Photographic Interpretation Handbook, United States Forces: Section 12 Industry

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Types of Overhead Cranes

- Locomotive Crane
- Revolving Elevated Crane
- Hammerhead Crane
- Large Gantry Crane
- Floating Crane
- Floating Shearlegs
- Bridge Crane on Tracks
- 2 Types of Overhead Cranes
Close-up of Knapsack Power Plant near Koln, largest steam power plant in Europe. Note coal conveyors, boiler houses, turbine and generator halls, large cooling towers.
One blast furnace feeds many open-hearth steel furnaces.

Blast furnaces are rated by their daily production, such as 500, 750, 1000, 1200 tons, etc.

Most occidental blast furnaces are accompanied by four (4) hot stoves each, but oriental blast furnaces have only three (3) hot stoves each, making them more vulnerable. Oriental blast furnaces frequently are surrounded by steel framework and, therefore, do not have round shape.
INDUSTRY
IRON AND STEEL (CONT.)

RESTRICTED

IRON AND STEEL
PLANT

KLADNO,
CZECHOSLOVAKIA

Vital
Installations: A B C D E

Distingiuishing
Characteristics:
1. Stockyard for finished products
2. Warehouse
E. 3. Rolling Mill
4. Soaking pits
C. 5. Open-hearth furnaces
D. 6. Bessemer converter
A. 7. Boiler house and electric power station
8. Stormhouse for steel bars
9. Cooling towers
10. Dry gas holder
11. Offices and laboratories
B. 12. Blast furnaces
13. Large coal bunkers (2 covered by sheds) served by 8 railway sidings
14. Gas cleaning plant
15. Shaft alongside coal bunker
16. Wet gas holder
17. Row of five lime kilns

RESTRICTED

CYCLE OF OPERATIONS

1. Limestone is excavated by shovel from an open quarry.
2. The excavated material is carried by narrow gauge railway up to a crusher building where it is crushed.
3. The crushed material is carried by conveyor from the crusher building to a storage building.
4. From the storage piles the crushed material is carried to the grinder building where it is pulverized and mixed with water.
5. The resultant sludgelike material is carried to silo storage tanks.
6. The sludge material is then put through long rotary kilns where, under intense heat, the sludge becomes clinker. After being stored, the clinker is carried to the grinder building for the final step.
7. The finished cement is carried by conveyor from the grinder building to storage silos.
8. The cement is shipped in bulk in box cars or is packaged and shipped.
Vital Installations: A. B. C.

NOTE: Many Japanese cement plants import the limestone used.

1. No limestone will be observed.
2. The plant will probably be located on navigable water.

DISTINGUISHING CHARACTERISTICS

1. Steamlike smoke issuing from a stack or stacks at the end of a long narrow one-story building, frequently the longest single building in the plant.
2. Open pit limestone quarry; narrow gauge railroad tracks leading from quarry to plant.
4. Crusher building at head of narrow gauge railroad tracks.

CYCLE OF OPERATIONS

1. Railroad for transporting heavy material to plant.
2. Machine shops and assembly buildings in assembly line layout; buildings are usually characterized by roof construction permitting maximum number of skylights.
3. Final assembly building.
4. Aircraft test field.
5. Steam power plant or transformer with incoming power lines.
INDUSTRY
ASSEMBLY PLANTS
MOTOR VEHICLE

DISTINGUISHING CHARACTERISTICS

1. Assembly.
2. Storage of component parts.
3. Storage yard.
4. Railroad.
5. Water transportation often available.
8. Steam power.

BAUXITE

DISTINGUISHING CHARACTERISTICS:

1. Bauxite storage warehouse. (note the characteristic shape.)
2. Rotary kilns.
3. Precipitation tanks.
4. Conveyor system between buildings.
5. Dock and rail facilities
7. Red mud lake for residue; often piped some distance from plant.

CYCLE OF OPERATIONS:

1. Bauxite stored on arrival from mine.
2. Bauxite crushed in crusher building.
3. In digester building bauxite treated with sodium hydroxide.
4. In filter building, impurities are removed.
5. Precipitation tanks remove alumina from solution.
6. Rotary kilns dry alumina.
7. Alumina stored before shipment to aluminum plant.
Distinguishing Characteristics

A. 1. 'T' shaped buildings with mercury arc converters as crossbars and pot rooms as uprights. (Note: many months necessary to replace mercury arcs; destruction of pot room 'freezes' aluminum in pots.

B. 2. Silos at end of pot rooms for storage of alumina and cryolite.

C. 3. Transformers and power lines.


Cycle of Operation

1. Alumina shipped in from alumina plant.
2. In the pot rooms alumina is reduced to aluminum by an electric furnace using carbon anodes and cathodes, and cryolite as a flux.
3. Aluminum stored in the open prior to shipment to a fabricating plant.

Refinery

Distinguishing Characteristics

A. 2. Large flat building (casting house) with ventilators on roof and tall stack.

B. 3. A visible source of electricity serving another large flat building (the tank house). This electric power:
   (a) Purchased power: lines running to a switching station and/or a power house.
   (b) Private power: a thermal electric power plant, possibly built inside the tank house.

C. 4. Tank house.

Cycle of Operation

1. Smelted copper is brought to the refinery by railroad and cast into anodes.
2. In the tank house it is purified of its gold and silver elements by the electrolytic process.
3. A solution of copper sulphate for use in the electrolytic process is maintained in the water treatment house, a small building either contained inside the tank house or auxiliary to it.
4. In the casting house the purified copper is melted down and cast into ingots.

Note: In most metal industries there are two distinct processes: Smelting and Refining. The smelter, located in the mining district, separates the ore from the gangue by mechanical methods, such as flotation, and isolates the metal from the ore by chemical methods, such as roasting. The refinery, located in the consuming districts, purifies the metal. When the mining and consuming districts coincide or economic conditions permit, both operations are done at the same time - as is sometimes the case in Alumina-Aluminum and Iron-Steel (refined iron).
INDUSTRY
SHIPBUILDING

RESTRICTED

CYCLE OF OPERATIONS

1. MATERIAL: Steel and material by rail and water to open or covered storage then to shops.

2. FABRICATION: Units fabricated in shops then by rail and cranes to hull.

3. HULL ERECTION: Keel laid and ship's hull erected on ways.

4. LAUNCHING & FITTING OUT: After launching, ship is tied up for fitting out (installation of machinery, armament and rigging.)

DISTINGUISHING CHARACTERISTICS

1. Mold loft
2. Administration
3. Workers' housing
4. Pattern shop
5. Fabricating shop
6. Outfitting storage
7. Copper shop
8. Power house
9. Machine shop
10. Outfitting basin
11. Covered ways
12. Sheet metal shop
13. Open ways
14. Plate and shape storage
15. Barge landing basin
16. Warehouse
17. Parking
18. Interyard railway
19. R.R. Storage yard

VITAL INSTALLATIONS:

A. B. C. D. E. F.

(Synthetic rubber plants tend to vary considerably)

INDUSTRY
RUBBER

SYNTHETIC RUBBER PLANT

DISTINGUISHING CHARACTERISTICS

1. Carbide Plant
2. High Pressure Synthesis Cylinders
3. Acetylene Gas Storage
4. Cooling Towers
5. Transformers Station
6. Main Officer and Laboratories
7. Storage Tanks
8. Probable Finishing Houses
9. Overhead Pipe Lines
10. Reservoir
11. Lime Plant
12. Probable Steam Plant
13. Warehouses
INDUSTRY
RAILROAD YARDS

VITAL INSTALLATIONS:
1. Rolling Stock
2. Tracks
3. Roundhouse
4. Repair Shops
5. Freight

NURNBERG MARSHALLING YARDS (This is a one-way Yard)
(A) Reception Sidings.
(B) Sorting Sidings.
(C) Sorting Sidings for special traffic.
(D) Forwarding Sidings.

FIXED INSTALLATIONS

RESTRICTED

INDUSTRY
PETROLEUM

Typical FLOW CHART: turning crude oil into refined products.

MOTOR FUEL
FINISHED KEROSENE
HEAVY FUEL OILS
RAW GASOLINE
PARAFFIN OILS
ASPHALT

12.20

RESTRICTED

12.21
CYCLE OF OPERATIONS

1. Crude oil to tank farm storage by pipeline, tank car or bunkering pier.
2. Crude oil to fractioning tower.
3. Various distillates to small tanks.
4. Some distillate fractions are reworked under pressure in cracking plant to produce additional gasoline and/or other needed fractions.
5. Heavy distillates refined to lubricants, tars and waxes.

DISTINGUISHING CHARACTERISTICS

1. Storage tanks for fractions
2. Storage tank farm
3. Fractioning (bubble) towers and/or other type distillation units.
4. Cracking plant
5. Packing house for lubricants
6. Bunkering pier
7. RR tank car sidings

NOTE: The vital installations in petroleum refineries are the producing rather than the storage units. These frequently appear as dark rectangular masses on aerial photographs and are commonly associated with many small storage tanks closely spaced.
NOTE: In Germany, so-called "synthetic oil" plants use the hydrogenation process with coal to produce oil. Such plants are characterized by cooling towers and a great number of storage tanks for wet gas, coal, and other by-products. This plant in Italy uses the hydrogenation process to produce aviation gasoline and lubricating oil from low grade crudes.

**CYCLE OF OPERATIONS**

1. Coke or low grade crudes from storage tanks treated in hydrogenation stals.
2. Treated crudes to distillation units.
3. Distillate to cracking units.
4. End products from cracking units to further refining in lubricating oil plant (elimination of wax or tar), and in butane-iso-octane plant (increase of octane and elimination of sulfur-dioxide).
5. Lubricating oil and aviation gasoline from refining units.
6. Other by-products include kerosene (from cracking units), asphalt (from distillation), and paraffin (from lubricating oil plant).
7. Storage and shipment.

**DISTINGUISHING CHARACTERISTICS**

**VITAL INSTALLATIONS**

1. Crude oil storage tanks.
2. Intermediate storage tanks.
3. Cooling tower.
4. Lubricating oil plant.
6. Distillation units.
7. Water tower.
8. Coal bunker.
9. Pyrolytic cracking units.
10. Boiler house and power plant.
11. Compressor house.
13. Injector house.
15. Butane storage tank.
17. Large dry gas holder.
20. Packing houses for lubricating oils, paraffin, etc.
22. Transformer station.

**DISTINGUISHING CHARACTERISTICS**

1. Wet gas holders.
2. Natural gas storage.
3. Retort houses.
5. Purifier.
7. Tar and other by-product storage.
8. Meter house.

**GAS PRODUCTION**

**CYCLE OF OPERATIONS**

1. Coal and natural gas burned in retort house to produce coal gas.
2. Coal gas to condensers and scrubbers; tar and other by-products to storage.
3. Cleaned gas to purifier.
4. Purified gas to storage in wet gas holders.
CYCLE OF OPERATIONS

1. Mains carry sewage to pumping station.
2. Sewage proceeds to grit chamber, grits removed to gondola cars.
3. Sewage passes through meter house to grease separation chambers.
4. Sludge is detained in sedimentation tanks.
5. Pumps force sludge into covered tanks where gas generated from process provides heat necessary for chemical digestion of sewage.
6. Gas formed is metered out through meter building into gasometer to be burned in burners atop meter house.
7. Digested sludge goes to elutriation building for washing.
8. Washed sludge is dried and loaded into gondolas at dewatering bldg.

DISTINGUISHING CHARACTERISTICS

1. Clusters of sedimentation tanks, sometimes with catwalks to center.
2. Covered digestion tanks.
4. Power house.
5. Rail or other disposal method.
6. Excess gas burner (lit at night).
7. Other buildings may not have distinguishing characteristics.

SEWAGE DISPOSAL

A. Pumping station
B. Grit chamber
C. Meter house
D. Sedimentation tanks 105'
E. Transformer
F. Power house (gas fired)
G. Administration
H. Dewatering building with processed sludge conveyor
J. Freight cars to be loaded
K. Elutriation
L. Sludge digestion tanks 84'
M. Gas meter (excess gas burner on roof)
N. Gas holder
O. Grease separation chambers
P. Sludge removal pumps

NOTE:

Number of above processes used depends on degree of purity of water supply.
This type of plant is used where water supply is polluted. Some areas merely aerate and chlorinate water, a few, where water is pure, chlorinate only.

A. 2 sedimentation basins
B. Filter plant
C. Washwater tower
D. Combination steam house and pumps
E. Trestle for coal cars
F. Garage
G. Chemical mixing laboratory
H. Aeration tanks, 2-45' tanks covered by aerator
J. Screen house
K. Intake pipes extend 500' into river
L. Storage of pipe sections, elbows, etc.