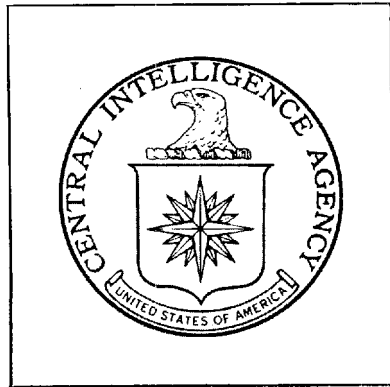


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Imagery Analysis Report

Selected Nonferrous Metals Plants

Communist China



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SELECTED NONFERROUS METALS PLANTS, CHINA

SUMMARY

This study of five selected nonferrous metals plants reveals that the Chinese are continuing their expansion of production facilities. Two major installations at Kun-ming and Chu-chou, which were in early stages of construction [Redacted] have subsequently been completed [Redacted]. The Kun-ming plant was observed in operation [Redacted] however, the Chu-chou plant has not been observed in operation.

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Minor additions occurred at the plants in Shen-yang, Pai-yin, and Ta-yeh. These plants were operating [Redacted]

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INTRODUCTION

This report is based on [Redacted] photographic coverage of five selected nonferrous metal plants located in Communist China. They are the:

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- Shen-yang Nonferrous Metals Plant
- Pai-yin Copper Smelter and Refinery
- Ta-yeh Copper Smelter
- Chu-chou Nonferrous Metals Plant
- Kun-ming Copper Smelter and Refinery

Because of a continuing lack of collateral information on the copper metallurgical industries in Communist China, an assessment of the level of operation and status of new construction at each individual plant was accomplished. A chronological analysis of the new construction within each plant is presented in this report. Line drawings of the existing facilities were prepared from the latest good quality photographic coverage. The specific function of the buildings annotated on these line drawings is found on the accompanying key to annotations. Photographic coverage [Redacted] was used as the basis for this report.

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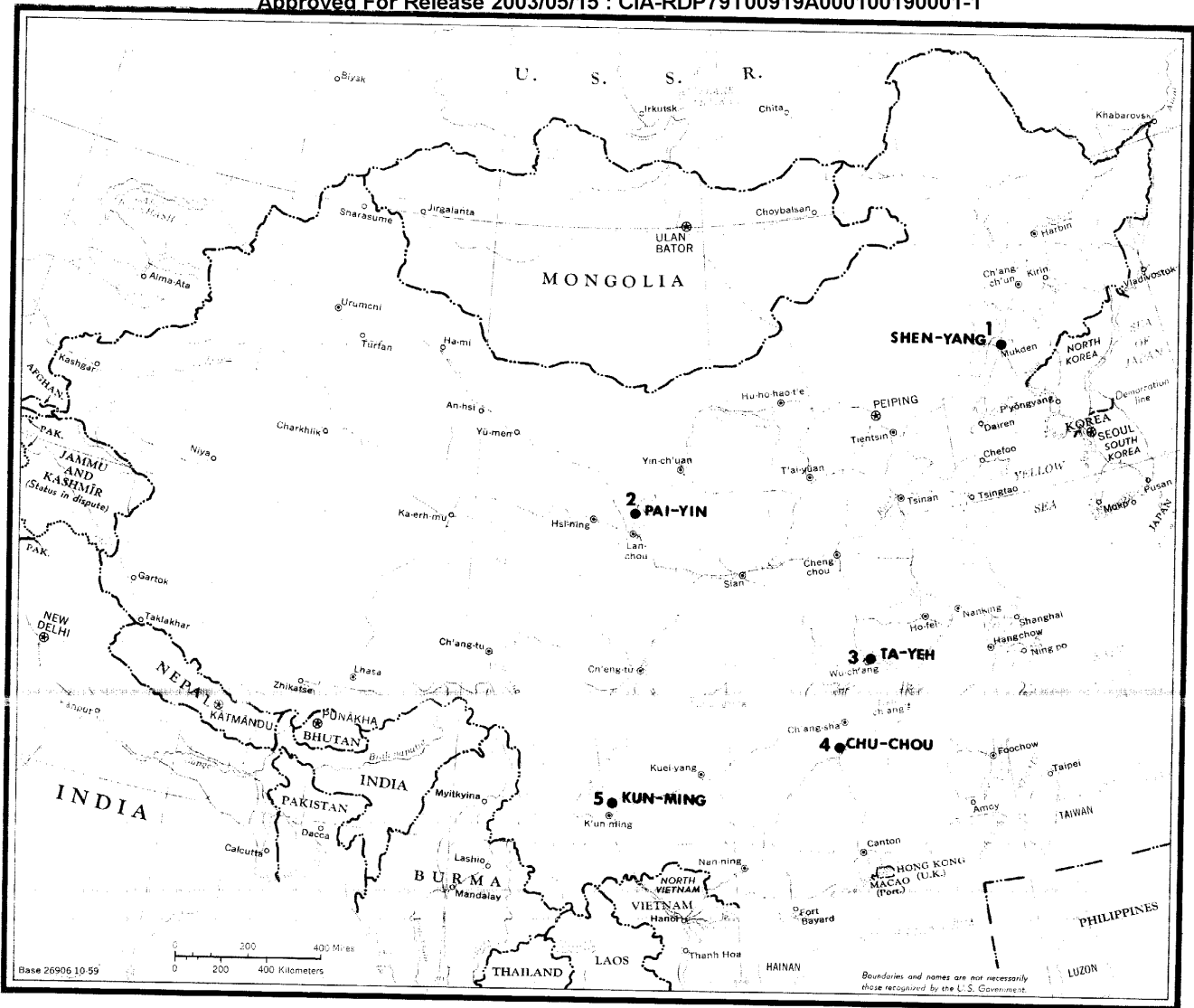


FIGURE 1. LOCATION MAP

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SHEN-YANG NONFERROUS METALS PLANT

The Shen-yang Nonferrous Metals Plant [Redacted] is located at 41-48N 123-22E, within the city of Shen-yang (Figures 2&3). The plant is secured by a wall with four controlled entrances and is connected to the Shen-yang rail and road networks.

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An analysis of the most recent photographic coverage [Redacted] revealed the following facilities at this plant: a copper smelter and refinery, a lead smelter and refinery, two by-products recovery areas, a steam plant, a fabrication complex, an administration area, and numerous support and storage buildings. These facilities were studied from [Redacted]

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[Redacted] photographic missions. Only a few minor changes have occurred to the facilities since the first photographic coverage [Redacted]

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Copper Smelter and Refinery

The Copper Smelter and Refinery is located in the southern section of the nonferrous metals plant (Figure 3, Area A). It consists of two smelters and ore preparation facilities, an electrolytic cell building, a large ore storage building, and numerous support and storage facilities. A comparison [Redacted] reveals that an ore storage building (Annotation 4) was lengthened by 50 per cent of its original size. The addition of two warehouses (Annotations 26 and 27) and a bridge transporter crane was also accomplished during this time interval. The plant was operating on all photographic coverage [Redacted]

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Lead Smelter and Refinery

The Lead Smelter and Refinery is located in the northern portion of the nonferrous metals plant (Figure 3, Area B) and consists of an electrolytic cell building, a smelting facility, a hydrofluosilicic acid plant, a power plant, dressing facilities, and several storage and support buildings. The addition of one stack and a conveyor system to the steam plant (Annotation 6) was completed [Redacted]

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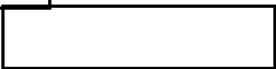
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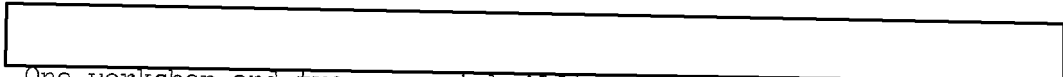


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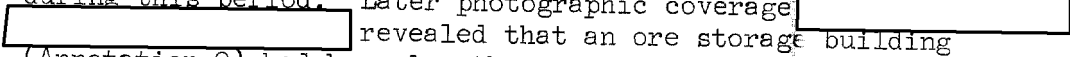
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One workshop and two support buildings were also constructed during this period. Later photographic coverage

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revealed that an ore storage building (Annotation 9) had been lengthened to approximately twice its original size. Also, an additional ore storage building (Annotation 23) and two bridge transporter cranes (Annotations 5 and 8) were constructed

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The facilities of this smelter and refinery were operating at a moderate rate on all photographic coverage.

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Other Facilities

Located within the complex are two by-product recovery areas and an administration area. The by-product recovery areas are located in the southwestern section of the complex and recover precious metals. Gold, silver, platinum, and zinc are the by-products of both copper and lead (Figure 2, Area D, E). The specific functions of the buildings within both areas cannot be identified.

The administration area (Figure 2, Area F), is located in the southern corner of the complex and consists of seven buildings. This area contains administration buildings, laboratories, and a plant security building.

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FIGURE 2. SHEN-YANG NONFERROUS METALS PLANT, CHINA

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TABLE I. SHEN-YANG NONFERROUS METALS PLANT

Key To Annotations

Area A: Copper Smelter and Refinery

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Crushing and Screening Unit 2. Open Storage (Limestone) 3. Ore Processing Facility 4. Ore Storage Building 5. Ore Crushing Unit 6. Roasting Facility 7. Smelting Facility 8. Casting Building 9. Open Storage 10. Storage Building 11. Storage Building 12. Storage Building 13. Ore Preparation Facility 14. Limestone Preparation Facility 15. Casting and Converter Building 16. Support Building 17. Electrolytic Cell Building 18. Sintering Building 19. Blast Furnaces (3) 20. Support Building 21. Cottrell Precipitator 22. Cottrell Precipitator 23. Blower House 24. Support Building 25. Support Building 26. Warehouse 27. Warehouse 28. Warehouse 29. Support Building | <ol style="list-style-type: none"> 11. Conveyor 12. Probable Cooling Coils 13. Support Building 14. By-Products Recovery Building 15. Sintering and Smelting Building 16. Bag House 17. Water Tower 18. Probable Desilverizing Unit 19. Electrolytic Cell Building 20. Probable Lead Softening Section 21. Hydrofluosilicic Acid Plant 22. Ore Storage Building 23. Ore Storage Building 24. Open Storage Area 25. Support Building 26. Workshop 27. Warehouse |
|---|---|

Area C: Fabrication Complex

1. Fabrication Building
2. Storage Building
3. Storage Building
4. Support Building
5. Support Building
6. Fabrication Building
7. Warehouse
8. Support Building
9. Storage Building
10. Administration Building
11. Warehouse

Area B: Lead Smelter and Refinery

1. Support Building
2. Support Building
3. Warehouse
4. Storage Building
5. Coal Storage Area
6. Power Plant
7. Crushing Unit
8. Crane Served Ore Storage Yard
9. Ore and Coal Storage Building
10. Workshop

Area D: By-Products Recovery Complex--
Probable Gold and Silver RefiningArea E: By-Products Recovery Complex--
Precious Metals Recovery

Area F: Administration Area

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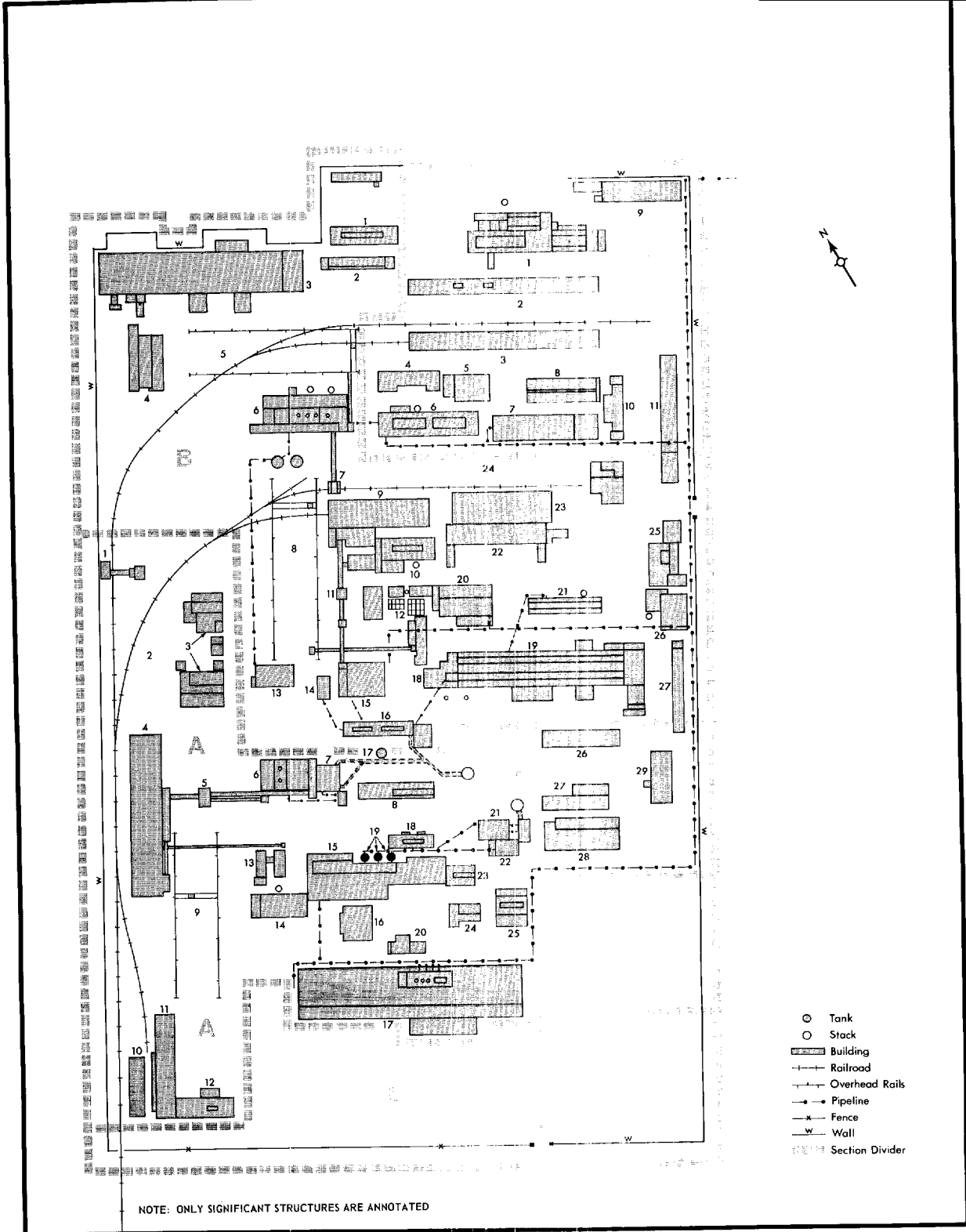


FIGURE 3 SHEN-YANG NONFERROUS METALS PLANT

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PAI-YIN COPPER SMELTER AND REFINERY

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The Pai-yin Copper Smelter and Refinery (Figures 4&5) [Redacted] is located at 36-32N 104-11E approximately 35 nautical miles NE of Lan-chou, China. The entire plant area is secured by a wall and is served by both rail and road.

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The plant was first observed [Redacted] [Redacted] At that time all the major buildings and the numerous support facilities had been fully constructed. Only two by-products recovery buildings remained under construction. The plant is served by numerous rail spurs and consists of an ore receiving building, an ore concentration plant, smelting facilities, an electrolytic cell building, a steam plant, and numerous support and storage facilities. Although the plant appeared operationally complete [Redacted] it was not operating at that time.

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When the plant was next covered [Redacted] the two by-product recovery buildings had been completed. A comparison [Redacted]

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[Redacted] revealed no new construction activity within the plant. The plant was operating on all photographic coverage [Redacted]

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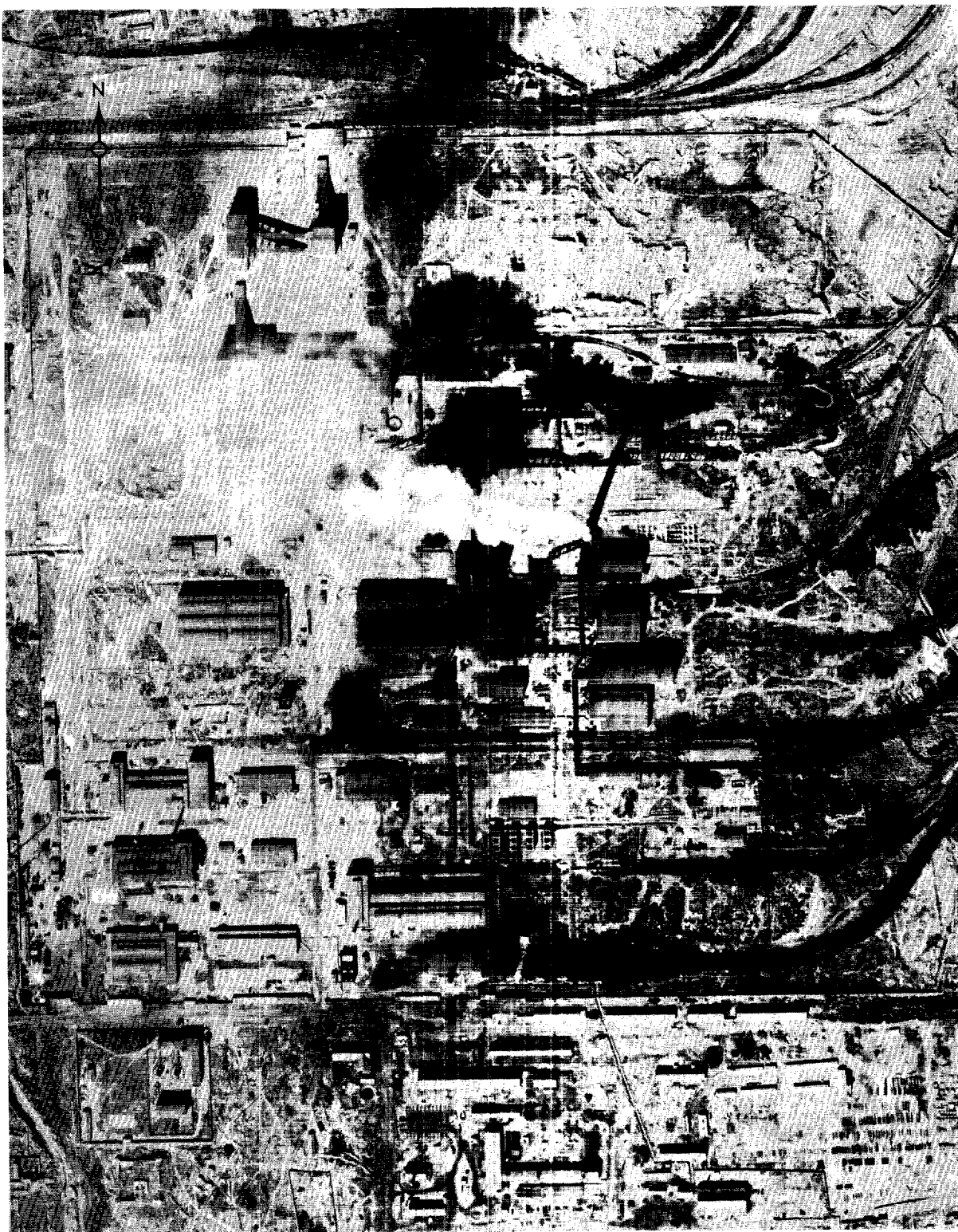


FIGURE 4. PAI-YIN COPPER SMELTER AND REFINERY, CHINA

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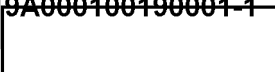
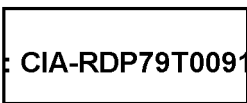
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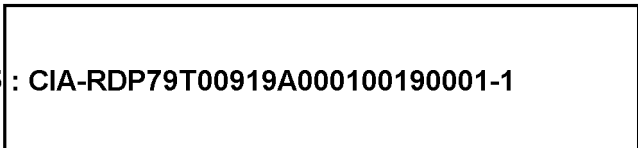
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TABLE II. PAI-YIN COPPER SMELTER AND REFINERY

Key To Annotations

- 1. Ore Receiving Building
- 2. Primary Crushing Building
- 3. Secondary Grinding Building
- 4. Conveyor
- 5. Ore Grinding and Storage Section
- 6. Ore Concentration Section
- 7. Thickening Tanks
- 8. Electrolytic Cell Building
- 9. Fabrication Building
- 10. Support Building
- 11. Fabrication Building
- 12. Support Building
- 13. Fabrication Building
- 14. Warehouse
- 15. Unidentified Facility
- 16. Steam Plant
- 17. Fabrication Building
- 18. Cooling Towers
- 19. Support Building
- 20. Coal Processing Facilities
- 21. Blower House
- 22. Converter Section
- 23. Casting Section
- 24. Smelting Section
- 25. Roasting Building
- 26. Ore Blending Facility
- 27. Ore Bins
- 28. Open Storage
- 29. Ore Bins
- 30. Open Storage
- 31. Stack
- 32. Cottrell Precipitator
- 33. By-Products Recovery Building
- 34. By-Products Recovery Building
- 35. By-Products Recovery Building
- 36. By-Products Recovery Building

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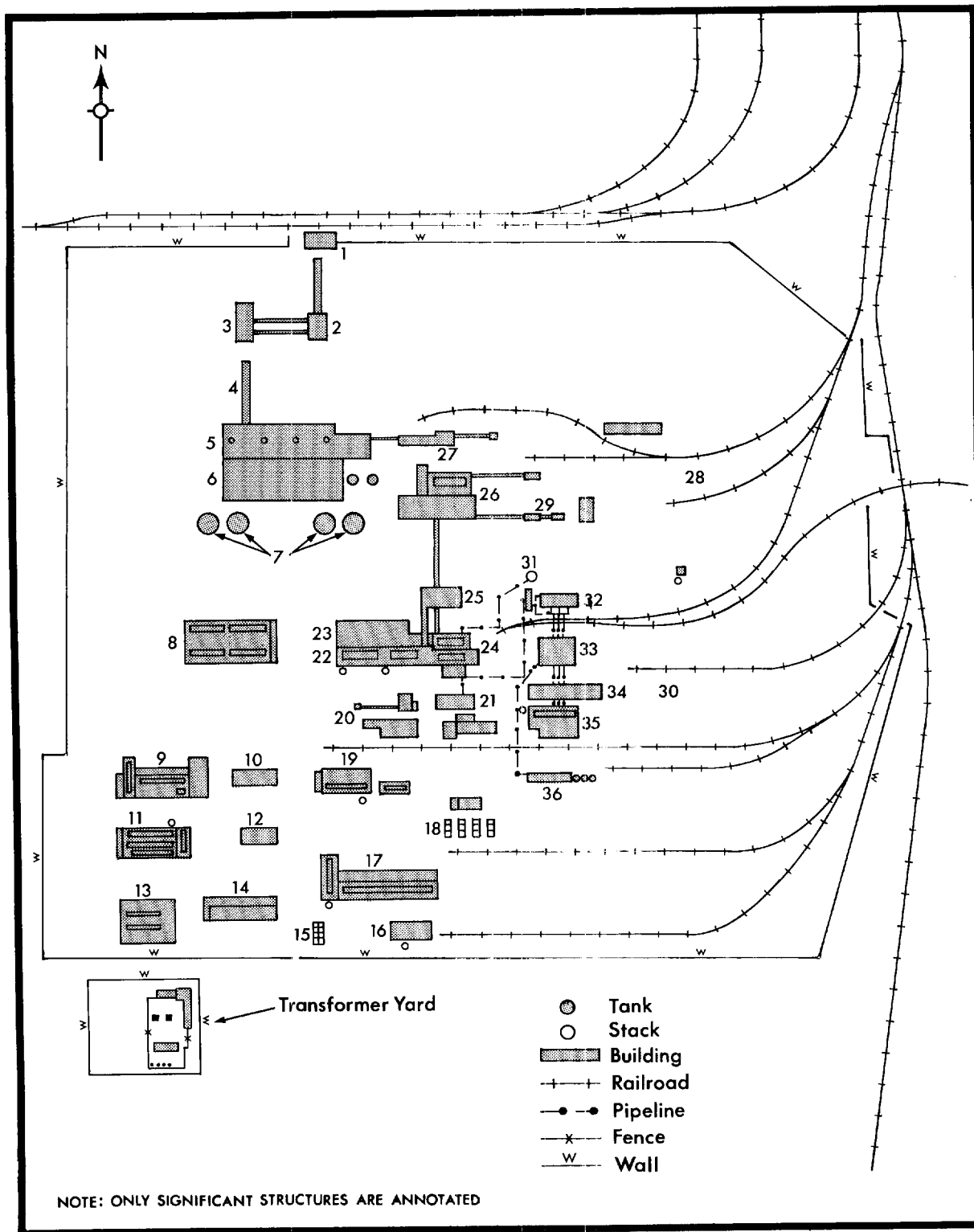


FIGURE 5. PAI-YIN COPPER SMELTER AND REFINERY

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TA-YEH COPPER SMELTER

The Ta-yeh Copper Smelter (Figures 6&7) [Redacted] is located at 30-10N 114-50E approximately 5.4 nautical miles NNW of the town of Ta-yeh, China. The plant is served by a rail spur from an iron ore concentration plant in Sheng-mung-ching which is located 3 nautical miles NW of the smelter. It is also served by a primary road from Ta-yeh.

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An analysis of the earliest photographic coverage dated [Redacted] reveals that all the major production facilities had been completed [Redacted]. A comparison of imagery [Redacted] revealed the additional construction of a possible workshop (Figure 7, Annotation 28), a storage shed (Figure 7, Annotation 29), and the rail spur extending from the main line.

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Although the plant was not observed in operation [Redacted] [Redacted] it has been operating at a moderate level on all subsequent coverage. The plant now consists of the following facilities: a smelting facility, ore preparation facilities, a steam plant, a coal pulverizing facility, a possible sulfuric acid plant, and numerous storage and support buildings.

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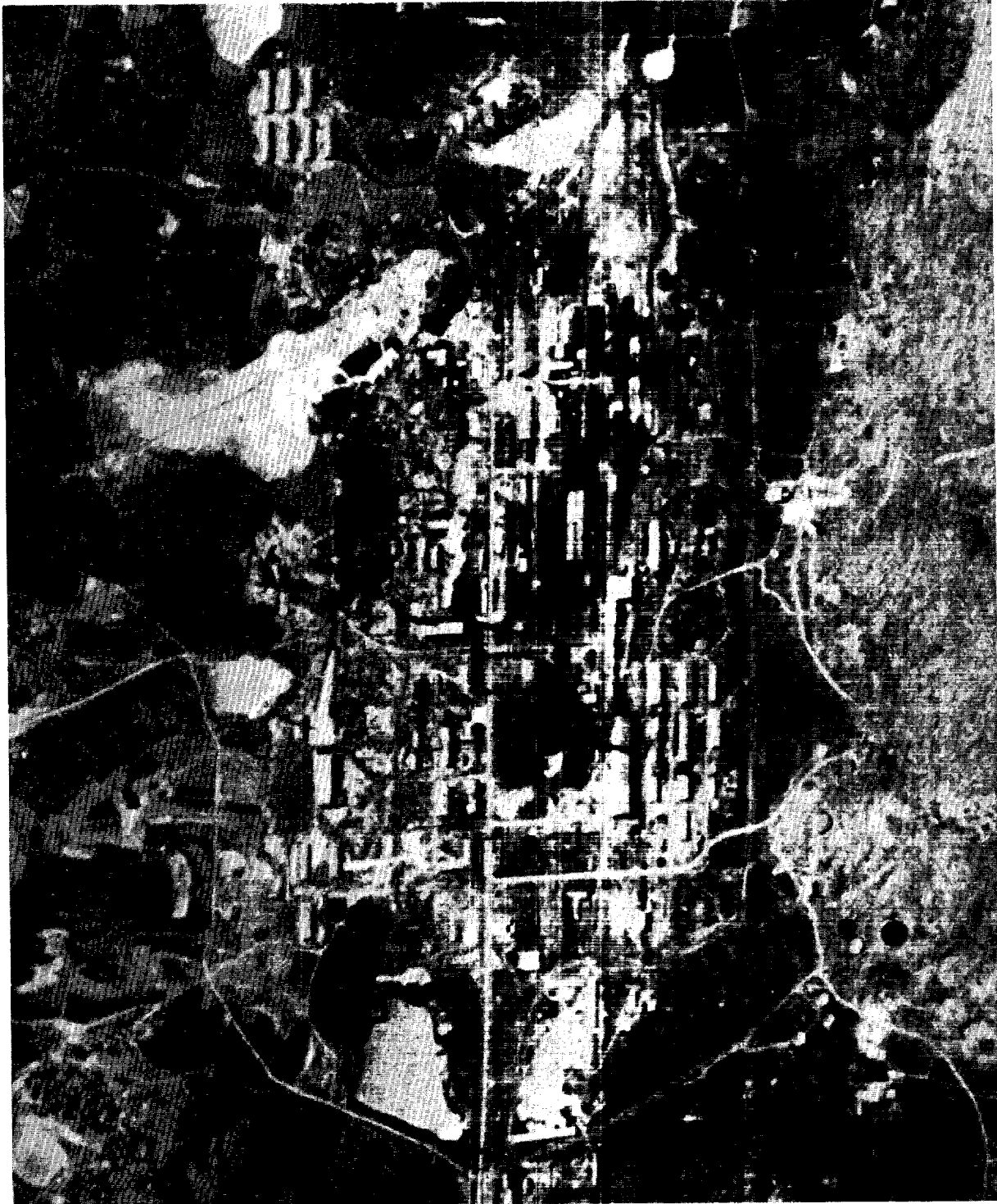


FIGURE 6. TA-YEH COPPER SMELTER, CHINA

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TABLE III. TA-YEH COPPER SMELTER

Key To Annotations

- 1. Support Building
- 2. Storage Building
- 3. Probable Coal Dressing Plant
- 4. Coal Storage Building
- 5. Warehouse
- 6. Steam Plant
- 7. Coal Storage Building
- 8. Support Building
- 9. Storage Tanks
- 10. Ore Preparation Facility
- 11. Ore Storage Building
- 12. Possible Refraction Towers
- 13. Possible Sulfuric Acid Plant
- 14. Support Building
- 15. Ore Preparation Facility
- 16. Crushing Unit
- 17. Ore Receiving Building
- 18. Probable Cottrell Precipitator
- 19. Cooling Towers
- 20. Bag House
- 21. Roasting Building
- 22. Support Buildings
- 23. Support Building
- 24. Support Building
- 25. Smelter and Converter Building
- 26. Ore Preparation Facility
- 27. Ore Storage Building
- 28. Possible Workshop
- 29. Storage Shed
- 30. Support Building
- 31. Support Building
- 32. Administration Building

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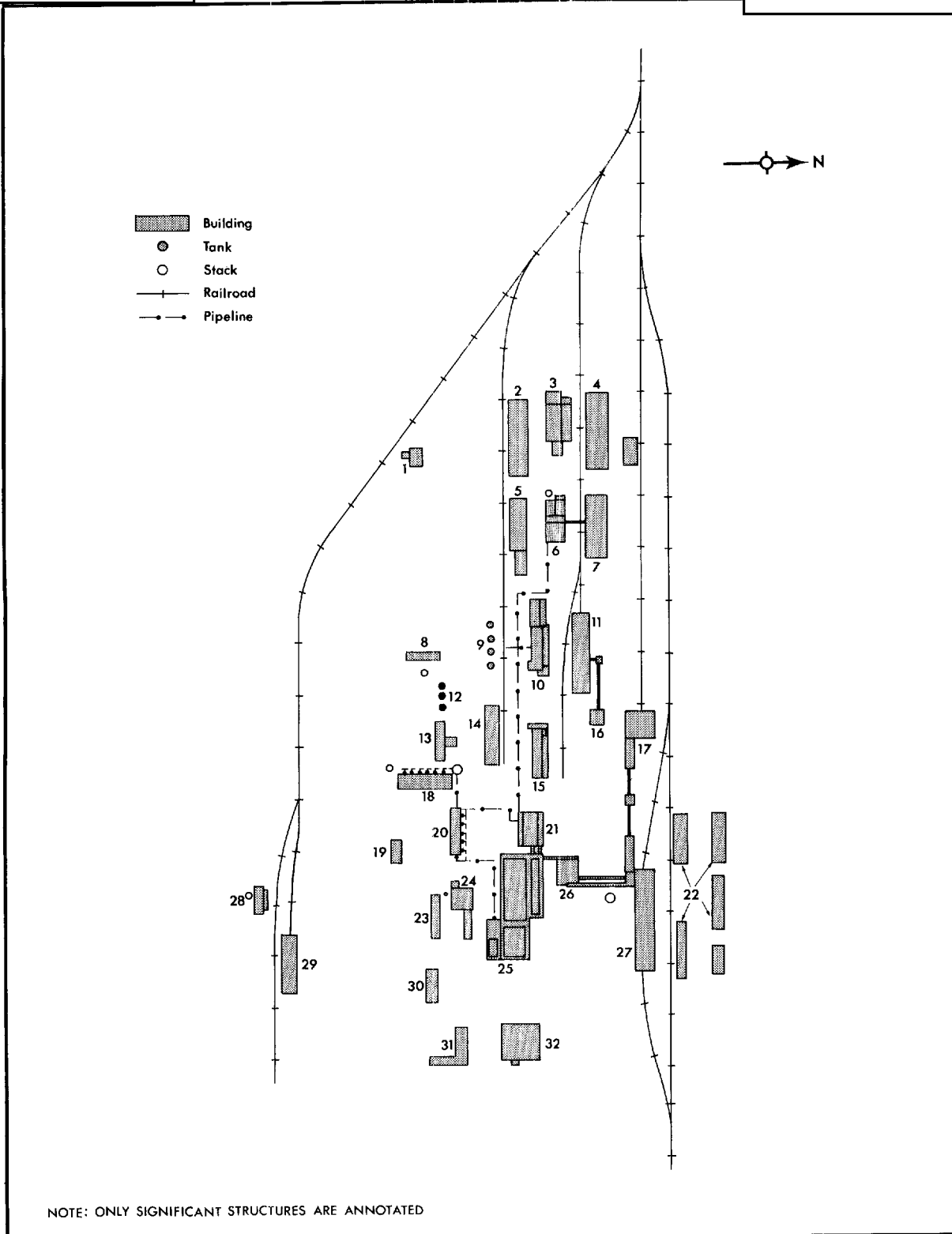


FIGURE 7. TA-YEH COPPER SMELTER

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CHU-CHOU NONFERROUS METALS PLANT

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The Chu-chou Nonferrous Metals Plant (Figures 8&9) [Redacted] is located at 27-52N 113-04E approximately 5 nautical miles NW of Chu-chou, China. The plant is secured by a wall and is connected by road to Chu-chou and by rail to the main Handou-Canton rail line. A chemical-fertilizer plant is located adjacent to the nonferrous metals plant. The nonferrous metals plant consists of a copper smelter and refinery, a zinc smelter and refinery, a steam plant and numerous support and storage facilities.

Copper Smelter and Refinery

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When first observed [Redacted] the construction of the copper smelter and refinery was nearing completion. Although the construction of the major components of the plant had been completed at this time, the plant was not observed in operation [Redacted]. Subsequent photographic coverage [Redacted] revealed expansion to two ore storage buildings (Figure 9, Annotations 1 and 3).

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The plant was observed in operation on the [Redacted] photographic missions [Redacted]

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[Redacted]

Zinc Electrolytic Refinery

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When first observed [Redacted] the zinc smelter and refinery was still in the early stages of construction. The construction was observed continuing at a low rate on the [Redacted] photographic missions [Redacted]. All [Redacted] of the major production facilities had been completed [Redacted] but they were not in operation. The plant includes the following facilities: a roasting section, a smelting section, a leaching and purification section, an electrolytic cell building, a by-products recovery plant, and numerous support and storage buildings.

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Support Area

This area is comprised of support and storage buildings that serve both the copper and zinc smelters and refineries. All of the buildings within this area were constructed [Redacted] with the exception of the support buildings which were built [Redacted]. These support buildings serve the steam plant and coal preparation facility.

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FIGURE 8. CHU-CHOU NONFERROUS METALS PLANT, CHINA

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TABLE IV. CHU-CHOU NONFERROUS METALS PLANT

Key To Annotations

Area A: Copper Smelter and Refinery

1. Ore Storage Building
2. Ore Bins
3. Storage Building and Silos
4. Storage Building
5. Support Building
6. Crushing and Grinding Unit
7. Crushing Unit
8. Sintering Building
9. Electrolytic Cell Building
10. Support Building
11. Smelting Building
12. Probable Blower House
13. Dust Collection Unit
14. Cottrell Precipitator
15. Fabrication Building
16. By-Products Recovery Building

17. Filtering Section
18. Rotary Kilns
19. Unidentified Facility
20. Storage Building
21. Support Building
22. Rectifier Building
23. Electrolytic Cell Building
24. Processing of Zinc Sulfate
25. By-Products Recovery Building
26. Support Building
27. Administration Building
28. Workshop
29. Support Building
30. Warehouse
31. Storage Building
32. By-Products Recovery Building
33. Warehouse
34. Cooling Towers
35. Support Building
36. Support Building

Area B: Zinc Electrolytic Refinery

1. Ore Storage Building
2. Ore Crushing Unit
3. Cottrell Precipitator
4. Cooling Towers
5. By-Products Recovery Building
6. By-Products Recovery Building
7. Warehouse
8. Ore Storage Building
9. Roasting Building
10. Ore Storage Building
11. Unidentified Facility
12. Ore Blending Unit
13. Ore Leaching Section
14. By-Products Recovery Building
15. By-Products Recovery Building
16. Purification Tanks

Area C: Unidentified Area

1. Warehouse
2. Warehouse
3. Warehouse
4. Support Building
5. Support Building
6. Coal Preparation Facility
7. Coal Storage Building
8. Steam Plant
9. Support Building
10. Warehouse
11. Warehouse
12. Warehouse
13. Support Building
14. Support Building

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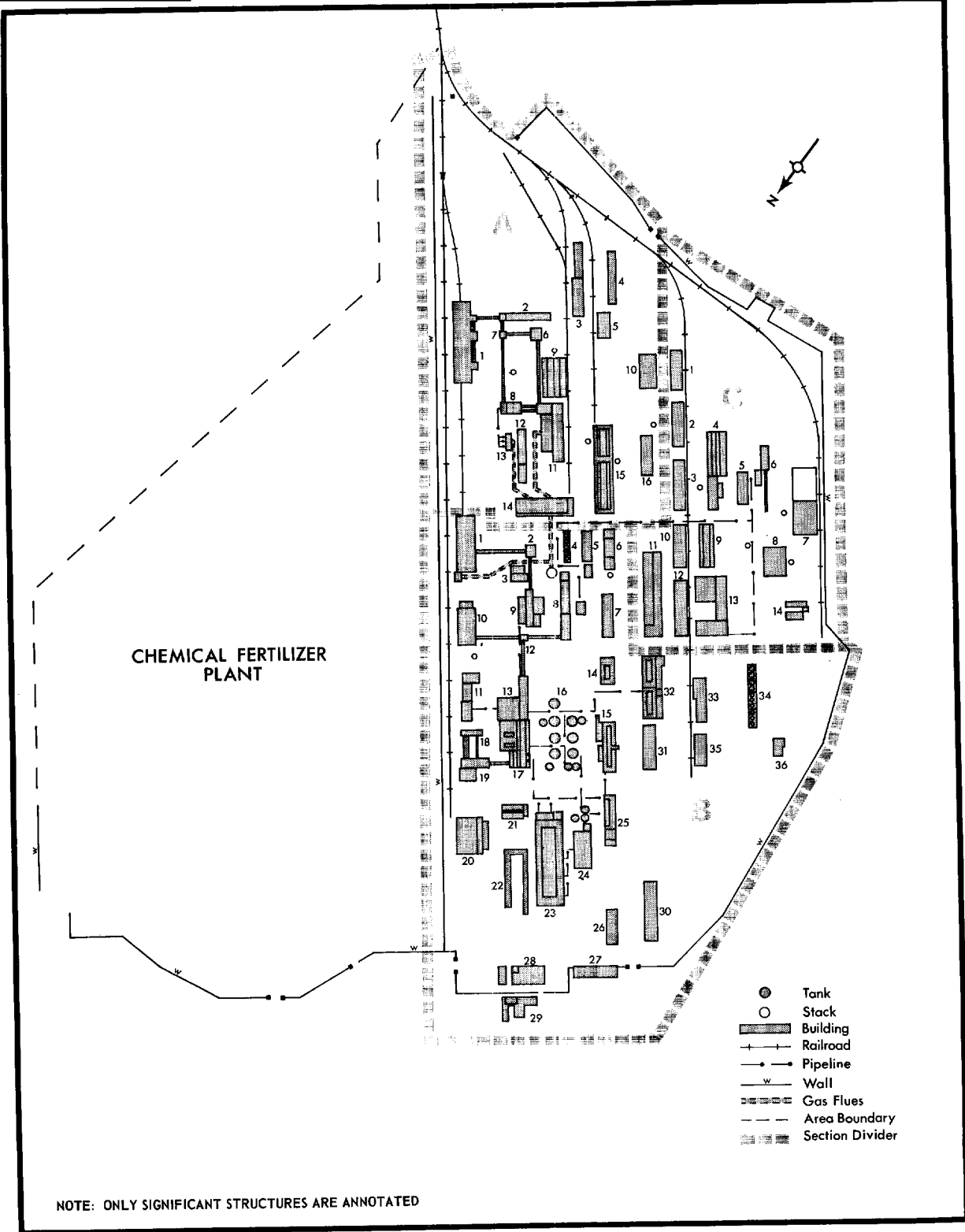


FIGURE 9. CHU-CHOU NONFERROUS METALS PLANT

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KUN-MING COPPER SMELTER AND REFINERY

The Kun-ming Copper Plant (Figures 10&11)  is located at 25-06N 102-40E approximately 5 nautical miles NNW of Kun-ming, China. This plant is secured by a wall and served by both rail and road.

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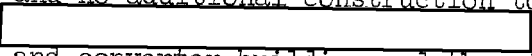

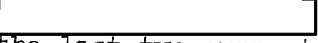


The plant was first noted  while still in the very early stages of construction. Only the electrolytic cell building and minor support buildings had been constructed at this time; however, the cell building does not appear operational.

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When the plant was next covered   considerable progress toward its completion had been made. The completed facilities consisted of a combination steam plant and coal pulverizing unit, a sintering facility, three blast furnaces, ore storage building, ore unloading and preparation facility, and additional construction to the casting and converter building. Numerous support and storage buildings were also constructed during this same period; however, the plant appeared inoperable.

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Analysis of coverage  showed little advancement in the construction of the casting and converter building and no additional construction to any other facilities. An analysis  revealed the completion of the casting and converter building and the additional construction of support, storage, and administration buildings. Although two support buildings were still under construction  the plant was seen in operation for the first time. Coverage   showed the completion of the last two support buildings. The plant was operating at a high level on the latest available coverage .

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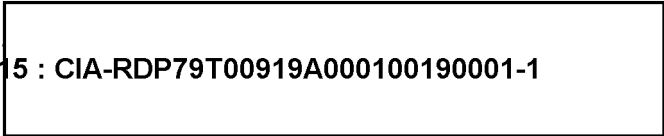
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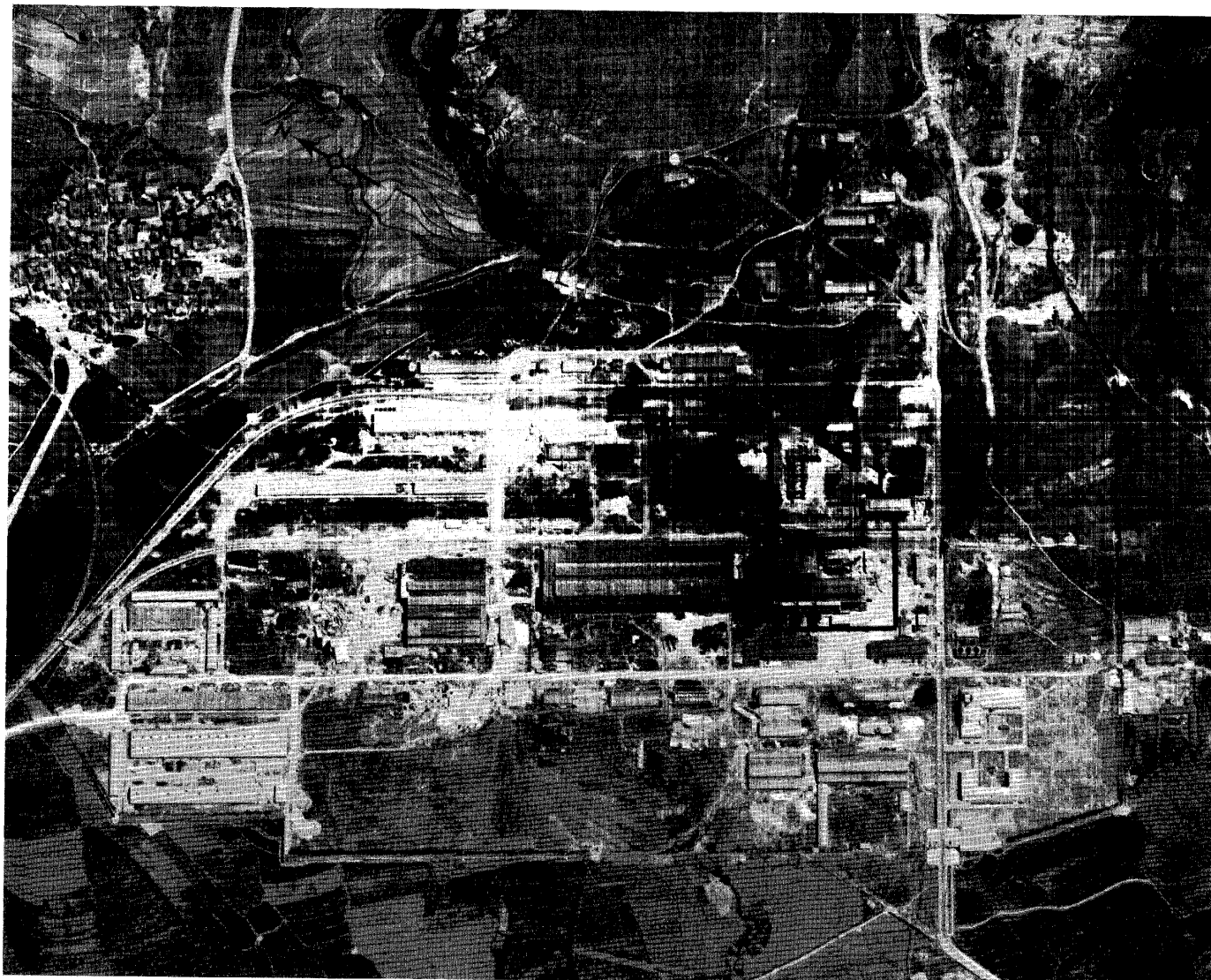


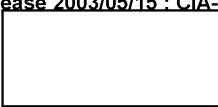
FIGURE 10. KUN-MING COPPER SMELTER AND REFINERY, CHINA

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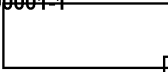
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TABLE V. KUN-MING COPPER SMELTER AND REFINERY

Key to Annotations

- 1. Support Buildings
- 2. Warehouse
- 3. Warehouse
- 4. Warehouse
- 5. Electrolytic Cell Building
- 6. Storage Building
- 7. Storage Building
- 8. Warehouse
- 9. Storage Building
- 10. Warehouse
- 11. Ore Unloading and Preparation
- 12. Steam Plant and Coal Pulverizing Unit
- 13. Converter and Casting Section
- 14. Blower House
- 15. Support Building
- 16. Support Building
- 17. Support Buildings
- 18. Blower House
- 19. Dust Catchers
- 20. Smelting Section
- 21. Sintering Section
- 22. Conveyor
- 23. Ore Storage Building
- 24. Stack
- 25. Cooling Ponds
- 26. Cottrell Precipitator
- 27. Support Building
- 28. Support Building
- 29. Administration/Laboratory
- 30. Administration Building
- 31. Cooling Towers
- 32. Water Storage Tanks

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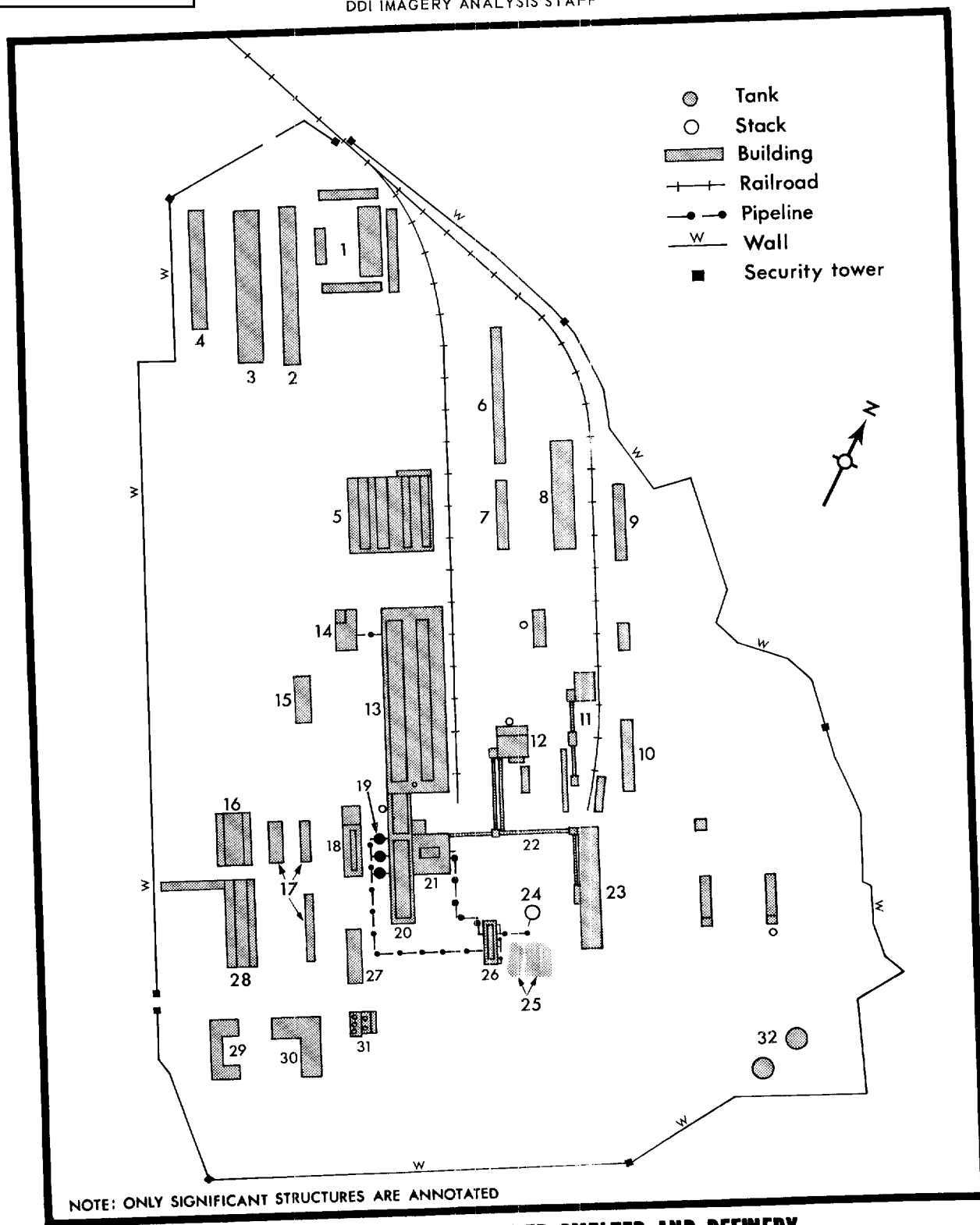


FIGURE 11. KUN-MING COPPER SMELTER AND REFINERY

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