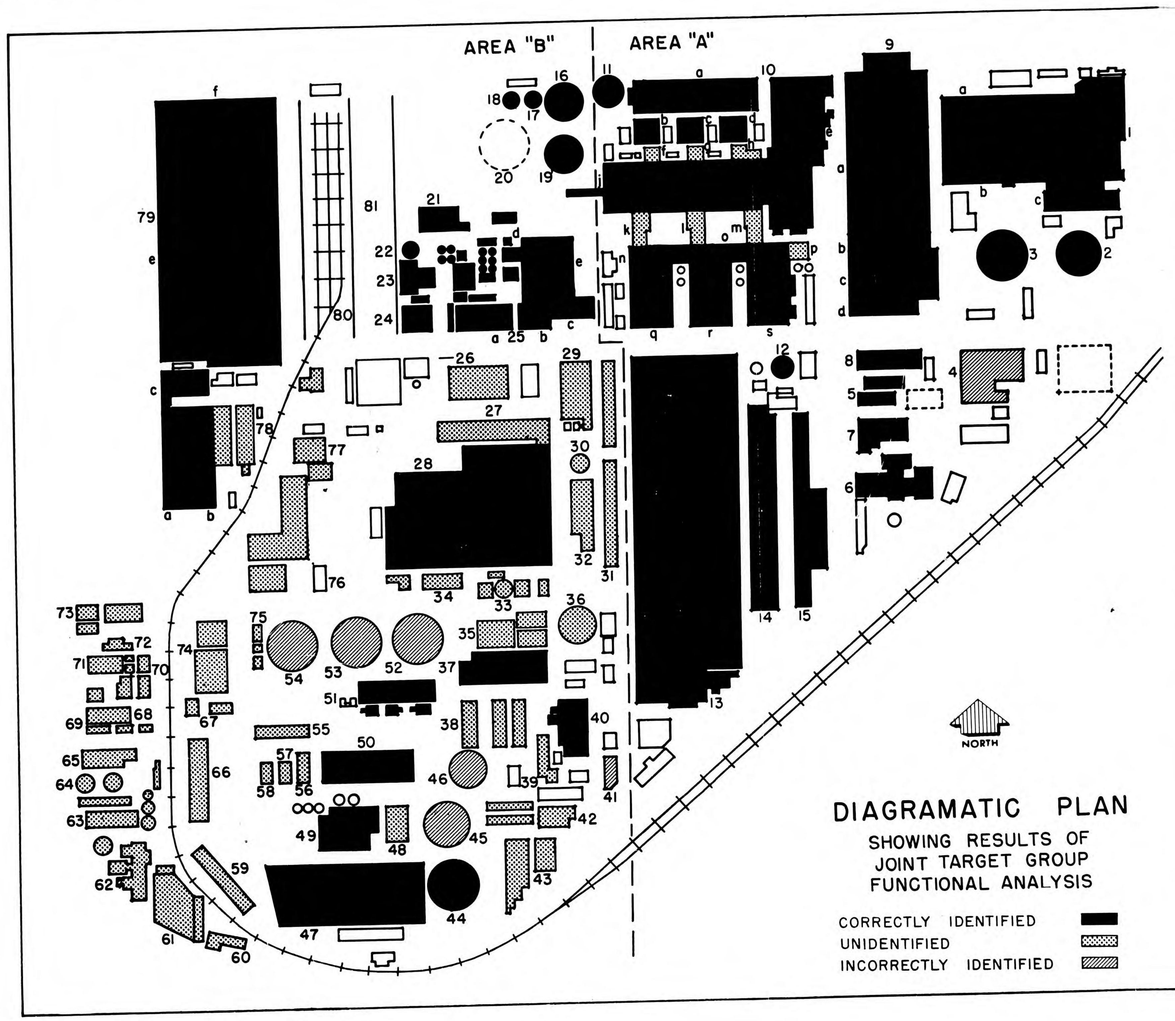
FUNCTIONAL ANALYSIS TABLE

SHOWA FERTILIZER CO., LTD. — 90.17 - 137

BUILDING NUMBER	PRIMARY	REPORTED FUNCTION	ACTUAL FUNCTION	EVALUATION: CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
JTG		JTG AREA "B"						
79 b		Ammonium Sulfate Manuf & Drying	Amm. Sul. Man. Saturation Rm					
c		Ammonium Sulfate Manuf & Drying	Ammonium Sulfate Drier Room					
d			Conveyor					
e		Connected with Conveyor for Loading	Conveyor					
f		Ammonium Sulfate Storage	Ammonium Sulfate (Fertilizer) Silo					
g		Connected with Conveyor for Loading	Conveyor					
80		Large Stock Yards & Overhead Cranes	Coal Yard & Overhead Cranes	x				85
d1		Large Stock Yards & Overhead Cranes	Storage Yard & Overhead Cranes	x				85



DIAGRAMATIC PLAN

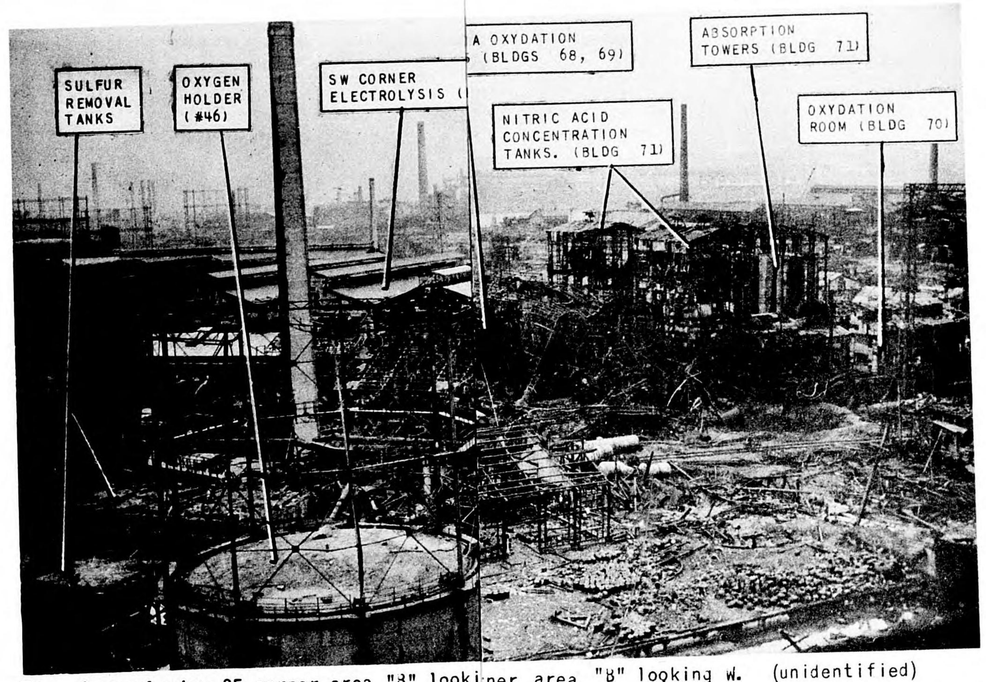
SHOWING RESULTS OF JOINT TARGET GROUP FUNCTIONAL ANALYSIS

CORRECTLY IDENTIFIED
UNIDENTIFIED
INCORRECTLY IDENTIFIED

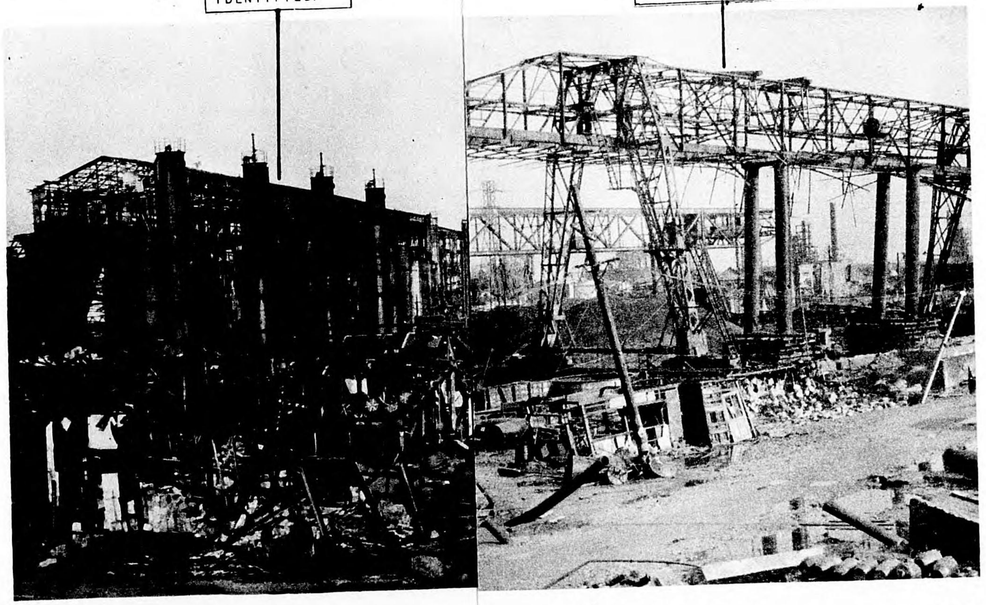
A Ammonia Synthesis Plant I (Bldg I) and wrecked copper-liquor recovery plant. Looking Southeast.

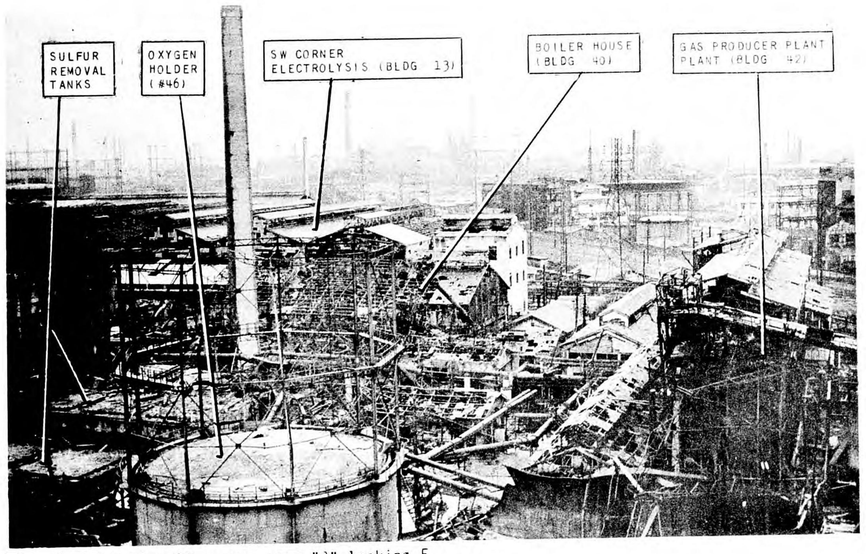
B Interior Electrolysis (Bldg 13) showing electrolytic cells. Looking East.

C Ammonia Synthesis Plant 2 - Gas Compression Building (Bldg 28).
1. Carbon Dioxide Absorbing Towers (Bldg 34) - Left
2. Concrete Water Tower (Bldg 33) - Left center
3. Wrecked Nitrogen Tank (Bldg 36) - Center-Looking Northwest

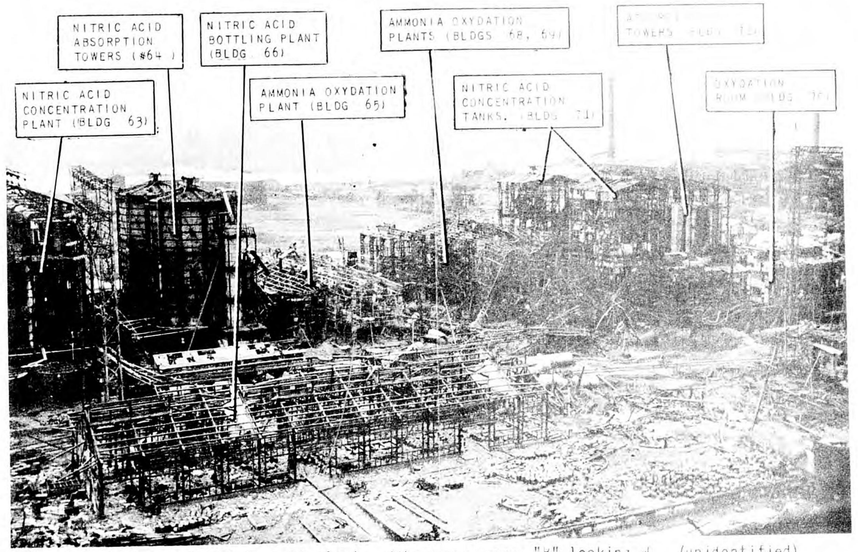


D General view SE corner area "B" lookiner area "B" looking W. (unidentified)

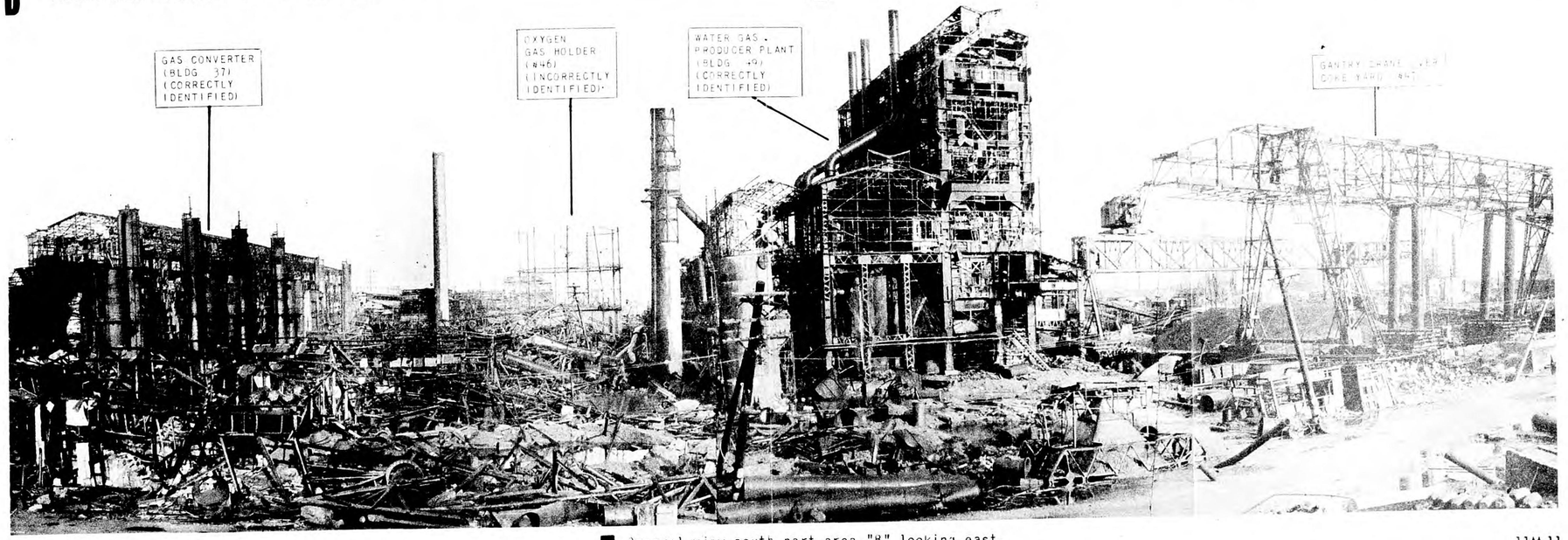




D General view SE corner area "B" looking E.



E General view of nitric acid plant. SW corner area "B" looking W. (unidentified)

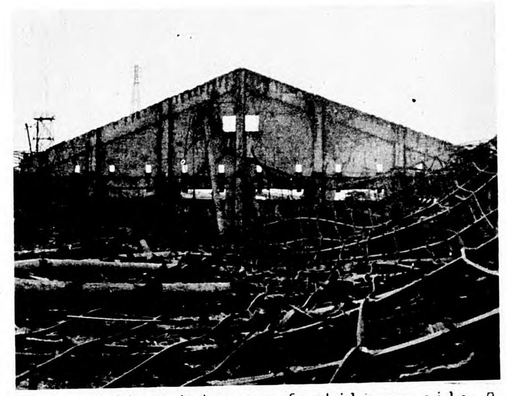


F General view south part area "B" looking east.

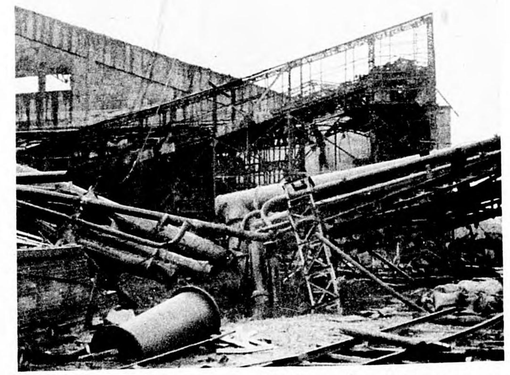
SHOWA FERTILIZER COMPANY

G Ammonium sulfate plant, blower room, Bldg 73 looking W. (Unidentified)

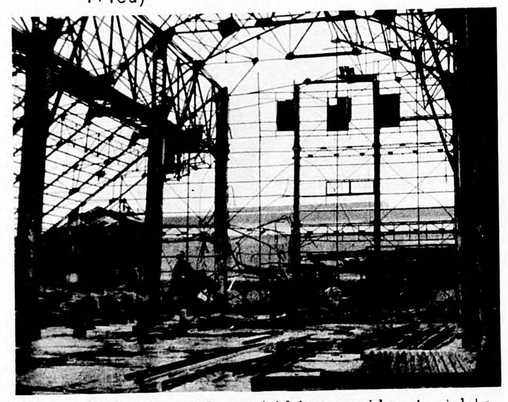
H Ammonium sulfate plant separation bldg 79 looking N. (correctly identified)



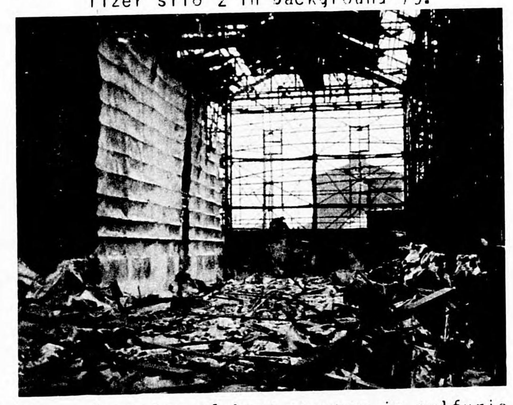
I Gutted interior fertilizer silo 2, bldg 79 looking N. (correctly identified)



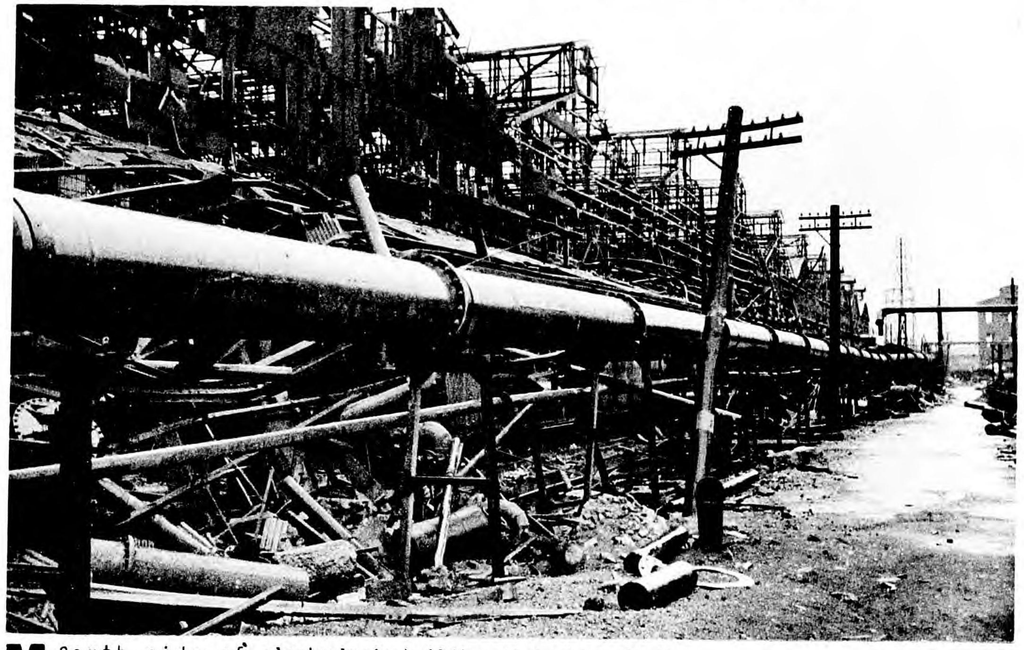
J Wrecked pipe bridge in foreground ammonium sulfate conveyor to fertilizer silo 2 in background 79.



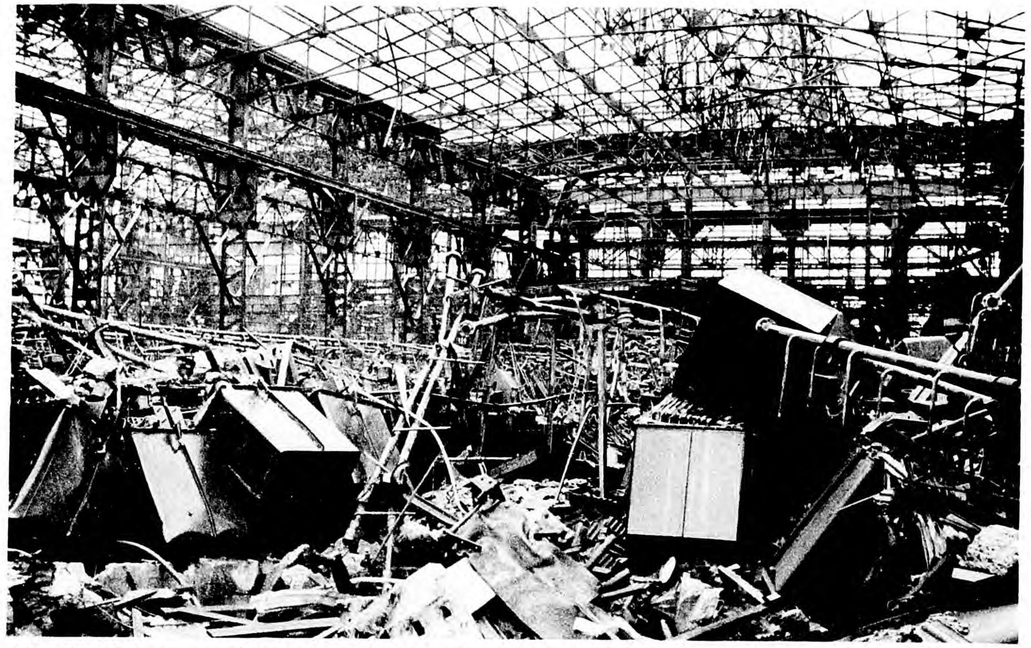
K Interior of fertilizer silo 1, bldg 9 looking N. (correctly identified)



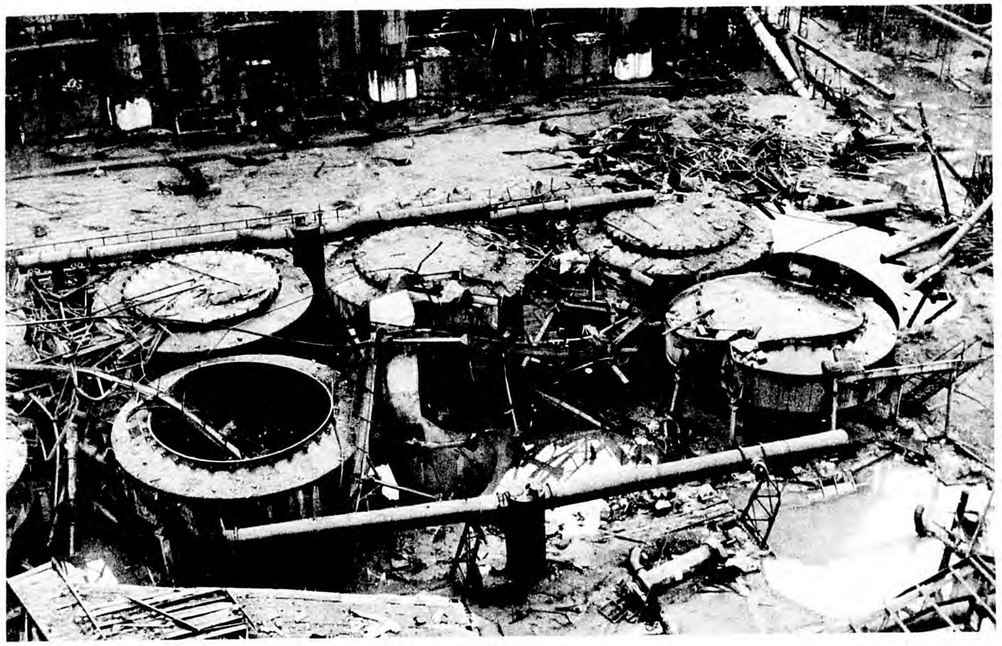
L Interior of lead chamber in sulfuric acid plant bldg 10. (correctly identified)



M South side of electrolysis building 13 looking South.



N Interior of electrolysis building 13, showing wrecked electrolytic cells. (correctly identified)



O Sulfur removal tanks 50 (correctly identified)

P Wrecked sulfuric acid tank cars, looking W between fertilizer silo 1, Bldg 9 and sulfuric acid plant bldg 10.

[redacted]

EXHIBIT N
NIPPON OIL REFINERY
90.25-1203

LAT. 34° 42'N - LONG. 135° 24'E

AMAGASAKI, JAPAN

See Exhibit P for abbreviations used in this exhibit.

[redacted]

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90.25-1203 NIPPON OIL REFINERY

LETTERS ON AERIAL PHOTOGRAPH CORRESPOND TO LETTERS OF GROUND PHOTOGRAPHS FOUND AT THE END OF THIS EXHIBIT. ARROWS INDICATE DIRECTION OF PHOTOGRAPHY.

FOR A COMPARISON OF THE GROUND VIEWS INDEXED HERE WITH THE TYPE OF THREE DIMENSIONAL AERIAL VIEW FROM WHICH THE INTERPRETATION WAS DONE SEE VECTOGRAPH EXHIBIT A IN THE ENVELOPE ACCOMPANYING THIS REPORT.

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NIPPON OIL REFINERY 90.25 - 1203

1. DESCRIPTION OF TARGET

a. The Nippon Oil Refinery, Amagasaki, was the most important refinery in the Osaka Area.

b. The refinery is located on reclaimed land east of the mouth of the Muko River on the west side of Amagasaki Harbor.

c. Field investigation revealed that the target area was occupied by two separate companies, the north portion by the Nippon Oil Refinery, the south portion by a synthetic oil plant allied to the Amagasaki Iron Works. There were a total of 101 listed structures in the area, comprising a built-up area of 610,700 sq. ft.

2. SUMMARY

a. The overall interpretation of building functions was good, particularly of the primary buildings. Of the 97 buildings checked:

(1) 54 were identified correctly.
(2) 16 were identified as having similar occupancy.
(3) 11 were unidentified.
(4) 16 were identified incorrectly.

b. No structural analysis was made.

c. Two CIU (XXI BC) Damage Assessment Reports were used to obtain the cumulative damage estimates. The amount and character of damage was very much underestimated as shown in Table I. The small size and generally complex pattern of the types of equipment comprising a major part of an oil refinery makes recognition of damage very difficult.

TABLE I

	ACTUAL Sq Ft	REPORTED Sq Ft
Structural Damage	567,900	396,600
Superficial Damage	18,300	76,500
Minor Damage *	24,100	15,000
Total Damage	610,300	488,100

* In general, Minor Damage was purposely omitted in D/A reports.

3. SOURCE OF DATA

a. Reported.

(1) AC/AS Intelligence F/A Report #99, 24 March 1945
(2) CIU (XXI BC) Industrial Report #54, 5 July 1945
(3) CIU (XXI BC) D/A Report #155, 29 July 1945
(4) CIU (XXI BC) D/A Report #191, 21 July 1945

b. Field Data.

(1) USSBS (3-2, PIC) field notes.

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4. FUNCTIONAL ANALYSIS

a. Use of Plant.

Reported: Refinery and synthetic oil plant.
Actual: As reported.

b. Boundaries.

As reported. Two separate companies, one, the Nippon Oil Refinery, the other, a synthetic oil plant, associated with the Amagasaki Iron Works were found to be within the target area.

c. Building Identification (F/A Table).

d. Summary of Tabulation.

TABLE 2

F/A ACCURACY FACTOR

		PRIMARY BUILDINGS		TOTAL BUILDINGS	
		No. Bldgs	%	No. Bldgs	%
Total Plant 72	Correct	19	86	54	56
Primary Buildings 84	Of Similar Occupancy	—	—	16	16
	Unidentified	—	—	11	12
	Incorrect	3	14	16	16
	Total	22	100	97	100

e. Remarks.

The identification of secondary structures in this target was the more difficult. The bulk of the listed primary structures were large storage tanks.

FUNCTIONAL ANALYSIS TABLE

NIPPON OIL REFINERY — 90.25-1203

BUILDING NUMBER JTG	PRIMARY	REPORTED FUNCTION: Joint Target Group	ACTUAL FUNCTION	EVALUATION: CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
1		Unidentified	Catylist Making Building			x		45
2		Unidentified	Employees Entrance Bicycle Racks				x	45
3		Storage or Quarters	Warehouse - Finished Products		x			78
4		Storage or Quarters	Warehouse - Finished Products		x			78
5		Storage or Quarters	Warehouse - Finished Products		x			78
6		Storage or Quarters	Warehouse - Finished Products		x			78
7		Storage or Quarters	Warehouse - Finished Products		x			78
8		Storage or Quarters	Employees bath room - wash room		x			65
9		Probable Storage	Machine Shop & Drum repair				x	20
10		Probable Storage	Garage & Shipping of Fuel			x		45
11		Unidentified	Gasoline Storage Tanks	x				85
12		Small Tanks	Material Store Houses	x				100
13		Storage Building	Material Store Houses	x				100
14		Storage Building	Can filling Room - Drum			x		70
15		Storage Building	Can Manufacturing				x	15
16		Storage Building	Can Manufacturing & Drum Filling				x	15
17		Storage Building	Drum Storage	x				85
18		Storage Building	Boiler Room					85
19		Still	Pump house - Stor. Propane & Butane			x		45
20		Unidentified	Crude Distillation Unit			x		85
21		Cracking or Secondary Distillati on	Thermal cracking & Calylitic Cracking	x				100
22		Cracking or Secondary Distillation	Product Tanks	x				100
23		(8) Run down tanks	Product Tanks	x				100
24		(8) Run down tanks	Product Tanks	x				100
25		(4) Run down tanks	Product Tanks	x				100
26		(6) Intermediate Tanks	Product Tanks	x				100
27		(6) Intermediate Tanks	Product Tanks	x				100
28		(4) Intermediate Tanks	Laboratory & Pumphouse				x	82
29		Possible Office or Laboratory	Office			x		88
30		Possible Office or Laboratory	Storage Tanks				x	85
31	x	(12) Storage Tanks Approx. 50' Dia.						

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FUNCTIONAL ANALYSIS TABLE

NIPPON OIL REFINERY — 90.25-1203

BUILDING NUMBER JTG	PRIMARY	FUNCTION: REPORTED (Joint Target Group)	FUNCTION: ACTUAL	EVALUATION: CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
32		(3) Tanks without tops (1) 25' (2) 40'	Storage Tanks	x								85
33		(4) Tanks 40' Diameter	Storage Tanks	x								85
34		(1) Tank 40' Diameter	Storage Tanks	x								85
35		(5) Horizontal pressure Tanks	Gasoline treating Plant		x							70
36		Lube Oil Plant	Slops dehydration				x					0
37		Unidentified	Sulfuric Acid Plant			x						45
38	x	(4) Storage tanks Approx. 50' Diameter	Storage Tanks	x								100
39		(5) Small tanks (3) 40' (2) 20'	Storage Tanks	x								100
40		Storage Shed	Warehouse	x								100
41		Shop Building	Open Storage				x					0
42		Tanks 35' Diameter	Water Tanks & Foamite Pumps	x								85
43	x	Tank 145' Diameter	Crude Oil Storage Tanks	x								85
44	x	Tank 145' Diameter	Crude Oil Storage Tank	x								85
45	x	Tank 50' Diameter	Crude Oil Storage Tank	x								85
46		Gas Holder 100' Diameter	Gas Holder	x								100
47		Gas Holder 100' Diameter	Gas Holder	x								100
48		Gas Holder 100' Diameter	Gas Holder	x								100
49		Gas Holder 115' Diameter	Gas Holder	x								100
50		Small Gas Holder	Gas Holder	x								100
51		Small Gas Holder	Gas Holder	x								100
52		(3) Small tanks	Tanks	x								100
53		Possible Pump House	Pump House & Laboratory	x								90
54		Unidentified	Hydrogen Plant				x					45
55		Poss. Gas purification building	Oxygen Plant					x				10
56		Poss. Gas purification building	Oxygen Plant					x				10
57		Poss. Gas purification building	Compressor House					x				10
58	x	Possible Water gas plant	Gas Purification Equipment					x				10
59	x	Possible Water gas plant	Water gas plant	x								90
60		Unidentified	Producer gas plant				x					45
61		Unidentified	Coal Dryer				x					45
62		Probable boiler house	Steam plant	x								95

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FUNCTIONAL ANALYSIS TABLE

NIPPON OIL REFINERY — 90.25-1203

BUILDING NUMBER JTG	PRIMARY	FUNCTION: REPORTED (Joint Target Group)	FUNCTION: ACTUAL	EVALUATION: CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
63		Gas Convertors	Gas Cracking Plant				x					0
64		Unidentified	Cooling Water Sump			x						45
65		Small Cascade Cooling Tower	Cooling Tower	x								100
66	x	(4) Hydrogen Sulphide removal columns (Cover removed from one)	Desulfurization Plant	x								100
67		Control building	Desulphurization Plant				x					0
68	x	(4) Organic sulphur removal - tower	Compressor House				x					0
69		Gantry crane servicing 66-68	Final Desulphurization Plant				x					0
70		Cascade cooling tower and probable pump house	Cooling house - pump house	x								98
72		Compressor house	Blower house			x						85
71		Poss. Splitting of Coke oven gas	Main Electric Substation				x					10
73	x	Contact oven house	Reactor Building				x					0
74		Office	Office & Warehouse	x								85
75		Office	Office & Warehouse	x								85
76		(2) Tanks	(2) Small Tanks	x								85
77		Boiler house	Steam plant	x								100
78		Storage Building	Office & Warehouse	x								85
79		Storage Building	Office & Warehouse	x								85
80		Storage Building	Office & Warehouse	x								85
81		Unidentified	Gas Separation Plant & Compressor Pump-house				x					45
			Gas Separation Plant - Butane Storage				x					45
82		Unidentified	Gas Separation Plant			x						85
83		Removal of oils by activated Carbon	Steam Still			x						85
84		Intermediate tanks	NOT ASSOCIATED WITH PLANTS IN THE TARGET AREA.									
85	x	Storage Tank 85' Diameter										
86	x	Storage Tank 85' Diameter										
87	x	Storage Tank 65' Diameter										
88		Pump house & Sheds										
89	x	Tank farm - Storage Tanks 114' Diameter	Storage Tanks Crude Oil or Refined Oil	x								100
90	x	" " " " " " " "	" " " " " "	x								100
91	x	" " " " " " " "	" " " " " "	x								100

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FUNCTIONAL ANALYSIS TABLE

NIPPON OIL REFINERY — 90.25-1203

BUILDING NUMBER	PRIMARY	REPORTED FUNCTION	ACTUAL FUNCTION	EVALUATION: CORRECT	SIMILAR	UNIDENT	WRONG	CORRECT	SIMILAR	UNIDENT	WRONG	F/A ACCURACY FACTOR
JTG		Joint Target Group										
92	x	Tank Farm - Storage Tanks 114" Diameter Storage Tanks	Tanks, Crude Oil or Refined Oil	x								100
93	x	" " " " " " "	" " " " " " "	x								100
94	x	" " " " " " "	" " " " " " "	x								100
95	x	" " " " " " "	" " " " " " "	x								100
96	x	" " " " " " "	" " " " " " "	x								100
97	x	" " " " " " "	" " " " " " "	x								100
98	x	" " " " " " "	" " " " " " "	x								100
99	x	" " " " " " "	" " " " " " "	x								100
100	x	" " " " " " "	" " " " " " "								x	0
101		Pump house										

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5. DAMAGE ASSESSMENT

a. D/A: (See D/A Table).

b. Summary of Tabulation.

TABLE 3

	PRIMARY BUILDINGS				TOTAL BUILDINGS			
	ACTUAL		REPORTED		ACTUAL		REPORTED	
	Sq Ft	% Dam	Sq Ft	% Dam	Sq Ft	% Dam	Sq Ft	% Dam
Total Building Area	217,500		217,500		610,700			
Damage								
Structural	207,500	95	136,900	63	567,900	92	396,600	65
Superficial	2,000	1	0	0	18,300	3	76,500	12
Minor *	6,100	3	0	0	24,100	4	15,000	2
Total Damage	215,600	99	136,900	63	610,300	99	488,100	79

* In general, Minor Damage was purposely omitted in D/A reports.

c. Remarks.

The intricate and highly condensed building layout of some chemical plants and all oil refineries makes it very difficult for the photographic interpreter to assess damage, since no regular outline of damage is seen, but rather a tangle of outdoor chemical equipment, which even when undamaged was difficult to identify.

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NIPPON OIL REFINERY

DAMAGE ASSESSMENT TABLE

90.25-1203

BUILDING NUMBER		BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			REMOVED (1000'S SQ. FT.)		
JTG			ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
1		3.1	3.1		3.1									
2		12.4	6.2		7.4				6.2					
3		4.1	4.1		4.1									
4		4.3	4.3		4.3									
5		4.3	4.3		4.3									
6		4.1				2.5			1.6		4.1			
7		4.4	4.4		4.4									
8		4.4	4.4		4.4									
9		5.9	5.9	5.9										
10		5.6	5.6		5.6									
11		0.4	0.4		0.4									
12		12.6							10.1					
13		6.5	6.5		1.3						5.2			
14		6.5	6.5	3.2	6.5									
15		6.6	6.6					6.6						
16		5.0	5.0		5.0									
17		6.7	5.0		6.7	1.7								
18		6.7	3.4			3.4		6.7						
19		2.4	1.2			1.2		2.4						
20		5.2	3.1		3.1	2.1		2.1						
21		4.7	4.7		2.4			2.4						
22		7.7	7.7		7.7									
23		3.0	3.0		2.3									
24		3.0	3.0		3.0									
25		1.5	1.5		1.5									
26		4.2	4.2		2.8									
27		4.2	4.2		2.1									
28		2.8	2.8	2.8	2.1									
29		4.8	4.8	1.2	4.8									
30		3.0	3.0		3.0									
31		20.3	18.7	5.1	5.1	1.6								
32		4.7	4.7	4.7										
33		6.1	6.1		6.1									

*In general, Minor Damage was purposely omitted in D/A reports.

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NIPPON OIL REFINERY

DAMAGE ASSESSMENT TABLE

90.25-1203

BUILDING NUMBER		BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			REMOVED (1000'S SQ. FT.)		
JTG*			ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
35		10.9	10.9		10.9									
36		6.4	6.4		6.4									
37		3.3	3.3				3.3							
38		8.6	8.6		4.3									
39		4.5	4.5		4.5									
40		3.0	3.0	1.5										
41		4.4	4.4	4.4										
42		1.9	1.9											
43		12.5	12.5		12.5									
44		12.5	12.5		12.5									
45		6.1	6.1		6.1									
46		8.8	8.8	8.8										
47		8.8	8.8				8.8							
48		8.7	8.7	8.7										
49		11.3	11.3	11.3										
50		1.8	1.8				1.8							
51		7.7	7.7				7.7							
52		3.7	3.7	1.2	3.7		1.2							
53		3.2	3.2	3.2	3.2						1.6			
54		2.3	2.3	or dest	0.7									
55		9.0	9.0				9.0							
56		4.9	4.9				4.9							
57		2.2	2.2				2.2							
58		1.7	1.7											
59		4.2	4.2		4.2									
60		3.7	3.7				3.7							
61		3.0	3.0				3.0							
62		5.3	5.3	5.3										
63		1.9	1.9					1.9	Damaged					
64		4.6	4.6	4.6										
65		6.2	6.2	3.1										
66		5.0	5.0		5.0									
67		3.6	3.6		or dest			3.6						

*In general, Minor Damage was purposely omitted in D/A reports.

NIPPON OIL REFINERY

DAMAGE ASSESSMENT TABLE

90.25-1203

BUILDING NUMBER		BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)			SUPERFICIAL (1000'S SQ. FT.)			MINOR * (1000'S SQ. FT.)			REMOVED (1000'S SQ. FT.)		
JTG			ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED	ACTUAL	REPORTED	REPORTED
68		2.8	2.8		2.8									
69		2.1	2.1		1.0									
70		5.2	5.2					5.2*		Damaged				
71		8.2	8.2		4.1						4.1			
72		0.8	0.8		0.8									
73		40.3	30.3			2.0			6.1	sm. dam.	many holes			
74		5.8	5.8	5.8										
75		4.1	4.1	4.1										
76		1.1	1.1		0.5									
77		2.4	2.4	2.4										
78		6.4	6.4	6.4										
79		6.6	6.6		6.6									
80		4.4	4.4		4.4									
81		5.4	5.4		5.4									
82		2.8	2.8		2.8									
83		5.0	5.0		5.0									
84		1.2	1.2		1.2									
85		5.7	5.7	5.7										
86		5.7	5.7	5.7										
87		2.2	2.2	2.2										
88		1.7	1.7	1.7										
89		9.9	9.9	9.9										
90		9.9	9.9	9.9										
91		9.9	9.9	9.9										
92		9.9	9.9										9.9	
94		9.9	9.9	9.9										
95		9.9	9.9	9.9										
96		9.9	9.9											
97		9.9	9.9										9.9	
98		9.9	9.9	9.9										
99		9.9	9.9	9.9										
100		9.9	9.9	9.9										
101		3.8	3.8			3.8								

*In general, Minor Damage was purposely omitted in D/A reports.

OMITTED FROM LIST

BUILDING NUMBER		BUILDING AREA	STRUCTURAL (1000'S SQ. FT.)		
JTG			ACTUAL	REPORTED	REPORTED
34		1.3	1.3		1.3
93		9.9	9.9		

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11N.11

90.25-1203 NIPPON OIL REFINERY

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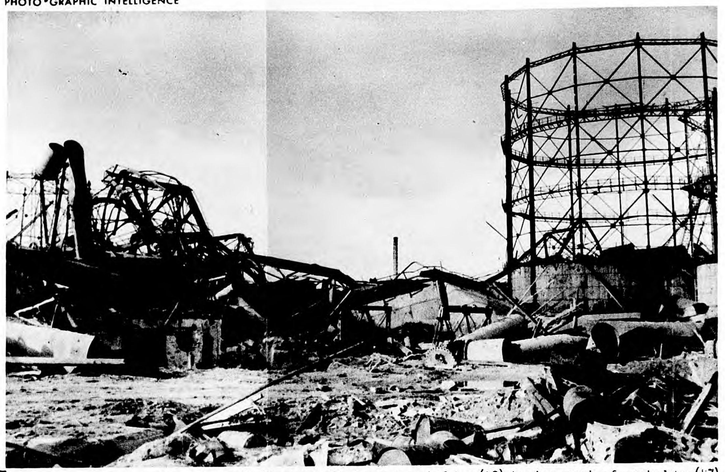
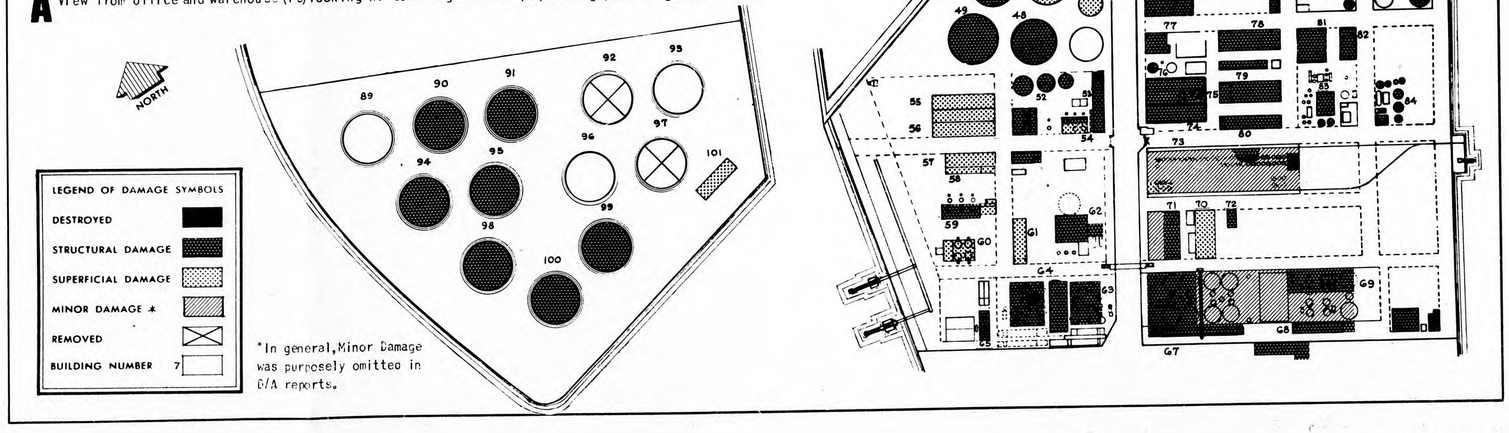
Reported
PHOTOGRAPHIC INTELLIGENCE



A View from office and warehouse (75) looking NW toward gasholder (48) showing part of gasholder (47).



*In general, Minor Damage was purposely omitted in D/A reports.

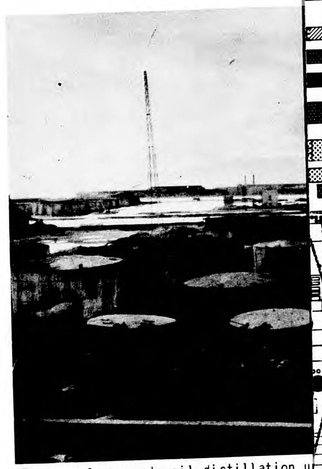
CONFIDENTIAL

CONFIDENTIAL

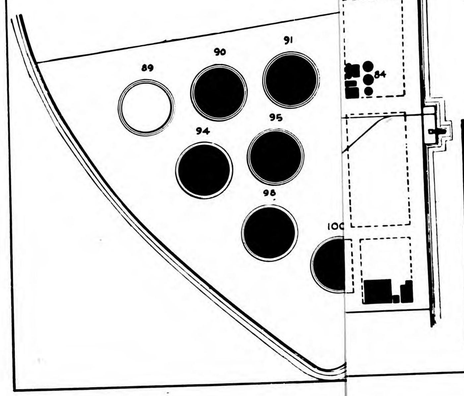
OIL REFINERY 90.25 - 1203

Actual
U.S.S.B.S. COMPILED GROUND INFORMATION

SEE VECTOGRAPH EXHIBIT A IN THE ENVELOPE ACCOMPANYING THIS REPORT FOR A THREE DIMENSIONAL VIEW OF THE NIPPON OIL REFINERY TAKEN AT APPROXIMATELY THE SAME TIME AS GROUND PHOTOGRAPHS ELSEWHERE IN THIS EXHIBIT.



B View from crude oil distillation u and pump house (29). Tank farm in

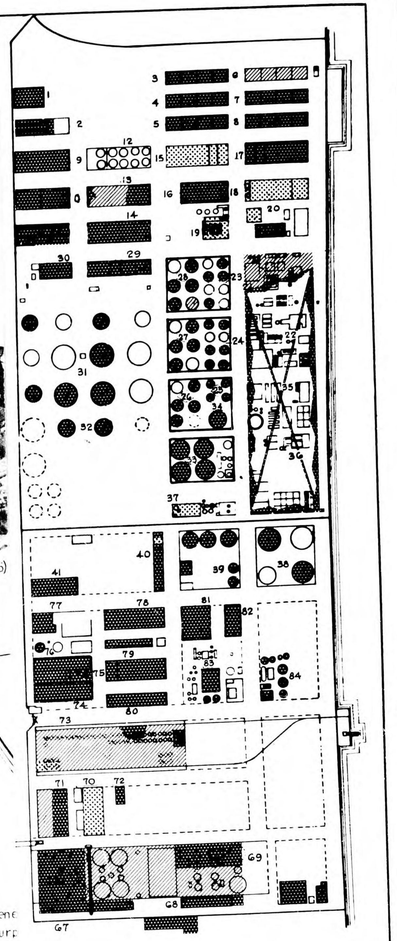


CONFIDENTIAL

90.25-1203 NIPPON

Reported
PHOTOGRAPHIC INTELLIGENCE

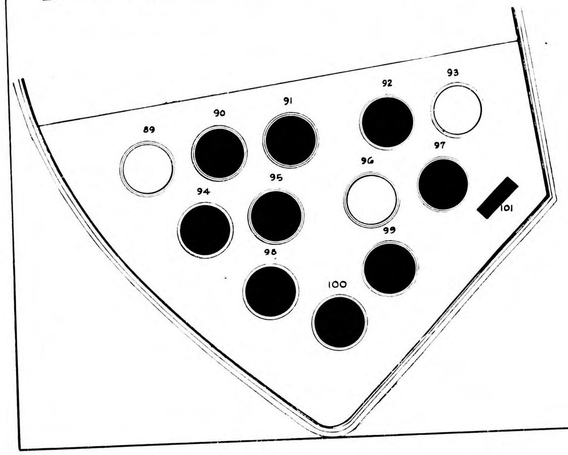
A View from office and warehouse (75)

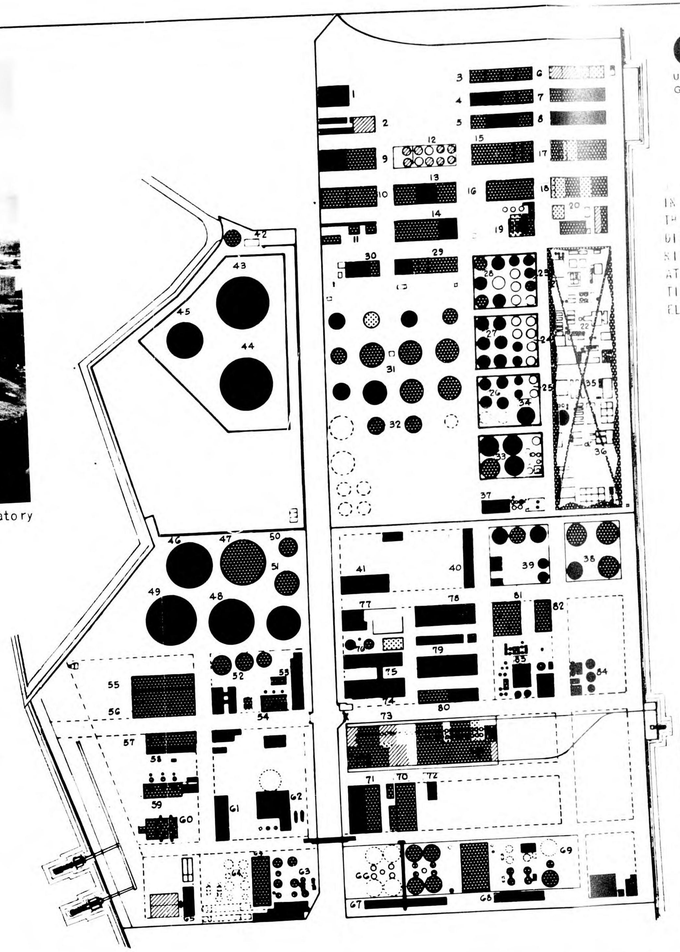


*In gene
was purp
G/A repo

NIPPON OIL REFINERY 90.25 - 1203

B View from crude oil distillation unit 21, looking NW toward laboratory and pump house (29). Tank farm in left background.





Actual
U.S.S.B.S. COMPILED GROUND INFORMATION

SEE VECTOGRAPH EXHIBIT A IN THE ENVELOPE ACCOMPANYING THIS REPORT FOR A THREE DIMENSIONAL VIEW OF THE NIPPON OIL REFINERY TAKEN AT APPROXIMATELY THE SAME TIME AS GROUND PHOTOGRAPHS ELSEWHERE IN THIS EXHIBIT.

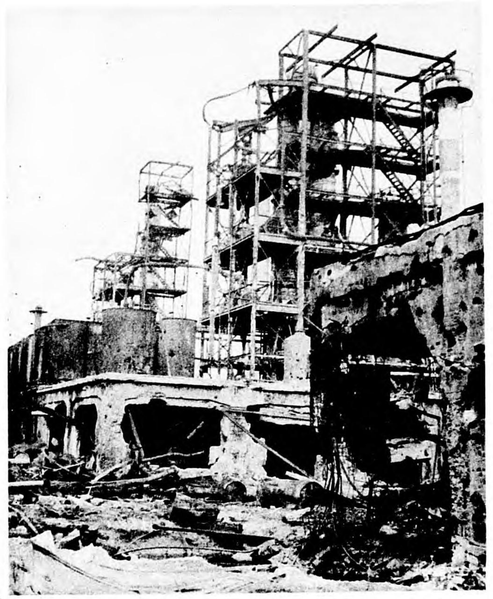
LEGEND OF DAMAGE SYMBOLS
DESTROYED
STRUCTURAL DAMAGE
SUPERFICIAL DAMAGE
MINOR DAMAGE
REMOVED
BUILDING NUMBER 7

NIPPON OIL REFINERY 90.25 - 1203

C Intense fire caused by drums filled with gasoline. View of building No. 8 looking NE.

D View of storage tanks from building No. 21 looking SW toward building No. 59.

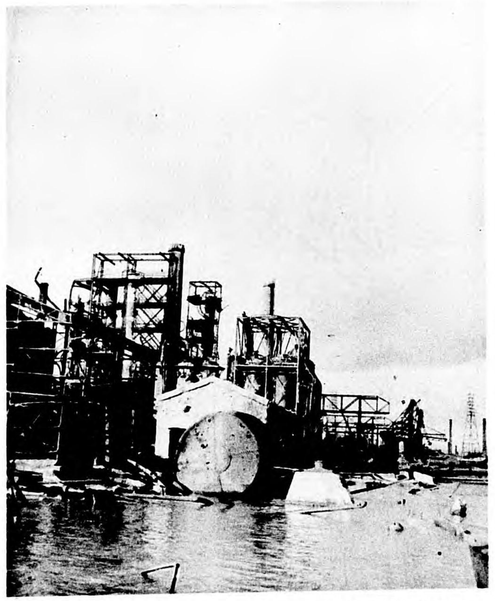
90.25-1203 NIPPON OIL REFINERY



E Damage caused by blast, fire and fragments. View from tank No. 34 looking NE toward units Nos. 21 and 22.

F Notice damage from fragmentation as well as explosions. Photo taken from tank No. 34 looking NW toward unit No. 31.

G Fragmentation damage to pipe lines and tanks are clearly visible from tank No. 34 looking NNE toward Nos. 27 and 28.



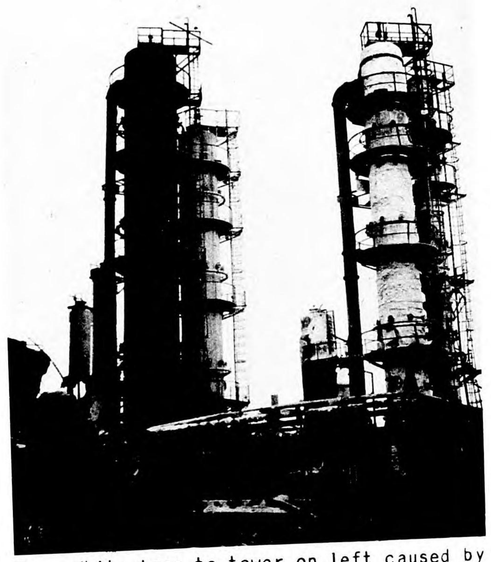
H View from seawall NE of No. 38 looking N. toward No. 35.

NIPPON OIL REFINERY 90.25 - 1203

I Notice stack fallen across building. Photo from position NE of unit No. 38 looking NE toward building No. 36.

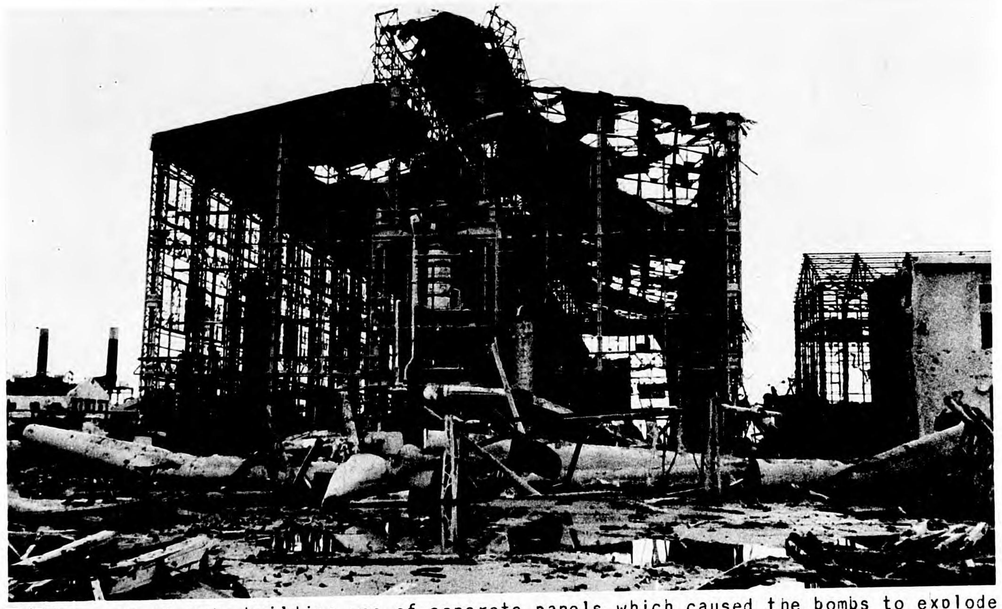
J View of tank group taken from road SE of tank No. 50 looking NE toward unit No. 31.

K Photo from position SE of building No. 32 looking N toward tank No. 39.



L White tone to tower on left caused by intense fire. View from between buildings No. 73 and 80 looking NE toward unit No. 83.

90.25-1203 NIPPON OIL REFINERY



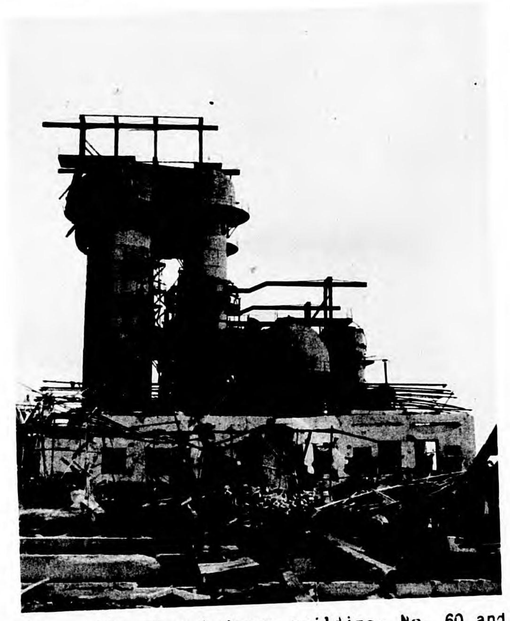
M The roof of this building was of concrete panels which caused the bombs to explode higher than anticipated. Ordinarily this roof would have been of corrugated metal or asbestos. View from between buildings Nos. 54 and 62 looking SE toward building No. 73.

N Notice relatively small damage to equipment due to fact that bombs exploded in roof structure building No. 73.

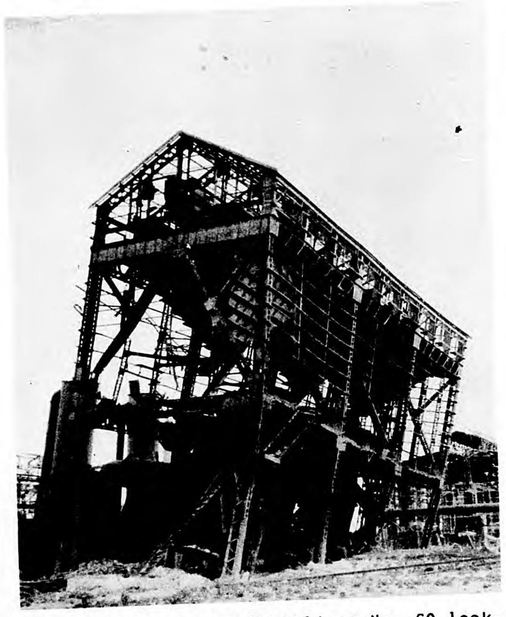
NIPPON OIL REFINERY 90.25 - 1203

O View SW of building No. 68 looking NW toward unit No. 63.

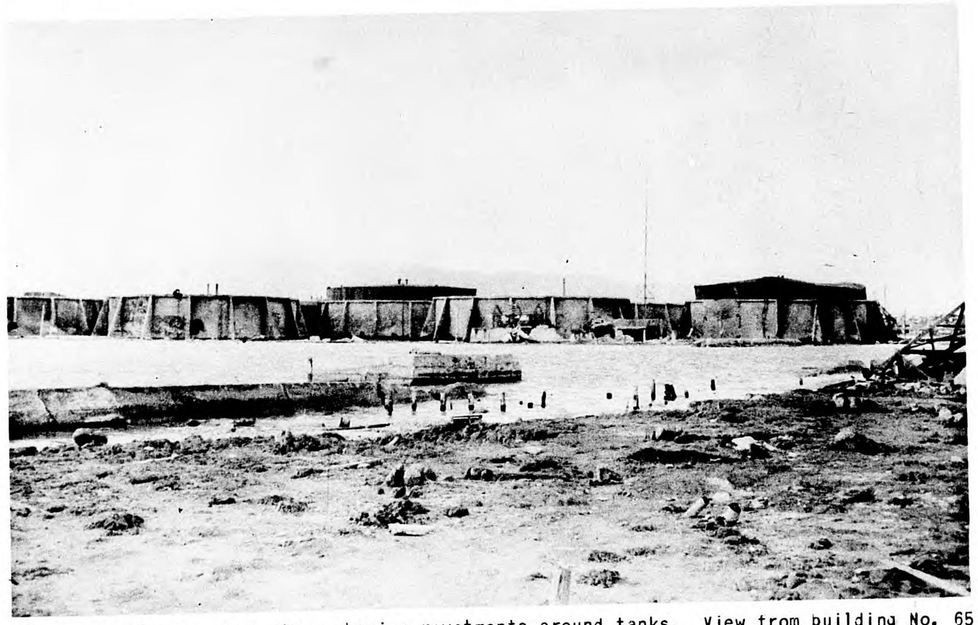
P View SW of building No. 68 looking NE toward unit 68 and overhead crane.



Q View from between buildings No. 60 and 65 looking SE toward unit No. 63.

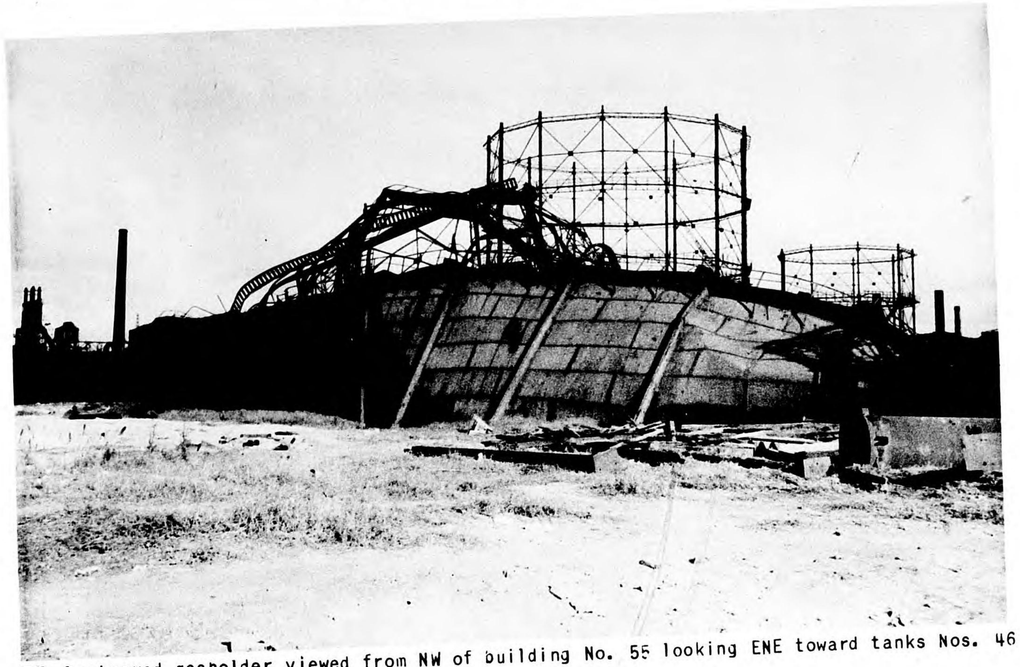


R View from NW of building No. 60 looking E toward building No. 59, building No. 73 in background.



S Tank farm across river showing revetments around tanks. View from building No. 65 looking NW toward tanks (93-99).

T View from between buildings No. 54 and 62 looking SE toward building No. 71.



U Destroyed gasholder viewed from NW of building No. 55 looking ENE toward tanks Nos. 46 and 49, tank No. 47 in background.

V View from road SE of tank No. 43 looking NW toward tanks No. 42 and 43.

EXHIBIT P

ABBREVIATIONS USED IN EXHIBITS B THROUGH N

1. General:

JTG	Joint Target Group
CIU	Central Interpretation Unit, XX Air Force
AC/AS	Assistant Chief of Air Staff, Intelligence
XXI BC	Twenty-first Bomber Command
OAS	Operations Analysis Section, XXI BC
R	Reported
A	Actual

2. Combustibility:

C	Combustible
N	Non-combustible
R	Fire-resistant

3. Construction:

B	Brick
Load B	Load bearing
B/U	Built-up roofing
C; Conc	Concrete
CA	Corrugated asbestos
CI	Corrugated iron
FB	Fiber board
LB	Load bearing construction
LT	Light construction
M	Metal
RC; R/C	Reinforced concrete
RC/F	Reinforced concrete frame
S	Steel
SF; S/F	Steel frame
SM	Sheet metal
T	Tile or slate
W	Wood
WF	Wood frame

4. For building construction types (A1.1, B2, etc) and HE vulnerability classifications (V1, V2, etc) see Text Table I and paragraph II I c.

VECTOGRAPH EXHIBIT A - NIPPON OIL REFINERY, AMAGASAKI

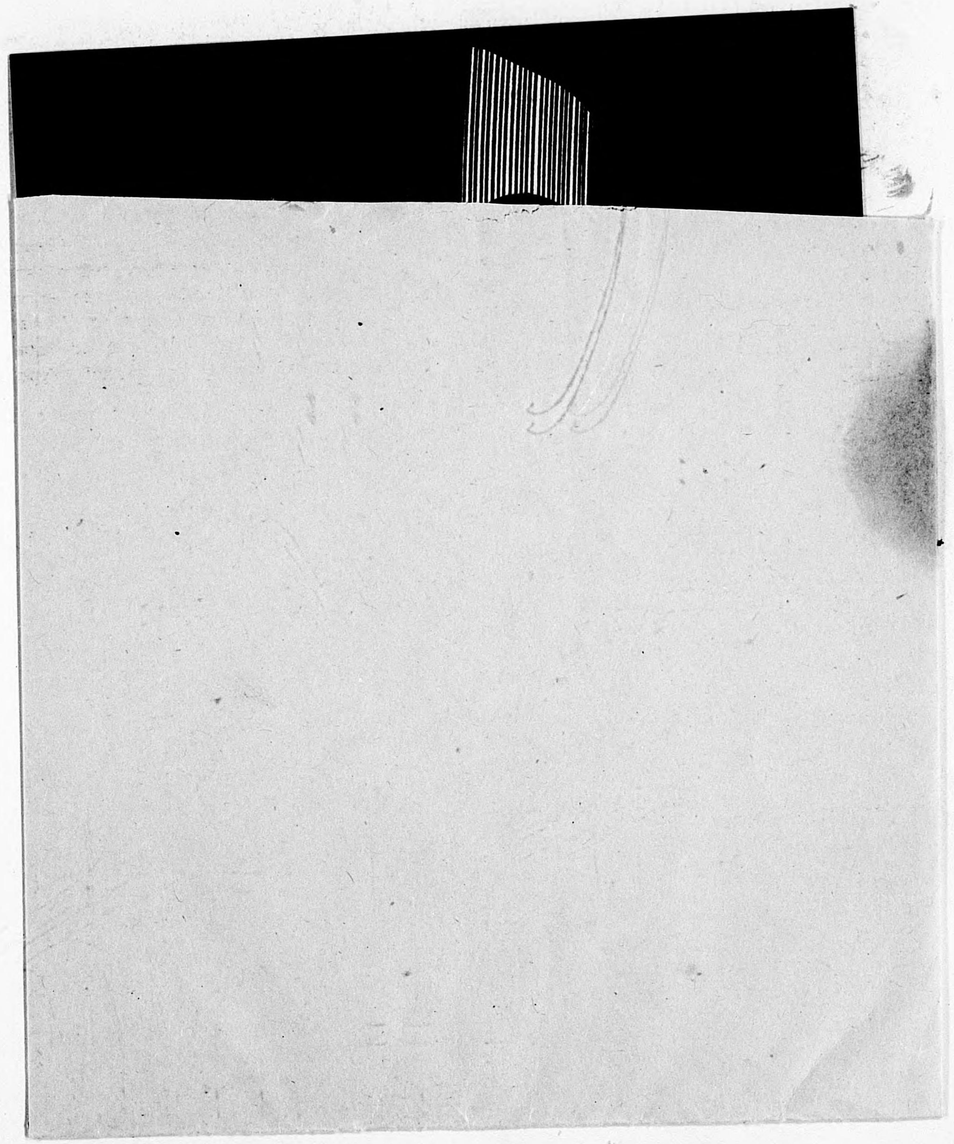
The Nippon Oil Refinery at Amagasaki was the most important oil refinery in the Osaka area. A comparison of this three dimensional view with the ground photographs of individual buildings in Exhibit N will indicate the difficulty a photographic interpreter encounters in making a functional or structural analysis or a damage assessment.

See aerial photograph at the beginning of Exhibit N for key to location of individual buildings shown in ground photographs. Function of and damage to individual buildings are also given in Exhibit N.

VECTOGRAPH EXHIBIT B - SUMITOMO METAL INDUSTRY COMPANY, OSAKA

The Sumitomo Metal Industry Company (also known as the Sumitomo Sakurijima Plant and and the Sumitomo Light Metal Industry Company, Osaka Plant) was a large propeller producing plant. It also accounted for large quantities of light metals essential for aircraft production and was one of the prime targets in the Osaka area. This vectograph may be compared with ground photographs of individual buildings in Exhibit L. The key to location of buildings shown in ground photographs is given on the aerial photograph at the beginning of Exhibit L.

VECTOGRAPH EXHIBITS



UNITED STATES STRATEGIC BOMBING SURVEY

European War

LIST OF REPORTS

The following list of studies is a bibliography of completed reports resulting from the German survey. Reports numbers 1, 2, and 3 can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. Permission to examine the remaining reports may be had by writing to the headquarters of the Survey at Gravelly Point, Washington 25, D. C.

1 The United States Strategic Bombing Survey: Summary Report (European War)
2 The United States Strategic Bombing Survey: Over-all Report (European War)
3 The Effects of Strategic Bombing on the German War Economy

AIRCRAFT DIVISION

(By Division and Branch)

4 Aircraft Division Industry Report
5 Inspection Visits to Various Targets (Special Report)

Airframes Branch

6 Junkers Aircraft and Aero Engine Works, Dessau, Germany
7 Erla Maschinenwerke G m b H, Heiterblick, Germany
8 A T G Maschinenbau, G m b H, Leipzig (Mockau), Germany
9 Gothaer Waggonfabrik, A G, Gotha, Germany
10 Focke Wulf Aircraft Plant, Bremen, Germany
11. Messerschmitt A G, Augsburg, Germany { Over-all Report; Part A; Part B; Appendices I, II, III
12 Dornier Works, Friedrichshafen & Munich, Germany
13 Gerhard Fieseler Werke G m b H, Kassel, Germany
14 Wiener Neustaedter Flugzeugwerke, Wiener Neustadt, Austria

Aero Engines Branch

15 Bussing NAG Flugmotorenwerke G m b H, Brunswick, Germany
16 Mittel-Deutsche Motorenwerke G m b H, Taucha, Germany
17 Bavarian Motorworks Inc, Eisenach & Durrenhof, Germany
18 Bayerische Motorenwerke A G (BMW) Munich, Germany
19 Henschel Flugmotorenwerke, Kassel, Germany

Light Metal Branch

20 Light Metals Industry of Germany { Part I, Aluminum; Part II, Magnesium
21 Vereinigte Deutsche Metallwerke, Hildesheim, Germany
22 Metallgussgesellschaft G m b H, Leipzig, Germany
23 Aluminiumwerk G m b H, Plant No. 2, Bitterfeld, Germany
24 Gebrueder Giulini G m b H, Ludwigshafen, Germany
25 Luftschiffbau Zeppelin G m b H, Friedrichshafen on Bodensee, Germany
26 Wieland Werke A G. Ulm, Germany
27 Rudolph Rautenbach Leichtmetallgiessereien. Solingen, Germany
28 Lippewerke Vereinigte Aluminiumwerke A G, Lunen, Germany
29 Vereinigte Deutsche Metallwerke, Heddernheim, Germany
30 Duerener Metallwerke A G, Duren Wittenau-Berlin & Waren, Germany

AREA STUDIES DIVISION

31 Area Studies Division Report
32 A Detailed Study of the Effects of Area Bombing on Hamburg
33 A Detailed Study of the Effects of Area Bombing on Wuppertal
34 A Detailed Study of the Effects of Area Bombing on Dusseldorf
35 A Detailed Study of the Effects of Area Bombing on Solingen
36 A Detailed Study of the Effects of Area Bombing on Remscheid
37 A Detailed Study of the Effects of Area Bombing on Darmstadt
38 A Detailed Study of the Effects of Area Bombing on Lubeck
39 A Brief Study of the Effects of Area Bombing on Berlin, Augsburg, Bochum, Leipzig, Hagen, Dortmund, Oberhausen, Schweinfurt, and Bremen

CIVILIAN DEFENSE DIVISION

40 Civilian Defense Division—Final Report
41 Cologne Field Report
42 Bonn Field Report
43 Hanover Field Report
44 Hamburg Field Report—Vol I, Text; Vol II, Exhibits
45 Bad Oldesloe Field Report
46 Augsburg Field Report
47 Reception Areas in Bavaria, Germany

EQUIPMENT DIVISION

Electrical Branch

48 German Electrical Equipment Industry Report
49 Brown Boveri et Cie, Mannheim Kafertal, Germany

Optical and Precision Instrument Branch

50 Optical and Precision Instrument Industry Report

Abrasives Branch

51 The German Abrasive Industry
52 Mayer and Schmidt, Offenbach on Main, Germany

Anti-Friction Branch

53 The German Anti-Friction Bearings Industry

Machine Tools Branch

54 Machine Tools & Machinery as Capital Equipment
55 Machine Tool Industry in Germany
56 Herman Kolb Co, Cologne, Germany
57 Collet and Engelhard, Offenbach, Germany
58 Naxos Union, Frankfort on Main, Germany

MILITARY ANALYSIS DIVISION

59 The Defeat of the German Air Force
60 V-Weapons (Crossbow) campaign
61 Air Force Rate of Operation
62 Weather Factors in Combat Bombardment Operations in the European Theatre
63 Bombing Accuracy, USAAF Heavy and Medium Bombers in the ETO
64 Description of RAF Bombing

MORALE DIVISION

Medical Branch

65 The Effect of Bombing on Health and Medical Care in Germany

MUNITIONS DIVISION

Heavy Industry Branch

66 The Coking Industry Report of Germany
67 Coking Plant Report No. 1, Sections A, B, C, & D
68 Gutehoffnungshuette, Oberhausen, Germany
69 Friedrich-Alfred Hutte, Rheinhausen, Germany
70 Neunkirchen Eisenwerke A G, Neunkirchen, Germany
71 Reichswerke Hermann Goering A G, Hallendorf, Germany
72 August Thyssen Huette A G, Hamborn, Germany
73 Friedrich Krupp A G, Borbeck Plant, Essen, Germany
74 Dortmund Hoerder Huettenverein, A G, Dortmund, Germany
75 Hoesch A G, Dortmund, Germany
76 Bochumer Verein fuer Gusstahlfabrikation A G, Bochum, Germany

Motor Vehicles and Tanks Branch

77 German Motor Vehicles Industry Report
78 Tank Industry Report
79 Daimler Benz A G, Unterturkheim, Germany
80 Renault Motor Vehicles Plant, Billancourt, Paris
81 Adam Opel, Russelheim, Germany
82 Daimler Benz-Gaggenau Works, Gaggenau, Germany
83 Maschinenfabrik Augsburg-Nurnberg, Nurnberg, Germany
84 Auto Union A G, Chemnitz and Zwickau, Germany
85 Henschel and Sohn, Kassel, Germany
86 Maybach Motor Works, Friedrichshafen, Germany
87 Voigtlander Maschinenfabrik A G, Plauen, Germany
88 Volkswagenwerke, Fallersleben, Germany
89 Bussing NAG, Brunswick, Germany
90 Muehlenbau Industrie A G (Miag) Brunswick, Germany
91 Friedrich Krupp Grusonwerke, Magdeburg, Germany

Submarine Branch

92 German Submarine Industry Report
93 Maschinenfabrik Augsburg-Nurnberg A G, Augsburg, Germany
94 Blohm and Voss Shipyards, Hamburg, Germany
95 Deutschewerke A G, Kiel, Germany
96 Deutsche Schiff und Maschinenbau, Bremen, Germany
97 Friedrich Krupp Germaniawerft, Kiel, Germany
98 Howaldtswerke A G, Hamburg, Germany
99 Submarine Assembly Shelter, Farge, Germany
100 Bremer Vulkan, Vegesack, Germany

Ordnance Branch

101 Ordnance Industry Report
102 Friedrich Krupp Grusonwerke A G, Magdeburg, Germany
103 Bochumer Verein fuer Gusstahlfabrikation A G, Bochum, Germany
104 Henschel and Sohn, Kassel, Germany
105 Rheinmetall-Borsig, Dusseldorf, Germany
106 Hermann Goering Werke, Braunschweig, Hallendorf, Germany
107 Hannoverische Maschinenbau, Hanover, Germany
108 Gusstahlfabrik Friedrich Krupp, Essen, Germany

OIL DIVISION

109 Oil Division Final Report
110 Oil Division Final Report, Appendix
111 Powder, Explosives, Special Rockets and Jet Propellants, War Gases and Smoke Acid (Ministerial Report #1)
112 Underground and Dispersal Plants in Greater Germany
113 The German Oil Industry, Ministerial Report Team 78
114 Ministerial Report on Chemicals

Oil Branch

115 Ammoniakwerke Merseburg G m b H, Leuna, Germany—2 appendices
116 Braunkohle Benzin A G, Zeitz and Bohlen, Germany
Wintershall A G, Luetzkendorf, Germany
117 Ludwigshafen-Oppau Works of I G Farbenindustrie A G, Ludwigshafen, Germany
118 Ruhroel Hydrogenation Plant, Bottrop-Boy, Germany, Vol I, Vol II
119 Rhenania Ossag Mineraloelwerke A G, Harburg Refinery, Hamburg, Germany
120 Rhenania Ossag Mineraloelwerke A G, Grassbrook Refinery, Hamburg, Germany
121 Rhenania Ossag Mineraloelwerke A G, Wilhelmsburg Refinery, Hamburg, Germany
122 Gewerkschaft Victor, Castrop-Rauxel, Germany, Vol I & Vol II
123 Europaeische Tanklager und Transport A G. Hamburg, Germany
124 Ebano Asphalt Werke A G, Harburg Refinery, Hamburg, Germany
125 Meerbeck Rheinpreussen Synthetic Oil Plant—Vol I & Vol II

Rubber Branch

126 Deutsche Dunlop Gummi Co., Hanau on Main, Germany
127 Continental Gummiwerke, Hanover, Germany
128 Huels Synthetic Rubber Plant
129 Ministerial Report on German Rubber Industry

Propellants Branch

130 Elektro Chemischewerke, Munich, Germany
131 Schoenebeck Explosive Plant, Lignose Sprengstoff Werke G m b H, Bad Salzemen, Germany
132 Plants of Dynamit A G, Vormal, Alfred Nobel & Co, Troisdorf, Clausthal, Drummel and Duneberg, Germany
133 Deutsche Sprengchemie G m b H, Kraiburg, Germany

OVERALL ECONOMIC EFFECTS DIVISION

134 Overall Economic Effects Division Report
Gross National Product
Kriegs Eil Berichte
Herman Goering Works
Food and Agriculture
} Special papers which together comprise the above report

PHYSICAL DAMAGE DIVISION

135 Villacoublay Airdrome, Paris, France
136 Railroad Repair Yards, Malines, Belgium
137 Railroad Repair Yards, Louvain, Belgium
138 Railroad Repair Yards, Hasselt, Belgium
139 Railroad Repair Yards, Namur, Belgium
140 Submarine Pens, Brest, France

141 Powder Plant, Angouleme, France
142 Powder Plant, Bergerac, France
143 Coking Plants, Montigny & Liege-Belgium
144 Fort St. Blaise Verdun Group, Metz, France
145 Gnome et Rhone, Limoges, France
146 Michelin Tire Factory, Clermont-Ferrand, France
147 Gnome et Rhone Aero Engine Factory, Le Mans, France
148 Kugelfisher Bearing Ball Plant, Ebelspach, Germany
149 Louis Breguet Aircraft Plant, Toulouse, France
150 S. N. C. A. S. E. Aircraft Plant, Toulouse, France
151 A. I. A. Aircraft Plant, Toulouse, France
152 V Weapons in London
153 City Area of Krefeld
154 Public Air Raid Shelters in Germany
155 Goldenberg Thermal Electric Power Station, Knapsack, Germany
156 Brauweiler Transformer & Switching Station, Brauweiler, Germany
157 Storage Depot, Nahbollenbach, Germany
158 Railway and Road Bridge, Bad Munster, Germany
159 Railway Bridge, Eller, Germany
160 Gustloff-Werke Weimar, Weimar, Germany
161 Henschel and Sohn G m b H, Kassel, Germany
162 Area Survey at Pirmasens, Germany
163 Hanomag, Hanover, Germany
164 M A N Werke Augsburg, Augsburg, Germany
165 Friedrich Krupp A G, Essen, Germany
166 Erla Maschinenwerke, G m b H, Heiterblick, Germany
167 A T G Maschinenbau G m b H, Mockau, Germany
168 Erla Maschinenwerke G m b H, Mockau, Germany
169 Bayerischa Motorenwerke Durrerhoff, Germany
170 Mittel-Deutsche Motorenwerke G m b H, Taucha, Germany
171 Submarine Pens Deutsche-Werft, Hamburg, Germany
172 Multi-Storied Structures, Hamburg, Germany
173 Continental Gummiwerke, Hanover, Germany
174 Kassel Marshalling Yards, Kassel, Germany
175 Ammoniskwerke, Mersburg-leuna, Germany
176 Brown Boveri et Cie, Mannheim, Kafertal, Germany
177 Adam Opel A G, Russelheim, Germany
178 Daimler-Benz A G, Unterturkheim, Germany
179 Valentin Submarine Assembly, Farge, Germany
180 Volkswaggonwerke, Fallersleben, Germany
181 Railway Viaduct at Bielefeld, Germany
182 Ship Yards Howaldtswerke, Hamburg, Germany
183 Blohm and Voss Shipyards, Hamburg, Germany
184 Daimler-Benz A G, Mannheim, Germany
185 Synthetic Oil Plant, Meerbeck-Hamburg, Germany
186 Gewerkschaft Victor, Castrop-Rauzel, Germany
187 Klockner Humblolt Deutz, Ulm, Germany
188 Ruhroel Hydrogenation Plant, Bettrop-Boy, Germany
189 Neukirchen Eisenwereke A G, Neukirchen, Germany
190 Railway Viaduct at Altenbecken, Germany
191 Railway Viaduct at Arnsburg, Germany
192 Deurag-Nerag Refineries, Misburg, Germany
193 Fire Raids on German Cities
194 I G Farbenindustrie, Ludwigshafen, Germany, Vol I & Vol II
195 Roundhouse in Marshalling Yard, Ulm, Germany
196 I G Farbenindustrie, Leverkusen, Germany
197 Chemische-Werke, Huels, Germany
198 Gremberg Marshalling Yard, Gremberg, Germany
199 Locomotive Shops and Bridges at Hamm, Germany

TRANSPORTATION DIVISION

200 Transportation Division Report
201 Rail Operations Over the Brenner Pass
202 Effects of Bombing on Railroad Installations in Regensburg, Nurnberg and Munich Divisions.
203 German Locomotive Industry During the War
204 Wehrmacht Traffic Over the German Railroads

UTILITIES DIVISION

205 German Electric Utilities Industry Report
206 1 to 10 in Vol I "Utilities Division Plant Reports"
207 11 to 20 in Vol II "Utilities Division Plant Reports"
208 21 Rheinische-Westfalische Elektrizitatswerk A G

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