Copy 1

REPORT NO. 24

GERMAN FIRE PROTECTION PRACTICE COVERING PETROLEUM RISKS

Smith

JOINT INTELLIGENCE OBJECTIVES AGENCY
WASHINGTON, D. C.

REPORT ON INVESTIGATION OF GERMAN FIRE-PROTECTION PRACTICE COVERING PETROLEUM RISKS

Date of Report

1 August 1945

(Smith, Carlisle T.)

CIOS SECTION
INTELLIGENCE DIVISION
OFFICE, CHIEF ENGINEER, USFET
APO 887

TABLE OF CONTENTS

Personnel of Inspection Team

CARLISLE F. SMITH, EXPERT CONSULTANT, OCE, CIOS

I. OBJECT OF THE INVESTIGATION:

To observe the nature of German fire protection facilities, equipment and installations covering petroleum risks such as tank farms and refineries.

II. CONCLUSIONS:

A very general appraisal is that the German selection of fire fighting media for this class of risk was similar to U. S. practice. They used foam for unenclosed risks and CO_2 for enclosed risks.

There are apparently more foam systems of the aspirated airfoam type than there are of the chemical foam type and the preference in Germany seems to be toward air foam for risks large enough to be beyond the capacity of self-contained portable units.

In considering the comparitive use of air vs. chemical foam in Germany it appears that while their airfoam application and technique is of a high order, that their technique with respect to the use of chemical foam is quite deficient compared to long established practice in the U. S.

The chemical foam installations observed were wrecked so that operation was impossible, however, the MINIMAX generators inspected were complicated affairs compared to the standard U. S. Navy generator.

German single powder for chemical foam generation was improperly packed and would be unacceptable in the U. S.

The single powder bins for storage directly above the generators were inferior to U. S. Construction.

The piping layouts to tankage and within the tanks would be considered acceptable in the U. S.

German airfoam systems were well engineered. However, the airfoam stabilizers available were not the equal of the U. S. Navy standard solution.

The use of CO_2 for total flooding of enclosed risks such as pump rooms was in order. However, the outlet nozzle constructions were very much inferior to the standard shielded nozzle used in the U. S. and also their

neglect in not directing nozzles toward the most likely sources of fire was inferior to U. S. practice. Also they did not use the automatic system but relied on manual operation only which would not be considered adequate in the best U. S. practice.

There was no material, apparatus or technique observed that would be of benefit in the U. S., including foam, CO_2 or other medium.

III. DETAILED REPORT OF VISITS TO TARGETS:

The targets visited and the personnel interrogated are listed as follows:

a. Name of Town or City - near EBENHAUSEN
(1) Organization - Luftwaffe gasoline depot.
Location on Map - GSGS 4346 L51/N 77
Personnel - deserted except for one German ex-employee workman who was familiar with installation.
Function - Gasoline storage depot.
Date of Invest. - 14 July 1945.

b. Name of Town or City - near EBRACH
(1) Organization - branch of WIFO
Location on map - GSGS 4346 M50/M 94
Personnel - deserted except for one German employee partially familiar with the installation.
Function - Gasoline storage depot for the HEERES. Filling depot for drums, jerry cans, & oil cans (litre size).
Date of Invest. - 15 July 1945.

c. Name of Town or City - near FREIHAM
(1) Organization - WIFO
Location on map - GSGS 4346 M49/Y 75
Personnel - German technical personnel as assigned by Capt. C.E.Rusk, U.S.A.,Q.M.C. in charge of the property.
Function - Gasoline and diesel fuel storage depot. Reported to be largest in southern Germany.
Date of Invest. - 19 and 24 July 1945.

d. Name of Town or City - near EBENSEE, Austria.
(1) Organization - DEA-NOVA Raffinerie
Location on Map - GSGS N48/V 53.
Personnel - Dr. Fritz Staiger, Director
Herman Scrbinsky, Chief Engineer.
Function - First attempt of Germans to put an oil refining operation in a mountain.
Date of Invest. - 21 and 22 July 1945.

EBENHAUSEN

There were eleven 600,000 Litre (5200 bbls U.S.) gasoline tanks and three 300,000 Litre (2600 bbls. U.S.) mixing tanks at the EBENHAUSEN depot all above ground plus valve and hose pits for loading and unloading 16 cars at one time.

The tanks were all protected by a masonery "bomb splinter" wall, the inside diameter of which was approximately two meters larger than the outside diameter of the tanks.

The fire protection system for the tanks and also the annular space between the tanks and the masonery wall was a fixed pipe chemical foam system using MINIMAX single powder generators. The water inlet pressure desired was 8 Atü (115 p/si U.S.).

There were two separate houses for duplicate generator and powder layouts so that the loss of one installation would not leave the entire risk unprotected. In fact one of the generator houses had been destroyed by bombing. The piping was interconnected between the two generator houses.

A steel bin was suspended directly above each generator, containing 400 kg. of powder ready to discharge into the generator hopper. A lever operated powder loosening device was incorporated near the outlet of each bin. Additional powder to be dumped into the steel bin was located in a room above the generator room which powder was packed in ordinary wooden kegs lined with a moisture resistant paper and tended to lump solid. The steel bins could be filled by dumping the powder thru a funneled chute thru the floor of the keg storage room.

The foam piping to and in the tanks and also the piping to the annular space between the tanks and the

masonry protecting wall would be considered satisfactory by U. S. standards.

The foam producing powder and the powder packing would not be acceptable by U. S. standards.

The gasoline valve and hose pits at the railroad siding were 5'3" wide by 9'4" long by 5'1" deep and could be covered with iron sheeting when not in use. The fire protection system for these pits was a fixed pipe CO_2 system manually operated, and supplemented with CO_2 30 kg. wheeled engines. The CO_2 system nozzles were not shielded and to that extent the system was not the equivalent of U. S. practice.

EBRACH

This risk in a general way was so similar to EBENHAUSEN that the differences only need be noted here.

The EBRACH depot carried on a considerable tank filling operation of both drums of approximately 55 gallon (U.S.) capacity, jerry cans and litre oil containers.

In addition to the chemical foam and CO_2 fixed systems, which are similar to EBENHAUSEN, EBRACH had a portable cart with air foam apparatus so that this protection could supplement the fixed systems and also assist in protecting the filling operations.

In the filling rooms they had Total dry powder extinguishers which were both ill-chosen and inadequate for the risk.

FREIHAM

This depot is reported to have been the largest bulk storage for gasoline and diesel fuel in southern Germany. The reported capacity at the end of the war was 27,000,000 gallons (U.S.) with projected additions under construction that would add 30,000,000 gallons (U.S.). The storage tanks were horizontal cylindrical tanks with spherical ends and the capacities were either 872,000 gallons (U.S.) each or 1,000,000 gallons (U.S.) each.

The entire installation was underground and the terrain is flat.

All pump rooms were protected by total flooding CO_2 systems, a separate system for each room, all manually operated.

Any tank fires were protected by airfoam apparatus mounted on trailer carts located at ground level in various areas. Inasmuch as the underground tank fires provided a natural crater for receiving foam, the fire protection problem was very simple. In addition to the application of foam the practice was to pump the fuel from the burning tank to an empty tank.

There was one fire due to bombing and the crater in this instance was 8' to 10' deep and the aperture in the tank was approximately the same size. The german engineer stated that had they had about two meters (6½' U.S.) more earth over this tank that the bomb would have been ineffective. This fire was obviously easy to extinguish.

In above ground installation at FREIHAM such as the office and barracks, they had total dry powder extinguishers.

EBENSEE

This target was an attempt by the Germans to put an oil refining operation underground, and underground in this instance was to tunnel into the side of a mountain. A description of such an operation can best be accomplished by illustrations which are shown herewith as Exhibit "A".

The fire protection for this risk was steam total flooding and for small fires they had portable chemical foam extinguishers. Obviously the fire fighting problem in a risk such as this is peculiar unto itself.

IV. PROPOSED FUTURE ACTION AND RECOMMENDATIONS:

To make this investigation complete an inspection of at least one major oil refinery and one or two tank farms should be made to either verify or alter the conclusions arrived at by virture of this investigation to date and now written in this report.

The Engineer Board, Fort Belvoir, Virginia, will no doubt wish to extend their investigation of the use of airfoam for refinery and tank farm fixed systems. The German technique in this field was well developed and the technology is covered by this investigator's report M-2.

German technique and apparatus with respect to the use of chemical foam was inferior to U. S. practice and does not warrant further study.

German technique and apparatus with respect to the use of CO_2 indicated nothing better that the equal of U. S. practice and in many cases was inferior to U. S. practice. No further study of this particular application of CO_2 is recommended.

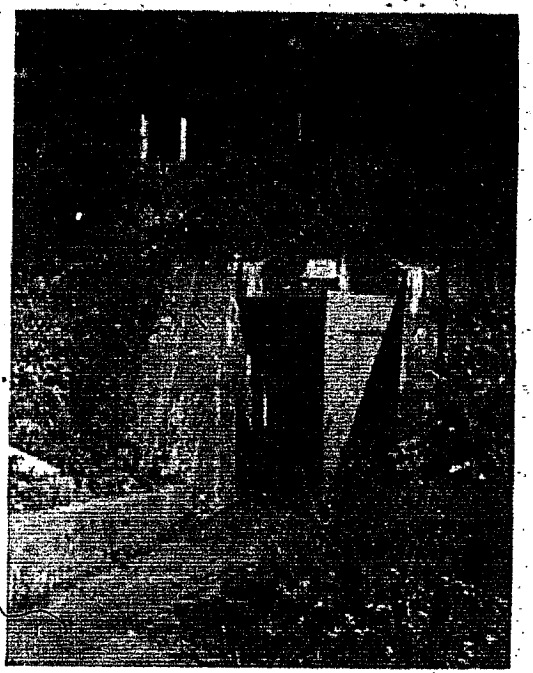


Exhibit 1.

Photograph showing Foam generator house at Ebenhausen.

Windows in upper portion of house are in the second story which is the storage of foam producing chemical to be dumped as required into the generator powder bin.

Tanks protected are back of this generator house in the woods.

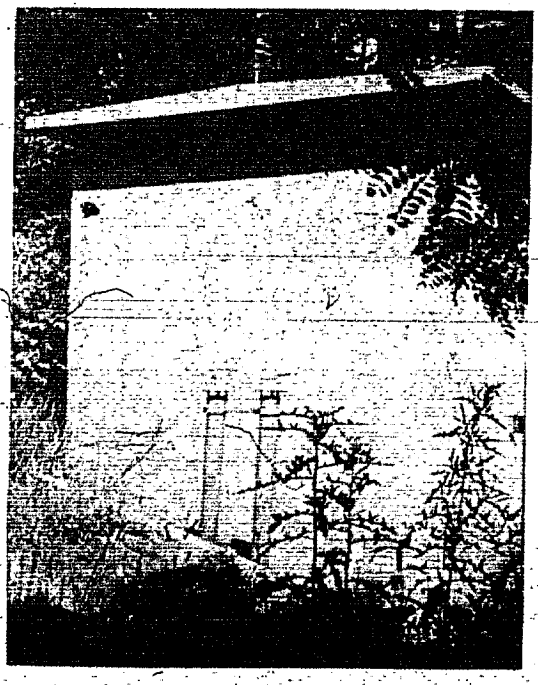


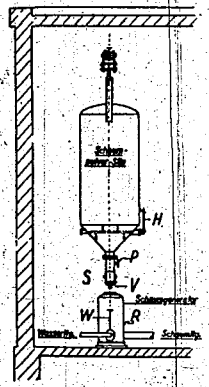
Exhibit 2.

Photograph showing Foam generator house at Ebrach.

In this house the bulk chemical (in wooden kegs) is stored on a balcony within the generator house.

Tanks protected are to the left of the generator house as shown in the photograph.

Bedienungsvorschrift der Minimax-Schaumfeuerlöschanlage



Inbetriebsetzung:

1. Schaumschieber in der Schaumleitung des brennenden Tanks bezw. der brennenden Tankgrube öffnen. Bei Strahl- oder Gießrohrbetrieb Schläuche ankuppeln und zugehörigen Schaumschieber öffnen.
2. Hauptwasserschieber in der Wasserzuführungsleitung öffnen.
3. Wasserschieber W ganz öffnen und Hebel R der Reguliervorrichtungen ganz nach rechts herumlegen.
4. Verschlußstopfen V aus den Pulverrohren herausziehen u. Schieberohr S herablassen.
5. Pulverschieber P durch Linksdrehen der Handräder ganz öffnen. Falls nicht gleich Pulver den Generatoren zufällt Hebel H der Brechervorrichtung zur Auflockerung des Pulvers hin- und herbewegen.

   Die Anzahl der in Betrieb zu setzenden Schaumgeneratoren richtet sich nach der Oberflächengröße des brennenden Tanks bezw. Tankgrube.

6. Unterbrechung des Löschbetriebes: Pulverschieber P schließen, Hebel R der Reguliervorrichtungen ganz nach links herumlegen, Wasserschieber W schließen und Entwässerungen an den Schaumgeneratoren sofort öffnen.
7. Wiederaufnahme des Löschbetriebes: Entwässerungen an den Schaumgeneratoren schließen sonst wie unter 3 u. 5 verfahren.

Außerbetriebsetzung:

1. Nach erfolgter Löschung des Brandes Pulverschieber P schließen und Pulverrohre mit Verschlußstopfen V wieder luftdicht abschließen.
2. Schaumgeneratoren solange arbeiten lassen, bis das noch in ihnen befindliche Pulver abgesaugt ist und dann Wasserschieber W schließen.
3. Schaumgeneratoren, Schläuche, Strahl- und Gießrohre innen und außen gründlich reinigen, sowie Schaumleitungen gut durchspülen.
4. Schaumgeneratoren und Schaumleitungen vollständig entwässern und hierauf sämtliche Schieber, Ventile und Hähne schließen.
5. Schaumpulver-Silo wieder auffüllen.

Bemerkung: Um die notwendige Lockerung des Schaumpulvers in den Silos aufrecht zu erhalten, alle 3 Monate ca 50kg Schaumpulver unten ablassen und oben wieder einfüllen, Einfüllöffnung wieder luftdicht abschließen.

EXHIBIT 3

a-MINIMAX INSTRUCTIONS FOR OPERATING CHEMICAL FOAM SYSTEM.

b-HOUSING FOR CHEMICAL GENERATORS SHOWN IN PHOTOGRAPHS 1 @ 2.

c-TRANSLATION IS EXHIBIT 4.

TRANSLATION OF EXHIBIT 3
(EXHIBIT 4)

Operating Instructions for the Minimax Foam Fire Extinguisher System:

To Operate

1. Open the valve in the foam line to the burning tank. Couple the hose for nozzle operation and open the proper valve.

2. Open the valve in the main water line.

3. Open the water valve W completely and turn the regulating lever R completely to the right.

4. Pull away closure V from the powder tube and lower the circular tube S.

5. Open the powder valve P by turning the handwheel completely to the left. In case the powder does not flow freely into the generator, move lever H back and forth. Lever H is to loosen the powder.

6. To stop operation, close powder valve P, turn lever R, the regulating device, completely to the left, close water valve W, and drain the water out of the generator at once.

7. To resume operation, close the generator drain and follow instructions 3 and 5.

To Take Out of Operation

1. After extinguishing the fire, close powder valve P and close the powder tube air tight with closure V.

2. Operate the generator until the powder in it is consumed and then close water valve W.

3. Clean the generator, nozzles, and hose; flush the foam line well.

4. Drain generator and foam lines, and close the valves, vents, and cocks.

5. Refill the powder bin.

Note: To keep the powder loose in the bin, 50kg of powder should be permitted to flow from the bottom and replaced through the top. The refill opening should be resealed air tight again.

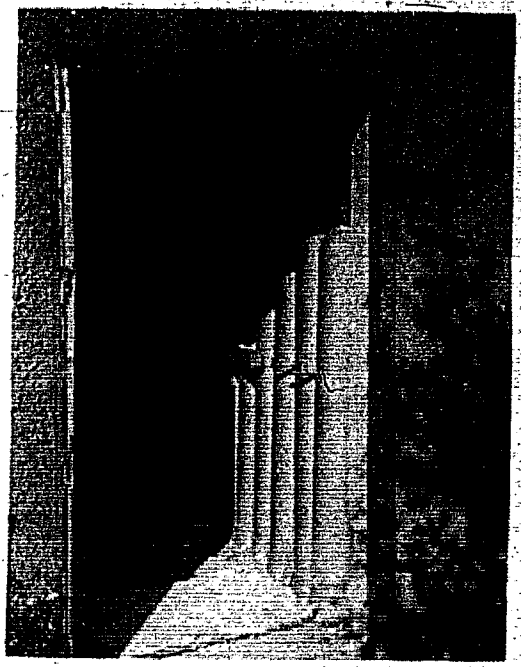


Exhibit 5.

Photograph showing Co2 (Carbon Dioxide) battery at Ebenhausen.

These cylinders were arranged for manual operation and were piped to the loading valve and hose pits such as that shown in Exhibit 6 below.

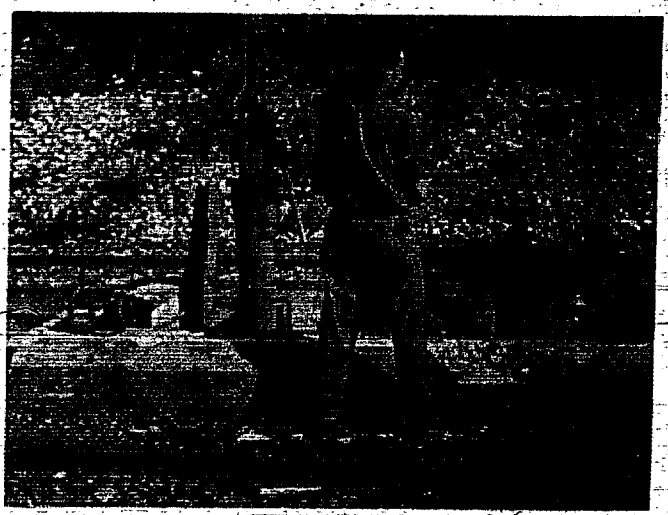


Exhibit 6. Photograph showing a loading valve and hose pit (5feet-3 inches wide by 9 feet-4 inches long and 5 feet-1 inch deep) at Ebenhausen. There were eight (8) of these pits and all were protected by total flooding carbon dioxide from the battery shown in Exhibit 5.

Exhibit 7.

Photograph of Ebrach depot taken from German Lookout tower looking toward hillside and forest in which tanks are located. One tank may be seen near left side of photograph slightly above center.

A view from left to right across the center of this view (Exhibit 7) is Exhibit 8.

Exhibits 8 and 9.

Photographs showing dispersal of drums due to bombing at the Ebrach Depot Fillin Plant.

These photographs show the general fire hazard existing at an operation of this sort that must be protected by portable foam equipment.

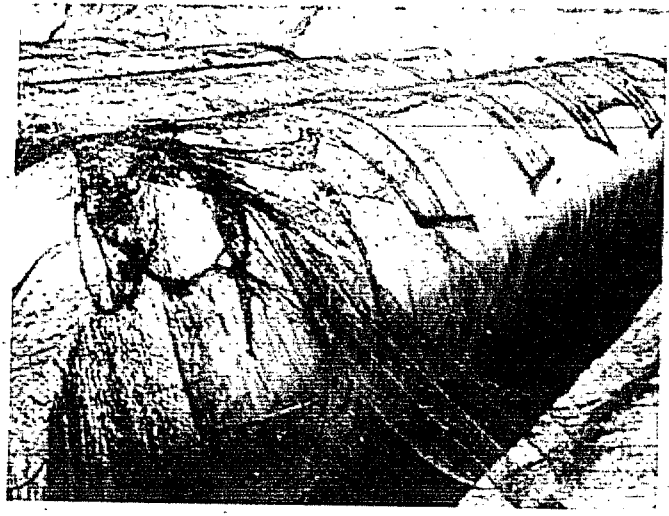


Exhibit 10. Photograph showing a group of storage tanks at Freiham that have not been covered. Note ground level near top of photograph. Each of these tanks has a capacity of 1,000,000 U.S. gallons.

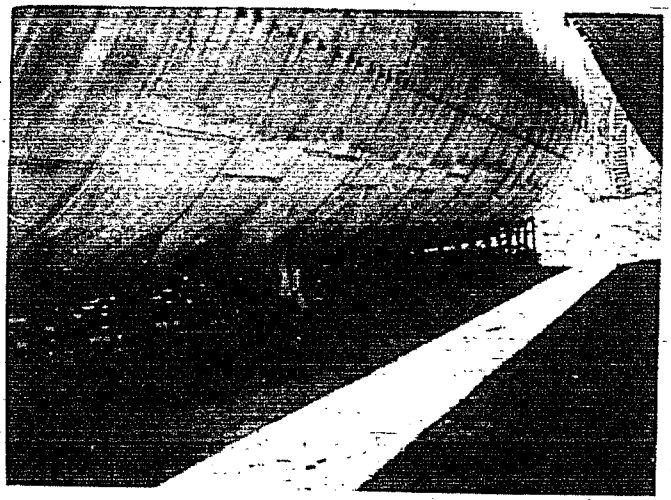


Exhibit 11. Photograph showing tanks in Exhibit 10. viewed from the foundation level.

Exhibit 12.

Photograph at Freiham showing bomb hit on buried tank (similar to those shown in Exhibits 10 and 11). Distance from ground level shown at upper edge of photograph to the tank was 10 feet.

Exhibit 13.

Similar to Exhibit 12, showing aperture in tank. Maximum dimension of aperture is approximately ten (10) feet.

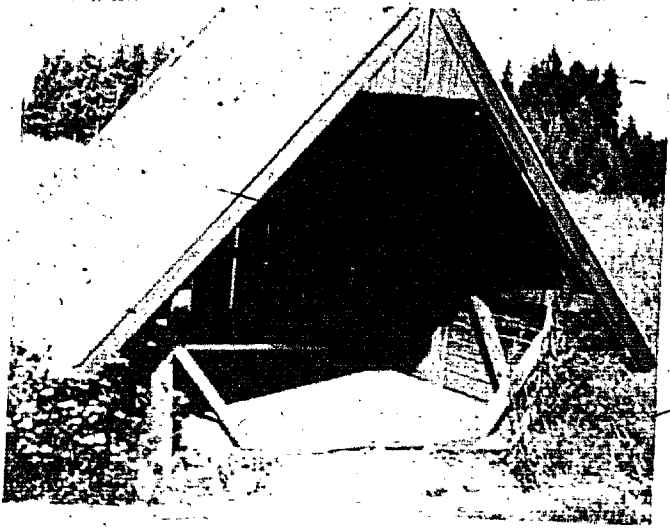


Exhibit 14. Photograph showing ground entrance to underground pump room at Freiham. Wooden shack over ground door to hide it from aerial observation.

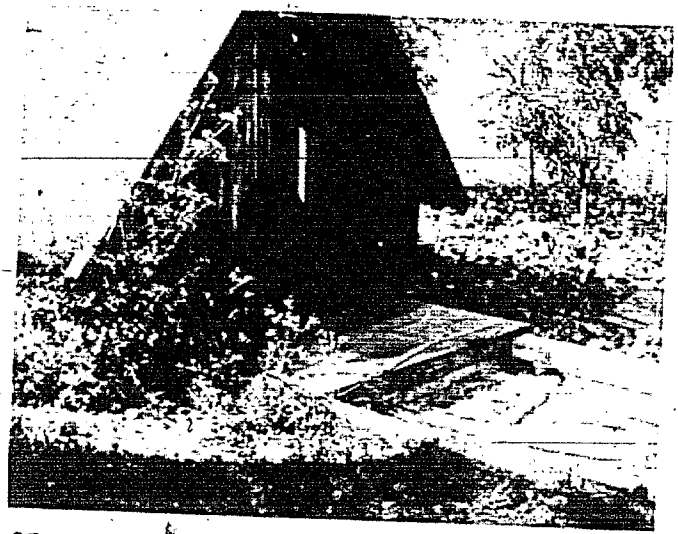


Exhibit 15. Photograph showing view at rear of Exhibit 14 showing track for steel entrance door to underground pump room.

Exhibit 16.

Photograph showing ventilators above underground pump rooms at Freiham.

These ventilators plus an entrance such as shown in Exhibits 14 and 15 are the only openings from the underground pump rooms and the open air.

This illustrates the ease with which this first fire hazard can be controlled by carbon dioxide total flooding.

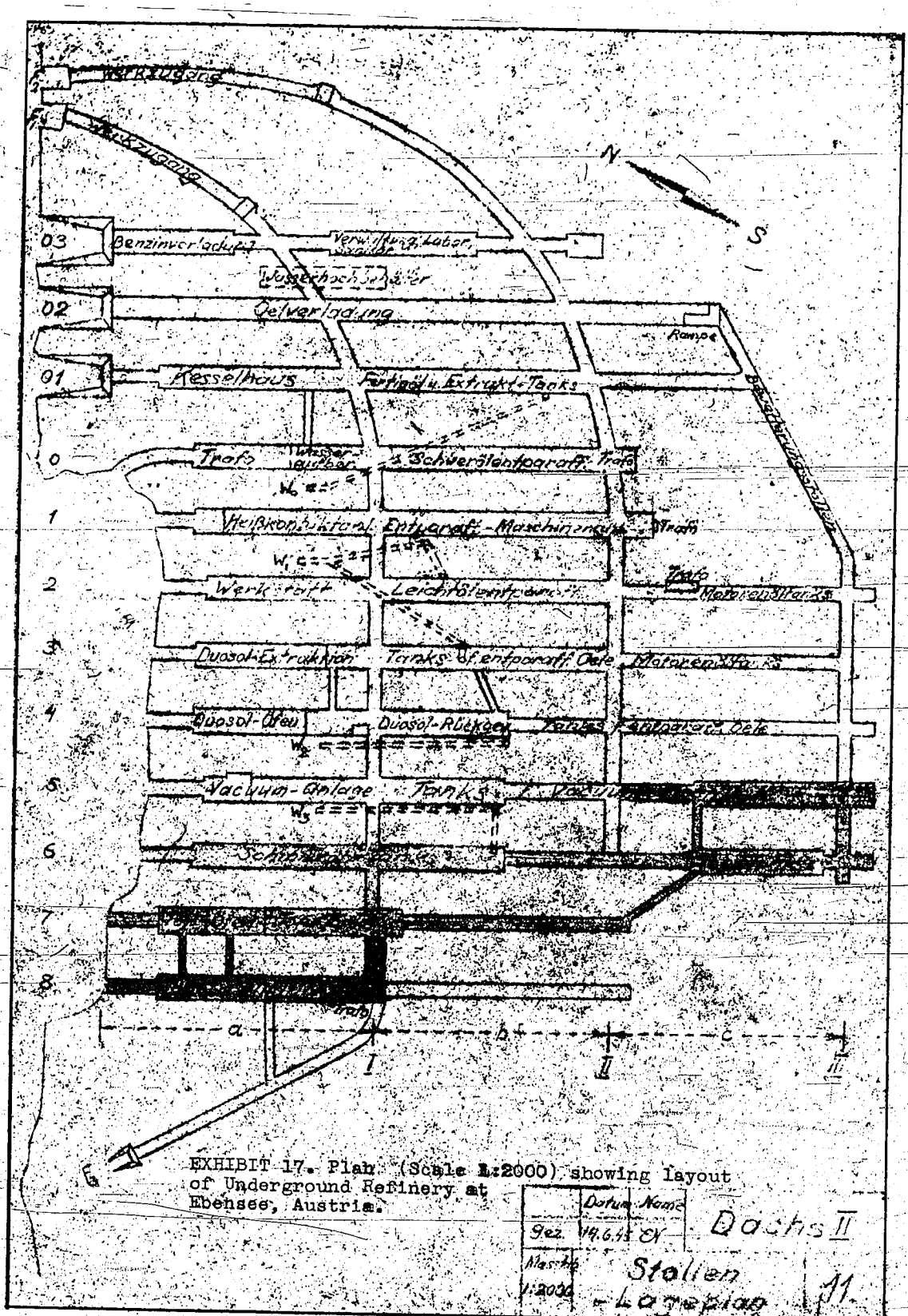


EXHIBIT 17. Plan (Scale 1:2000) showing layout of Underground Refinery at Ebensee, Austria.

	Datum	Name	
Gez.	14.6.45	CK	Oachs II
Masstab 1:2000			Stollen - Lageplan 11.