

*HANDBOOKS PREPARED UNDER THE DIRECTION OF THE  
HISTORICAL SECTION OF THE FOREIGN OFFICE.—No. 31*

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AND  
SAAR MINEFIELDS

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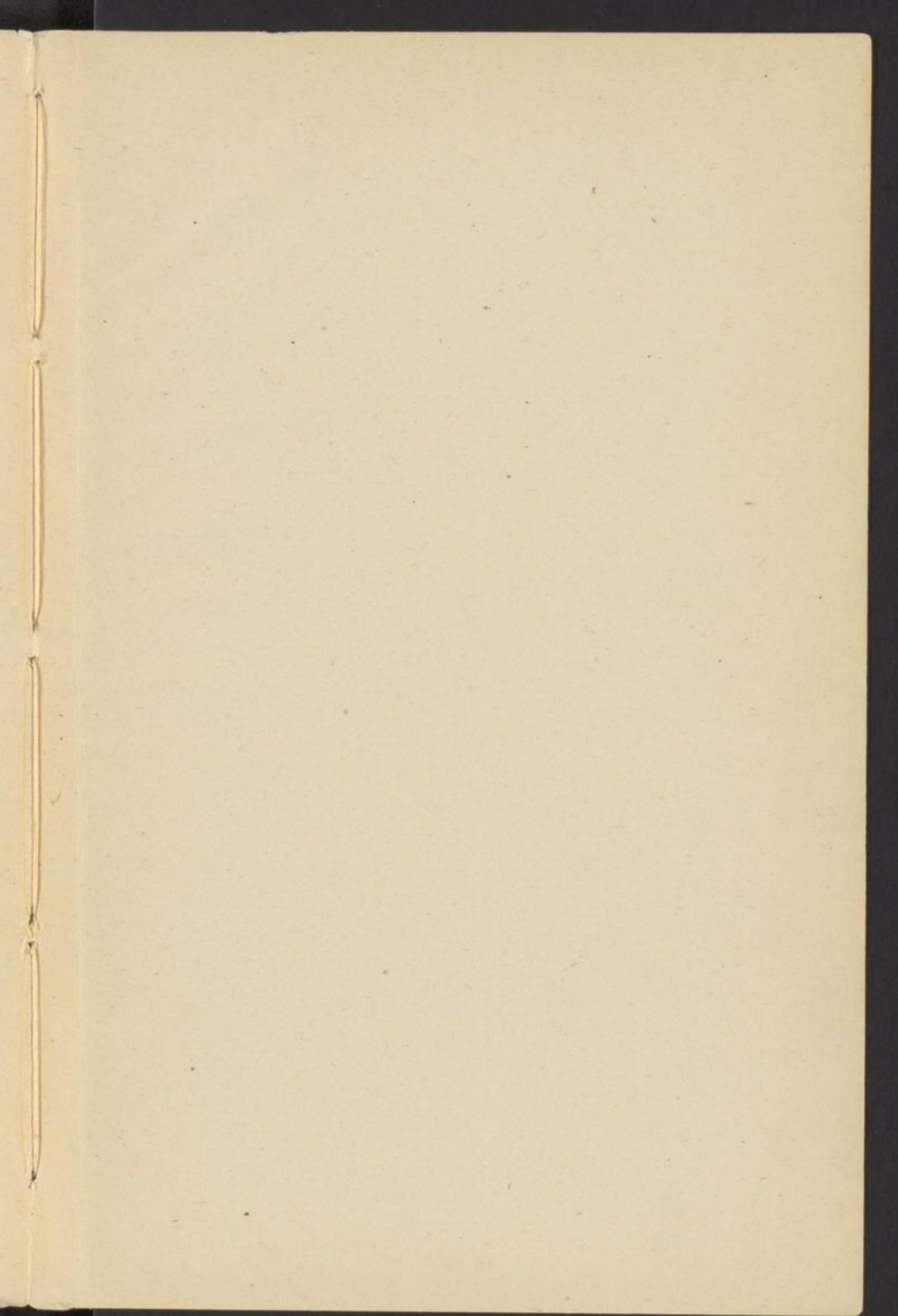
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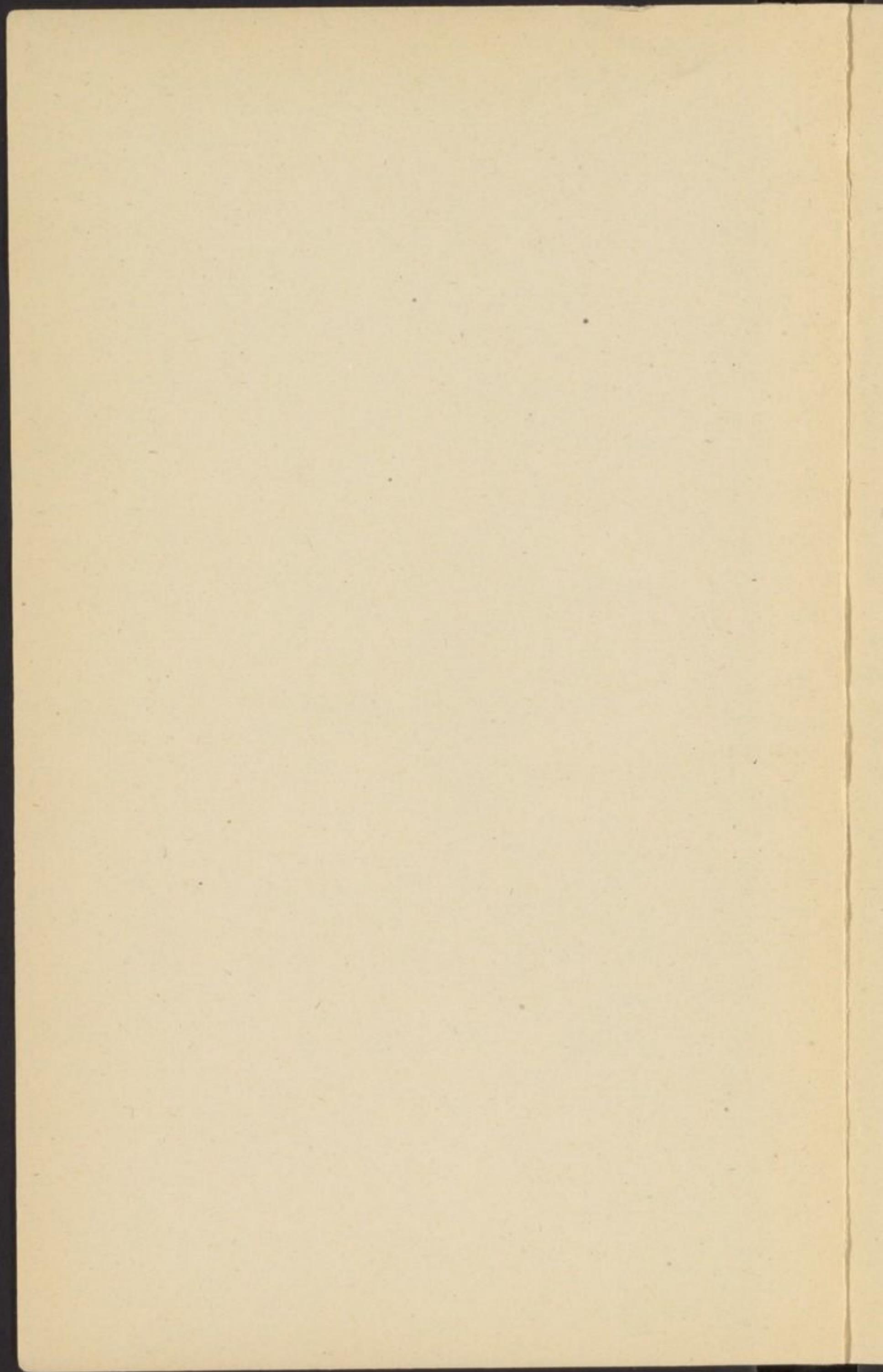


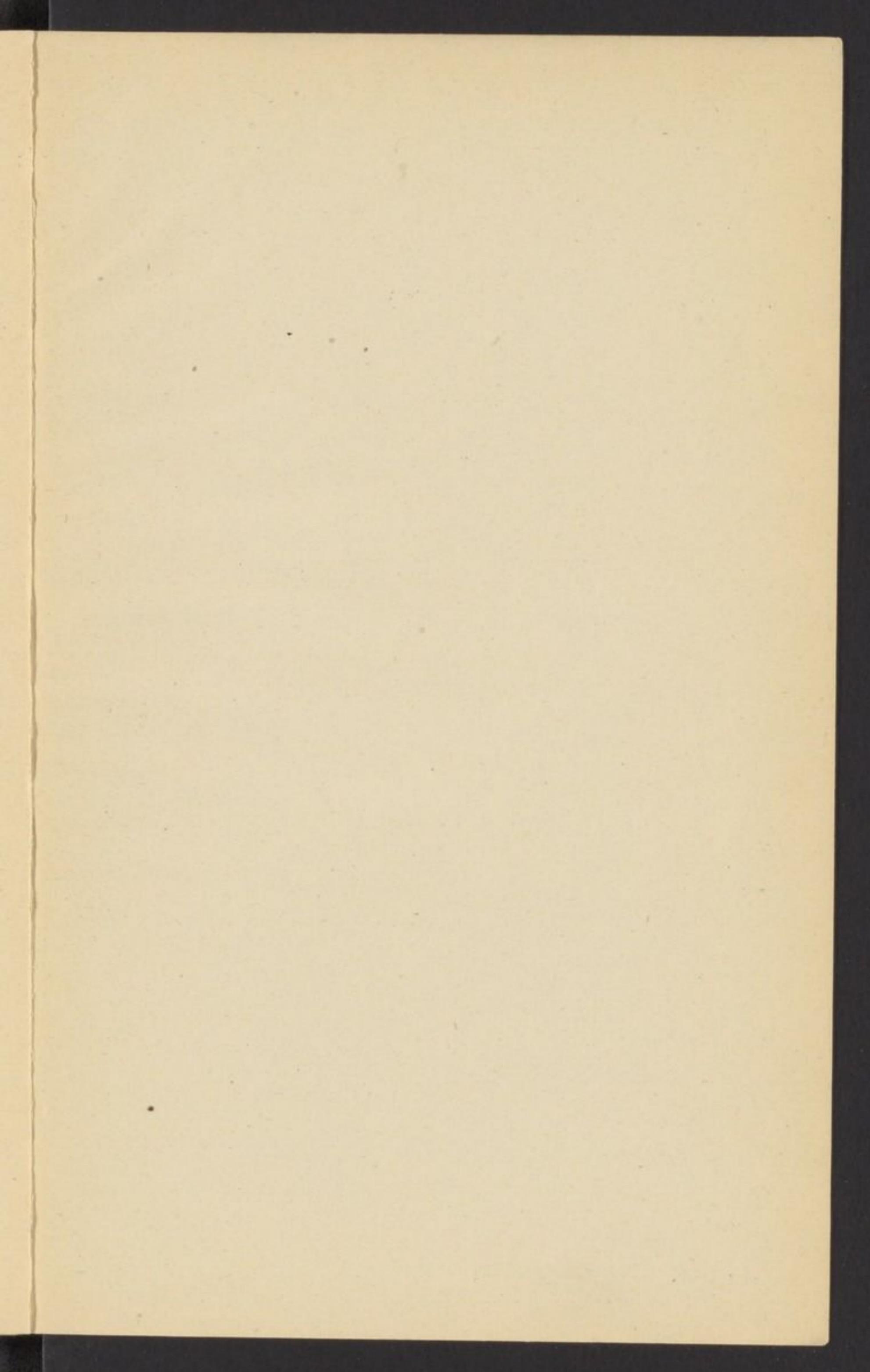


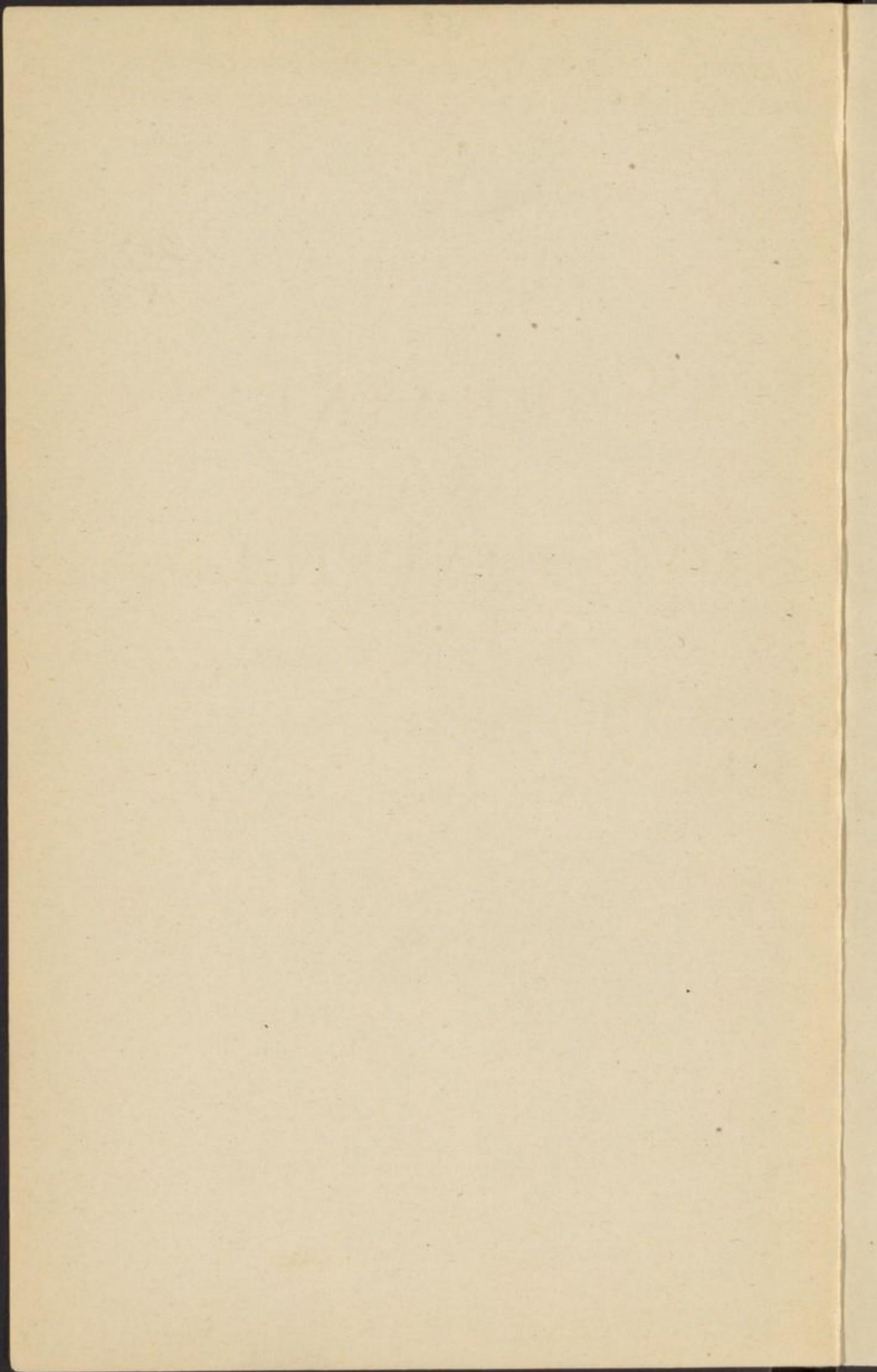
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LORRAINE  
AND  
SAAR MINEFIELDS

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PUBLISHED BY H. M. STATIONERY OFFICE,

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AMERICAN MUSEUM OF NATURAL HISTORY  
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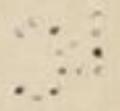
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1917 (Foreign Office)

## EDITORIAL NOTE

IN the spring of 1917 the Foreign Office, in connexion with the preparation which they were making for the work of the Peace Conference, established a special section whose duty it should be to provide the British Delegates to the Peace Conference with information in the most convenient form—geographical, economic, historical, social, religious, and political—respecting the different countries, districts, islands, &c., with which they might have to deal. In addition, volumes were prepared on certain general subjects, mostly of an historical nature, concerning which it appeared that a special study would be useful.

The historical information was compiled by trained writers on historical subjects, who (in most cases) gave their services without any remuneration. For the geographical sections valuable assistance was given by the Intelligence Division (Naval Staff) of the Admiralty; and for the economic sections, by the War Trade Intelligence Department, which had been established by the Foreign Office. Of the maps accompanying the series, some were prepared by the above-mentioned department of the Admiralty, but the bulk of them were the work of the Geographical Section of the General Staff (Military Intelligence Division) of the War Office.

Now that the Conference has nearly completed its task, the Foreign Office, in response to numerous inquiries and requests, has decided to issue the books for public use, believing that they will be useful to students of history, politics, economics, and foreign affairs, to publicists generally and to business men and travellers. It is hardly necessary to say that some of the subjects dealt with in the series have not in fact come under discussion at the Peace Conference; but, as the books treating of them contain valuable information, it has been thought advisable to include them.

It must be understood that, although the series of volumes was prepared under the authority, and is now issued with the sanction, of the Foreign Office, that Office is not to be regarded as guaranteeing the accuracy of every statement which they contain or as identifying itself with all the opinions expressed in the several volumes ; the books were not prepared in the Foreign Office itself, but are in the nature of information provided for the Foreign Office and the British Delegation.

The books are now published, with a few exceptions, substantially as they were issued for the use of the Delegates. No attempt has been made to bring them up to date, for, in the first place, such a process would have entailed a great loss of time and a prohibitive expense ; and, in the second, the political and other conditions of a great part of Europe and of the Nearer and Middle East are still unsettled and in such a state of flux that any attempt to describe them would have been incorrect or misleading. The books are therefore to be taken as describing, in general, *ante-bellum* conditions, though in a few cases, where it seemed specially desirable, the account has been brought down to a later date.

G. W. PROTHERO,

*General Editor and formerly  
Director of the Historical Section.*

*January 1920.*

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## I. GEOGRAPHY PHYSICAL AND POLITICAL

### (1) POSITION AND BOUNDARIES

THE Minette iron-ore deposit and the Saar coal-field occupy two strips of territory which lie between Luxemburg on the north, Kaiserslautern on the east, Longuyon on the west, and St. Nicolas-du-Port (a little south of Nancy) on the south.

The first strip, that which contains the Minette iron-field, extends from Longwy south-south-east to Nancy, its centre line passing through Longwy, Briey, Pont-à-Mousson, and Nancy. It is 68 miles long by nearly 20 miles broad, and its area is 1,320 square miles. Of this area 35 per cent. (463 square miles) is covered by iron-ore deposits.

The second strip, which contains the Saar coal-field, also passes through Pont-à-Mousson, from which it extends in a north-easterly direction for a total distance of 90 miles, coming to an end about Lautercken on the Glan. Its width is between 15 and 16 miles, and its area about 1,400 square miles, of which 52 per cent. (730 square miles) is occupied by coal-measures.

The combined area of the two strips, allowing for the 210 square miles where they overlap in the neighbourhood of Pont-à-Mousson, is some 2,500 square miles; and of this the deposits of valuable minerals cover an area of nearly 1,200 square miles.

The whole area is treated in other Handbooks in this series,<sup>1</sup> and consequently only summary notes need be given here.

## (2) SURFACE AND RIVER SYSTEM

### *Surface*

Most of the district lies on the Lorraine plateau. The surface of the Minette field consists of lower Jurassic formations, viz. Bath oolite and clays, which constitute the rolling Briey and Jarnisy plateaux in the west and centre, and the Haye heights, running parallel to the Moselle valley, on the east. All this is second-rate agricultural land, intersected by deep and steep-sided river-valleys; its general level is highest in the north and east, lowest in the south and west. The Haye is to a great extent wooded.

The Saar coal-field also belongs for the most part to the Lorraine plateau, but to the eastern or Triassic portion, the district of red sandstone and rich soils. It is much more broken than the Briey plateau, and might almost be described as a hill country; to the north-east it becomes more and more hilly as it rises to the watershed between the Moselle and the upper Rhine. There is comparatively little forest in this region, in the most industrialized district practically none. Most of it is fairly good agricultural land.

### *River System*

With two trifling exceptions in the north-east and north-west, the whole district belongs to the basin of the Moselle. Roughly speaking, the Moselle itself

<sup>1</sup> No. 26, *Belgium*; No. 27, *Luxemburg and Limburg*; No. 30, *Alsace-Lorraine*; No. 37, *Bavarian Palatinate*; No. 38, *Rhenish Prussia*.

drains the iron-field, and its main tributary, the Saar, the coal-field.

The Minette field of the Briey plateau lies on the watershed between the Meuse and Moselle. The Chiers (flowing past Longwy), the Crusne, and the Othain drain the northern portion of the French or western side; these flow into the Meuse not far from Sedan. The northern extremity is drained by the Alzette (Elz), which flows through Luxemburg to join the Moselle; the east by the Fensch and other small left-bank tributaries of the Moselle; the centre and south by the Orne, which rises in the Woëvre and flows east across the Minette field to join the Moselle between Metz and Thionville.

These rivers differ considerably in character. The northern rivers, belonging to the Briey plateau, are rapid, almost torrential; they run in deep valleys cut in the oolite, and act both as sources of water-power (their courses are often studded with mills) and as obstacles to communication. The Orne, together with its tributaries, the Woëvre streams, is very sluggish; it flows over flat clayey country, which it frequently floods, and, though it passes through a gorge to reach the Moselle, its fall is everywhere too slight to be utilized for water-power.

The southern (Nancy) extension of the Minette field is watered by the Moselle at Pompey in the north and at Pont St. Vincent in the south; in the east by its tributary, the Meurthe. Here again there is no available water-power, though the rivers themselves are considerable; and it would require improvements to make them navigable.

### (3) RACE AND LANGUAGE

As the district under consideration mainly forms part of Alsace-Lorraine on the one hand and of the Rhineland on the other, the population has been fully

discussed elsewhere, and a brief recapitulation of the main facts will here suffice.

The native population of these mining districts is by race and language almost wholly French in the Minette field, and almost wholly German in the Saar field. One small corner of the Minette field, including (*a*) the Luxemburg section and (*b*) a triangle of German territory roughly bounded by a line joining Ottange and Hayange, and including some 19 square miles of territory (together 7 per cent. of the iron field), is German-speaking. On the other hand, in the Saar coal-field (as limited by the present boundaries of concessions) only a single commune, Hémilly, in the extreme south-west, is French-speaking. Just a quarter of the Saar coal-field—though the least productive quarter—was part of France from 1815 till 1871. From 1801 to 1815 France possessed the whole basin.

The portion of the Minette field annexed to Germany is now chiefly exploited by means of Italian labour. There were 31,000 of these Italians in 1910, and the number must have risen greatly since then. Ninety-one per cent. of them speak no language but their own.

#### (4) POPULATION

##### *Distribution*

The main areas of mining and of industries immediately dependent upon it are densely populated. *Kreis* Diedenhofen, with the German Minette field and the great ironworks of the Moselle, Fensch, and Orne valleys, has an average of 300 per square mile, though it includes on the east a considerable expanse of agricultural country with a low population figure. *Canton* Briey, containing the French Minette field and the adjoining agricultural regions of the Briey plateau, has a density of 215 per square mile. *Canton* Nancy,

with the southern extension of the Minette field, has 250 inhabitants per square mile; but this figure includes the population of the large town of Nancy.

In the coal-field the figures are still higher. The *Landkreis* of Saarbrücken has a density of 950 per square mile (this figure does not include the urban population); *Kreis* Ottweiler, 650; *Kreis* Saarlouis, 500. These three *Kreise* together form the nucleus of the coal-field; but mining is also carried on to the south in *Kreis* Forbach (270), and to the east in Zweibrücken (375), Homburg (280), and Kusel (250); while to the north there are collieries in St. Wendel (225).

The agricultural areas lying just outside the mining districts have very much lower densities, varying from 120 (*Kreis* Château Salins) to 200. For the most part they reach a figure of 130–140, including urban as well as rural population.

The general distribution of the population may therefore be represented as follows:

Apart from the disturbing influence of the mine-fields, the Lorraine Jurassic plateau has an average density of 120–150 per square mile. Farther east and north-east this tends to rise as the more fertile Triassic belt is reached on the one hand and the low-lying and fertile Moselle valley on the other. Upon this is now superimposed a dense industrial population, concentrated in the Saarbrücken–Ottweiler region on the one hand, and along a belt from Longwy to Nancy on the other; but leaving the intermediate districts almost unaffected.

#### *Movement*

The rates of birth, death, and immigration are all high, especially in the Minette field. In the Saar coal-field conditions are fairly stable, and the less energetic

exploitation of the collieries leads to no such rapid changes as are still taking place on the Briey plateau. The rise of population necessary for the industrialization of the Saar district has already been for some years complete, and was largely brought about by the immigration of Germans; the transformation of the German Minette field is being produced by the immigration of Italians. On the French side of the frontier Belgians and Luxemburgers form a large proportion of the immigrants, who are still numerous.

## II. ECONOMIC CONDITIONS

### (A) COAL

#### (1) THE SAAR FIELD

The limits of the Saar field are less accurately known than those of any other German coal-field. In German Lorraine 185 square miles are at present conceded for mining purposes, and are believed to contain valuable seams to a depth of over 6,500 ft. In Prussia about 433 square miles are probably workable, and in the Bavarian Palatinate 194 square miles have been conceded, of which, however, only about 21 square miles are sufficiently known to allow of an estimate of their resources.

The coal-field lies in a depression running from north-east to south-west and extending transversely in the centre from about Dillingen (north-west of Saarlouis) to Saarbrücken. It is bounded on the south-east by a long and fairly straight fault, beyond which the coal can still in places (as at St. Ingbert) be reached at a greater depth. The north-east and south-west extremities of the field dip downwards, and the extent to which they may ultimately be workable is not yet known. The dip to south-west is, however, interrupted by a transverse fault running through Solgne and Achâtel, which lifts the coal-field again to within a little of the surface, to dip again past the French frontier. This south-west section, extending from the Solgne fault nearly to Martincourt beyond the Moselle, falls mostly in France and constitutes the Pont-à-Mousson coal-field, described below. Between the Solgne fault and the south-west edge of the Saar field at Hémilly and Maiweiler lies an unexplored

district, about 12 miles long, in which coal probably exists, but if so it lies at a very considerable depth; German authorities state that the depth appears to be such as to put working out of the question.

Longitudinally the field extends north-eastward to near the confluence of the Nahe and Glan, i. e. nearly 50 miles north-east of Saarbrücken. It has, however, been worked only in a district 10 by 3 miles in extent in the Palatinate, at the Potzberg, Hermannsberg, and Königsberg mines. Here the upper strata of the coal-field, the so-called Ottweiler beds, are worked. Boring has touched the deeper strata at about 3,300 ft.; but no galleries have been driven, and it is doubtful whether these strata can be profitably exploited. North-east, beyond the Königsberg mine to the edge of the Rhine valley trough, it is extremely doubtful whether further workings are practicable.

The transverse extent of the field (north-west to south-east) is also doubtful. In the north-west the probable boundary is the Nied valley, continued south-westward by the French Nied and north-eastward by a line through Düppenweiler. This, however, is a purely theoretical boundary, and accessible and valuable seams are not known to extend so far. The boundary of the known area must be placed on a line running from Dillingen, 3 miles north-west of Saarlouis, south-west through Ottendorf (Ottonville) to about Bienville, on the German Nied, and thence south-south-east for 6 or 7 miles by Hémilly to Maiweiler, from the neighbourhood of which it runs fairly straight north-east to Saarbrücken and beyond, following the line of a great fault. To the south-east of this fault it is probable that seams of considerable value run, at a depth of 6,000–7,000 ft., for some distance. At St. Ingbert this low-level field is reached by mines.

The system of coal-seams in the Saar field may be

briefly described as follows. There are four main groups:

(i) The lowest are the bituminous coals (*fettkohlen*), which fill the bottom of the basin and rise to the surface on its southern edge from Saarbrücken to Neunkirchen. This series is by far the most important element in the Saar basin, but, owing to its position at the bottom of the deposit, is difficult and expensive to exploit. It is worked in many places in the parts nearest Saarbrücken, but in Lorraine only at Heiligenbronn and Kleinrosseln.

(ii) Above this series lie the lower flaming coals (*liegende flammkohlen*). These crop out along an irregular belt passing a few miles to the north of Saarbrücken. They are extensively worked in the Saar valley; in Lorraine they are worked at two sites (Kleinrosseln and Spittel or L'Hôpital).

(iii) The third series consists of the upper flaming coals (*hängende flammkohlen*). In general character these resemble the series last described, and crop out along a line which crosses the Saar half-way between Saarbrücken and Saarlouis.

(iv) The uppermost of the four strata is the dry-coal series (*magerkohlen*). This is the most extensively worked of all.

The whole of the Saar coal appears to be of somewhat inferior quality, and its exploitation is not very actively pushed; the output could be greatly increased if desired, but it has been restricted in order to avoid competition with the Westphalian coal.

The reserves in the Saar field are calculated as follows (in millions of metric tons):

Depth.	Dry Coals.	Flaming Coals.	Bitu- minous.	Total.
Less than 4,000 ft.	717	4,966	4,086	9,769
Between 4,000 and 6,600 ft.	216	2,350	4,213	6,779
All depths	933	7,316	8,299	16,548

These reserves are all contained in seams that have been to some extent explored and worked. The reserves contained in portions of the field which have not been thoroughly explored are described as very considerable.

## (2) THE PONT-À-MOUSSON BASIN

This field, which is known only by borings, is a continuation of the Saar coal-field, here covered by thick deposits of Lias, Trias, and (in places) Permian rocks. These contain water-bearing strata, through which it would be difficult to sink shafts.

The coal-measures form an anticlinal ridge running south-west across the frontier. The axis of the ridge passes through Eply and Atton, a little south of Pont-à-Mousson, and thence to Martincourt. The area of workable coal-measures is 58 square miles; the richest part is east and north-east from Pont-à-Mousson. This area certainly does not exhaust the coal-field, which probably continues in every direction beneath an increasing thickness of Secondary rocks. It may be considered, however, to include all the coal strata which are workable under present conditions.

The Pont-à-Mousson field is distinctly less rich than that of the Saar valley. In view, however, of the difficulty of procuring coal to satisfy the requirements of the French Minette iron-field, it might be found worth while to exploit this deposit, which lies directly between the two great iron-mining centres of Nancy and Briey. But if a readjustment of the Franco-German frontier in the future should throw open the Saar basin to French enterprise, the poorer and less accessible deposit of Pont-à-Mousson would no doubt be left for the time being untouched. The reserves are estimated at 330,000,000 metric tons.

## (B) IRON ORE

The iron-ore deposits of the area here described are known as the Minette field, from the trade name of the ore which it contains. This field lies on the plateau between Verdun, Metz, and Luxemburg, over half of it being in France, while most of the remainder is in Germany. It is the most important iron-field on the Continent, and has been described as the most important in the world. It is at any rate of overwhelming importance in relation to the countries in and near which it lies.

Thus France produced annually, just before the war, about 21,700,000 metric tons of iron ore, her output having increased with great rapidity for some twenty years. Of this, 19,800,000 tons came from the Minette field. The whole of the rest of France produced only 1,900,000 tons of ore. Thus over 90 per cent. of the total French output came from the Minette field; and the French output of Minette exceeded the whole British production of iron ore by 3,800,000 tons per annum.

Germany, again, is a country poor in iron ore. Her total output in 1913 was about 28,700,000 tons; but of this 21,100,000 came from the Minette field, the whole of the rest of Germany producing 7,500,000 tons.

Luxemburg is an important producer of pig-iron, and the ore treated in her blast-furnaces, which furnish raw material to Belgian and north-western German steelworks, comes entirely from the Minette field. The Luxemburg portion of that field produced 7,300,000 tons of ore per annum.

The total annual production of the Minette field was thus 48,200,000 tons of ore, or three times the total British output of 16,000,000 tons, and over three-quarters of the United States total of 62,000,000

tons. The Minette field supplied with three-quarters of its raw material an immense steel-working district whose corners lie at Charleroi, Dortmund, and Nancy. This district absorbed about 60,000,000 tons of ore annually, of which 45,000,000 tons were Minette ore and about 15,000,000 tons Swedish; it produced annually 25,000,000 tons of steel, or two-thirds of the output of the United States. The great steel industry of Belgium and western Germany thus depends for its existence very largely on the Minette field.

The field covers in all an area of 463 square miles, of which 282 lie in France, 166 in Germany, 14 in Luxemburg, and a trifle over one in Belgium. Its total length from north to south is about 60 miles, and its greatest breadth about 20 miles. On the north and east the ore comes to the surface and is worked in levels and surface-workings; westward it dips deeper and deeper underground, the westward limit of mining being dictated partly by the thickness of the formations overlying the iron ore and partly by the varying richness of the ore itself.

The ore known as Minette occurs in the so-called Dogger beds of the Jurassic oolite (limestone). A high percentage of phosphorus (1.7 to 1.9 per cent.) is the chief chemical characteristic of the ore; this fact rendered it commercially valueless till the discovery of the basic process in 1878. The total thickness of the ore is from 80 to 130 ft. Some of the ores are calcareous and some argillaceous, but the same stratum does not preserve the same character throughout the field. On the whole, argillaceous ores are commoner; calcareous ores are found mostly in the Briey basin (in the French section of the field), and also in Luxemburg, but comparatively little in the German section or the Longwy basin.

The relation between these two main types of ore is

important from the point of view of metallurgy. A calcareous ore is self-fluxing; i. e. the lime present unites with other matter in the ore to form a fusible slag in the blast-furnace, and this slag can be run off in liquid form. An argillaceous ore will not melt unless lime is added to it in the furnace. This lime is known as a 'flux'. It may take the form of ordinary limestone, or else of a calcareous ore; the latter is of course greatly preferable, since it yields iron as well as serving to flux the other ore. Blast-furnaces which smelt argillaceous ores, therefore, find it profitable to mix calcareous ores with them in such a proportion as to produce a 'self-fluxing mixture'. The German Minette blast-furnaces obtain their fluxes chiefly in the form of calcareous ores from French mines in the Briey basin. In most cases they have actually purchased these mines for the express purpose of securing the best self-fluxing mixture; and hence arise various political problems in connexion with the Minette field.

The percentage of iron in the Minette ores is low, seldom much above 40 per cent. and averaging perhaps 37 per cent. This is not a high percentage for an iron ore; the extremely profitable nature of the Minette workings is due to other factors. The ores exist in great quantities and in continuous deposits; mining is easy and cheap; the juxtaposition of different ores makes it everywhere easy to obtain a self-fluxing mixture; the ores are soft and easily reducible; and the percentage of phosphorus renders the pig-iron which they yield highly suitable for treatment by the basic process. These advantages more than compensate for the comparatively low percentage of iron.

The future development of the Minette field lies chiefly in the Briey basin. The more superficial deposits of Germany will certainly be exhausted before those of France; the Luxemburg field has already

lost two-fifths of its whole deposit. The reserves of Minette ore estimated as 'actual', i. e. remunerative in the present state of the steel industry, are as follows:

	<i>Metric tons.</i>
France (including Nancy)	3,000,000,000
Germany . . . . .	1,830,000,000
Luxemburg . . . . .	270,000,000
Total . . . . .	<u>5,100,000,000</u>

To this may be added certain 'potential' reserves, i. e. deposits which might under different conditions be profitable:

	<i>Metric tons.</i>
France . . . . .	200,000,000
Germany . . . . .	500,000,000
Total . . . . .	<u>700,000,000</u>
'Actual' reserves . . . . .	5,100,000,000
Grand total . . . . .	<u>5,800,000,000</u>

These estimates do not include the possible westward extension, under different conditions, of the mining area.

#### (1) THE MINETTE FIELD IN FRANCE

France possesses 282 square miles of the Minette field, or 61 per cent. of the whole. Of this share about a quarter (69.5 square miles) lies in the Nancy field; the remaining three-quarters (212.5 square miles) lies in the great northern Minette field and is distributed between the basins of Longwy, Crusne, and Briey.

The annual output of the entire French field is, according to the 1913 figures, 19,800,000 metric tons, but it must be borne in mind: (1) that the Briey basin has been steadily increasing its production, at the rate of from 1,000,000 to 2,000,000 tons annually, for several years; (2) that the recently discovered Crusne

basin may be expected to begin producing shortly; (3) that the Longwy basin is becoming less important both relatively and absolutely, as its ferruginous limestones are superseded for use as fluxes by the calcareous ores of Briey. The estimated reserves, which are 'actual', i. e. profitable for mining in the present state of the iron industry, are given in the following table:

<i>Basin.</i>	<i>Reserves.</i> <i>Metric tons.</i>
Longwy . . . . .	300,000,000
Crusne . . . . .	500,000,000
Briey . . . . .	2,000,000,000
Total of northern field . . . . .	2,800,000,000
Nancy . . . . .	200,000,000
Grand total . . . . .	3,000,000,000

(a) *The Nancy Basin*

In this isolated southern extension of the field the Dogger formation crops out along the sides of the Moselle and Meurthe valleys and those of their tributaries, and sinks to the west under the Forêt de Haye region. The proportion of iron present in the ore is from 32 to 37 per cent., compared with 35 to 42 per cent. in the northern field. The estimated reserves include those portions of the field, underlying the Haye forest, which have not yet been conceded. The annual output is between one and a half and two million tons.

(b) *The Northern Field (Basins of Briey, Longwy,  
and Crusne)*

*Briey Basin.*—This southernmost section of the northern field is divided into the (a) Orne, (b) Landres, and (c) Tucquegnieux basins.

(a) The Orne basin underlies the Orne valley and

terminates eastward in a series of rich outcrops along the Moselle valley in German Lorraine. Westward it extends as far as Brainville. West of this and south of Bruville the ore stratum becomes thinner (under 8 ft.) and the yield of iron unprofitably low. The deepest shaft at present existing is at Auboué (413 ft.). Elsewhere shafts do not go below 330 ft. Deep workings are a good deal hampered by water. The ores have on an average 37 per cent. of iron.

(b) The basin of Landres lies north-north-west from that of the Orne valley, from which it is separated by a tract of barren ground about Ozerailles. It is bounded on the east by the faults of Norroy and Bonvillers, which separate it from the Tucquegnieux basin. The average percentage of iron over the basin as a whole is from 38 to 40.

(c) The basin of Tucquegnieux adjoins the two basins already described, and runs eastward across the German frontier. Its ores have on the average from 35 to 40 per cent. of iron.

The general characteristic of the Briey basin is the predominance of grey calcareous ores, with occasional valuable deposits of other kinds. The whole of the 'actual' reserves are suitable for treatment by the basic process. The output of the Briey basin in 1913 was 15,000,000 tons of ore.

*Longwy Basin.*—The basin of Longwy occupies the northernmost portion of the Minette field, being situated on the frontiers of France, Belgium, Luxemburg, and Germany. The ores are (1) ferruginous limestone with 20–28 per cent. of iron, (2) argillaceous ores with 35–40 per cent. of iron.

They are produced partly in surface-workings, Hussigny being the chief centre of this type of working, and partly in levels. The total output of the Longwy basin in the years 1904–8 was as follows:

	<i>Surface-workings.</i>	<i>All workings.</i>
	<i>Metric tons.</i>	<i>Metric tons.</i>
1904 . .	418,000	2,593,000
1905 . .	345,000	2,333,000
1906 . .	360,000	2,602,000
1907 . .	499,000	2,713,000
1908 . .	397,000	2,280,000

The fall of production in 1908 was due to the replacement of the ferruginous limestones of the Longwy basin, for use in smelting, by the richer calcareous ores of Briey, which, owing to their higher percentage of iron, are more economical in making a self-fluxing mixture with the argillaceous ores.

*Crusne Basin.*—The basin of the Crusne, between the Longwy and Tucquegnieux basins, is of recent discovery and not yet fully explored. The deposit resembles in character those of the Longwy basin.

## (2) THE MINETTE FIELD IN GERMANY

The German Minette field is contiguous with the French and Luxemburg fields, and lies on the left bank of the Moselle. It begins in the north at the Luxemburg frontier between Audun-le-Tiche (Deutsch-Oth) and Kanfen, and runs thence southward to the neighbourhood of Metz. Its total area is 166 square miles, or about 36 per cent. of the whole Minette field.

The deposits in their general character closely resemble those of French Lorraine. Working is, however, cheaper, the ore here lying nearer the surface than in most of the French area; it is in many places worked in open-air surface-workings, and electric power derived from the waste gases of blast-furnaces contributes to the cheapness of production.

The field is divided by the valleys of the Fensch and Orne into three main sections: (i) north, (ii) central,

and (iii) south. The north is considerably the most important. The 'actual' reserves of ore are estimated as follows :

	<i>Metric tons.</i>
(i) Plateau of Aumetz (north) . . . . .	1,125,000,000
(ii) Between the Fensch and Orne (central) . . . . .	383,500,000
(iii) South of the Orne (south) . . . . .	321,500,000
Total . . . . .	1,830,000,000

### (3) THE MINETTE FIELD IN LUXEMBURG

A small portion of the Minette field lies in the canton of Esch-sur-Alzette in Luxemburg. The Dogger plateau is here cut into by a series of streams, viz. the Dudelange stream, the Kayl, and the Alzette (Elz), which divide it into three sections. The iron ore crops out on the banks of each of these streams and underlies the intervening hills. The whole Luxemburg Minette field thus consists of :

- (i) The Differdange-Redange field.
- (ii) The Esch-Rumelange field.
- (iii) The Rumelange-Dudelange field.

In the first field the total thickness of the deposit is 84 ft., the ore being mostly argillaceous. In the second field, at the site known as *In der Höhl*, the deposit reaches its greatest thickness of 168 ft. Towards the east and south-east the thickness and richness of the deposit rapidly decline. At Rumelange the deposit is 123½ ft. thick, and consists of calcareous ores. In the third field at Dudelange the deposit is only 75½ ft. thick, and is calcareous. The total area is 14 square miles, of which 5.4 square miles have been completely worked out.

## (4) THE MINETTE FIELD IN BELGIUM

North of the Longwy basin a small portion of the Minette field ( $1\frac{1}{8}$  square mile in area) projects across the Belgian frontier in the neighbourhood of Musson and Halanzy. The ore here is at the surface, this being the westernmost portion of the northern outcrop of the Dogger formation. It has been actively worked in the past, but is now almost entirely exhausted, and cannot be reckoned upon as a future source of ore.

## (C) COMMUNICATIONS AND TRANSPORT

Both coal and iron, being heavy non-perishable goods, are well suited for transport by water. The Saar canal (*Canal des Houillères*) is available for the use of the Saar coal-field; the canal branches off from the Rhine-Marne Canal at Gondrexange and joins the Saar river between Saaralben and Saargemünd, canalization being continued as far as Ensdorf. Only a small proportion of the output, however, was conveyed by this route, the last figures available (1911) being about half a million tons. Nearly all the coal and iron is dealt with by rail. Saarbrücken is on the main line which runs north-east from Metz to Bingen, while the iron-field, by means of numerous subsidiary lines, has access to the Luxemburg-Metz line, which leads north into Belgium, and from Metz has branches east and west direct into Germany and France. The Moselle is indeed canalized from Metz across the French border to the Rhine-Marne Canal, but the conveyance of ore into Germany by this route is slow and inconvenient. If the Moselle were canalized from its junction with the Rhine up to Metz, the waterway, no doubt, would be greatly used and it would be possible to effect an exchange of Prussian coal and Lorraine

ore. Again, if the canalization of the Saar were continued up to its confluence with the Moselle at Konz, coal from the Saar would be extensively sent by waterway to Germany, since, as will be seen, Saar coal is not very well suited to the manufacture of coke, which is chiefly in demand for the Lorraine iron and steel works. The cost of the canalization of the Moselle has been estimated at 80,000,000 marks, and the proportions of this total which would fall on Prussia, Luxemburg, and Alsace-Lorraine are given as 59,000,000 marks, 7,000,000 marks, and 14,000,000 marks respectively. The canalization of the Saar has been estimated to cost 20,000,000 marks. This would provide for the establishment of a large modern canal allowing for two barges of 600 tons abreast. The performance of the work has undoubtedly been obstructed by the Prussian Government in the interests of the railway.

If, however, the entire control of the Lorraine iron deposits passes into the hands of France, it might be worth while to arrange a system of canal transport which would make Dunkirk the outlet of the ore and metallurgical products of Lorraine. It has been suggested that the Nord-Est Canal, which was provided for by a French law of March, 1901, would serve this purpose. This canal and its branches would incidentally provide access to Lorraine for the coke of the Department of Nord, and ultimately to some extent for that of England. It is improbable that these supplies would entirely replace Westphalian coke, but they would make the French dependence upon it less oppressive.

This is an ambitious and expensive scheme, and the French attitude towards it may depend as much on political as on economic considerations. It is perhaps questionable whether Dunkirk could take the place of

Antwerp as the port of Lorraine. In the first place, it would be farther from Longwy to Dunkirk (374 km.) than from Longwy to Antwerp (265 km.), and it would probably be some time before the return freight, more especially the metallurgical by-products of Lorraine, would be able to find at Dunkirk as plentiful and cheap freight for all parts of the world as they were able to do at Antwerp.

#### (D) MINING LAWS

*Germany.*—The coal and iron deposits of the district fall under the general Prussian mining law of June 24, 1865. The deposits of minerals belong to the first finder or claimant (who must obtain recognition from the Government). Royalties are paid to the Government at the rate of 2 per cent. on the gross produce of the mine. Besides this tax the mines have to pay considerable sums in local rates and State taxes. The total charges in the case of coal are estimated to exceed 10 per cent. of the selling value of the mineral. Certain payments have also to be made to the miners' benefit funds. It appears that no royalties are payable to the owner of the soil, but that an indemnity must be paid to him for damage to his property of whatever kind.

It is noteworthy that the mines in the Saarbrücken coal-mining district generally belong to the Prussian Government, and are worked as part of the Crown property.<sup>1</sup> The explanation of this fact is that Saarbrücken was formerly part of the Principality of Nassau-Saarbrücken, an independent state in which the mines were reserved to the Crown. During the Napoleonic period, when the whole field belonged to

<sup>1</sup> That fraction of the minefield which is in the Bavarian Palatinate is worked by the Bavarian Government.

France, the mines were taken over and worked by the Imperial Government, and after the Principality became part of the Kingdom of Prussia in 1815 the Prussian Government continued to work the mines; but, on the passing of the Act of 1865, the Government took out concessions just as a private individual would have done, with the same incidents, except, of course, that a Government does not pay any mining taxes to itself. Some concessions in the district, which the Government probably did not think worth taking up, have been taken up by private individuals.

*France.*—The coal and iron mines can only be worked by virtue of an act of concession by the State, which vests the property in the *concessionnaire* for ever, but with power to dispose of it or transmit it like any other property, except that it cannot be sold in lots or divided without the consent of the Government given in the same form as the concession. Royalties are payable in part to the owners of the surface; they are sometimes proportional to the yield, sometimes fixed, and sometimes partly proportional and partly fixed. This royalty in the case of iron mines varies from about  $\frac{3}{4}d.$  to  $10d.$  per ton, and in other cases from about  $7d.$  to  $11d.$  per cubic metre. Fixed royalties, which appear to be more usual, vary very greatly in amount, but it is stated that royalties of  $\frac{1}{4}d.$ — $\frac{1}{2}d.$  per hectare are by far the most frequent rates. The partly fixed and partly proportional royalties vary from about  $\frac{1}{2}d.$  per hectare and 2 per cent. on the produce to about  $2\frac{1}{2}d.$  per hectare and  $1d.$  per ton of the ore extracted. The principle on which the Government fixes the royalties payable to the owners of the soil in the different districts is not very clear, but it is understood that regard is paid to custom, local usage, prescriptive rights, and precedents of all kinds, the existence or the absence of previous mining opera-

tions, special circumstances as to the position of the mines, &c. The taxes payable to the Government are also partly fixed and partly proportional. The fixed tax is payable annually according to the extent of the concession, and is at the rate of 10 francs for the square kilometre. The proportional tax is fixed each year by the budget of the State, but is not to exceed 5.5 per cent. on the net produce.

*Luxemburg.*—The ownership of the mines is, as in France, vested in the *concessionnaire*, who can only obtain a concession by virtue of a law. The concessions are usually granted to owners of blast-furnaces erected in the country and for works of public utility. They appear to be for an unlimited period, but the payment of the rent is only extended over a period of years, e. g. fifty years. Taxes and royalties are payable partly to the Government, who may charge a tonnage rent (on an average about 5*d.* per ton) or a fixed rent by way of composition of the tonnage rent, proportional to the rental value of the mine; and partly to the owners of the surface, the amount being fixed at 5 per cent. of the sum paid to the Government, but not to exceed 10 centimes per ton of the mineral worked. The tonnage rent is  $\frac{1}{2}$  per cent. on the selling price of the ore; the fixed rent has in the past worked out at about 5*d.* per ton. It is understood that the taxes on concessions besides the royalties to the State amount to between  $\frac{1}{4}$ *d.* and  $\frac{1}{2}$ *d.* per ton, besides communal and other duties, which vary with the circumstances of the case.

## (E) METALLURGICAL EQUIPMENT

*Alsace-Lorraine.*—The iron industry is of ancient establishment in the province. In the Middle Ages there were numerous forges in the valleys of the Fensch and Orne, and in the seventeenth century furnaces were established at Moyeuivre, Ottange, Hayange, and in other places. At the beginning of the war of 1870 there were 30 blast-furnaces in Alsace-Lorraine; in 1914 there were 67. Of these some dozen have a capacity of 300 tons per 24 hours; the capacity of the others, with few exceptions, ranges from 180 to 200 tons. The production of cast iron in the province in 1913 was 3,869,866 tons, the production of steel in the same year being 2,300,464 tons.

At the outbreak of war Alsace-Lorraine possessed 26 Bessemer basic converters of 12–35 tons capacity and 12 Martin basic furnaces of 25–30 tons capacity, also two puddling works, machinery in 10 factories for rolling out iron, 2 wire mills, 1 tube and pipe factory, and 15 cast-iron and steel foundries.

*France.*—In France in 1912 the number of blast-furnaces in the Est, which comprises the Departments of Meurthe and Moselle and of Haute Marne, was 79 in use, with 9 under construction; in the Department of Meurthe and Moselle alone there appear to have been 74. In this Department there were 25 iron and steel works containing 36 Thomas converters and 9 Martin furnaces, while the industry there employed over 27,000 workmen.

After the outbreak of war 90 per cent. of the French iron-ore production passed into the hands of Germany. By an order of November 2, 1915, a special Board of Administration was appointed to control the mines and foundries of Longwy and Briey. The Board undertook the protection of the mines and works

which had been either abandoned or left with insufficient staff. An industrial advisory committee was appointed, consisting of members of the German iron and steel industries, and on November 23 the occupied French mining districts were brought under the special tariffs existing in Germany for iron and manganese ore. There were established in the district 13 dispatching stations, 2 transit stations, and more than 100 German smelting furnaces.

It has not been possible to ascertain what has been the output of the mines in the occupied territories of France during the war, but such information as is available goes to show that it has been considerably below the normal.

## (F) FUTURE CONDITIONS

### (a) *Coal*

If, as a result of conditions of peace, France should acquire all or part of the deposits of iron and coal previously owned by Germany, various important economic problems would arise.

The French production of coal in 1913 was 41,000,000 tons. The total German production in the same year was 278,000,000, of which the Saar field contributed nearly 18,000,000. There is little doubt that the output of the Saar field has, to some extent, been restricted in the interests of the Westphalian mines, and that the production could be considerably increased. The consumption of coal in France in 1913 was 63,000,000 tons, that is to say, 22,000,000 more than the production of the country. Of the imported coal 4,000,000 tons came from Belgium, 11,000,000 from England, and 7,000,000 from Germany. The imports of coal from Germany have greatly increased of late

years, having doubled between 1909 and the outbreak of war.

The local consumption of the Saar coal has also to be considered. Before the war it was roughly as follows: 1,925,000 tons are used by the mines, disappear in waste, &c., 3,292,000 are used to produce coke consumed locally, 1,160,000 are consumed as coal by the local metallurgical industries, and 1,469,000 are forwarded to local customers other than the metallurgical industry. Thus about 9,000,000–10,000,000 tons remain for dispatch elsewhere.

The position of the coal supply to France after the war, if the frontier is altered in her favour, will depend on where the boundary is fixed. If Alsace-Lorraine is recovered in accordance with the frontier of 1815, i. e. as existing before the war of 1870, then, in view of the fact that this territory produces about 3,800,000 tons of coal and consumes about 9,000,000 tons, France's excess of consumption over production, now 22,000,000 tons, will be increased by 5,200,000 tons. If the French obtain the basin of the Saar—the production of coal in this district being about 14,216,000 tons, and the consumption about 5,000,000—France would get an accession of coal amounting to roughly 9,000,000 tons. But the extra amount of coal accruing to her, after reckoning the deficit due to the acquisition of Alsace-Lorraine within the frontiers of 1815, would be no more than 3,000,000 or 4,000,000 tons.

The main difficulty has always been the supply of the Lorraine iron-fields with coke. France consumes almost double her production of coke (consumption of metallurgical coke in France, 7,097,000 tons, and production, 4,027,000). Further, the price of iron and steel depends largely on the price of fuel. Coal is expensive in France; and hitherto the Lorraine iron industry has been largely at the mercy of the West-

phalian coal-field, the price of coal in Germany being controlled by a syndicate. It will be remembered that in March, 1913, the price of German coke was put up two marks a ton against France as a reply to the campaign which was then going on in France against imported goods. It has been calculated that the cost price per ton of cast iron (*fonte*) in France is 7 francs higher than in Belgium, 14 francs higher than in Germany, 21 francs higher than in England, and 25 francs higher than in the United States. The French Lorraine iron-masters have tried to meet the difficulty by themselves acquiring interests in the Belgian and German coal-fields. Coal properties owned in Belgium and Germany by the large French iron companies have been valued at 60,000,000–80,000,000 marks, while to French initiative was largely due the exploitation of the new coal basin of La Campine in Belgium, in which the French interest is valued at over 60,000,000 marks. In these circumstances it is unfortunate that the Saar bed is not suitable for supplying coke for the Lorraine iron industry. Coke is, as has been seen, produced from Saar coal and consumed locally, but the coal is not suited to the production of coke, and gives a low percentage of coke for the amount of coal used. The Saar field provides chiefly gas coal and domestic coal. Two-thirds of the coke used by the Lorraine iron industry, i. e. about 2,000,000 tons, was imported from Westphalia; and it would appear that a considerable proportion of this may have to be obtained from the same source after the war. French production cannot be greatly increased; large imports from the United Kingdom are unlikely, inasmuch as tonnage will be short; and further the transport of coke by sea involves a great deal of waste. In any case, any considerable increase in the imports from England would seem to be dependent on the proposed

extension of the French waterways which has already been described.

(b) *Iron*

The total production of iron ore in 1913 in Germany and Luxemburg (which is part of the German Zollverein) was about 28,700,000 tons and 7,300,000 tons respectively. Of this total only about 2,000,000 tons were exported. The quantity reserved for home consumption was therefore about 34,000,000 tons. The loss of German Lorraine would reduce the German home production by about 21,000,000 tons per annum; and, as even in 1913 Germany imported 14,000,000 tons of foreign iron ores, the German iron and steel industry would be mainly dependent on imported raw materials.

In 1913 France produced 21,700,000 tons of iron ore (excluding 1,926,000 from Algeria and Tunisia), of which 19,800,000 came from the Lorraine field. She imported, in the same year, 1,400,000 tons and exported 9,700,000 tons. It is evident that the main problem which France will have to face, in connexion with her newly acquired iron-mines, will be that of securing for their ores admission on favourable terms into Germany.

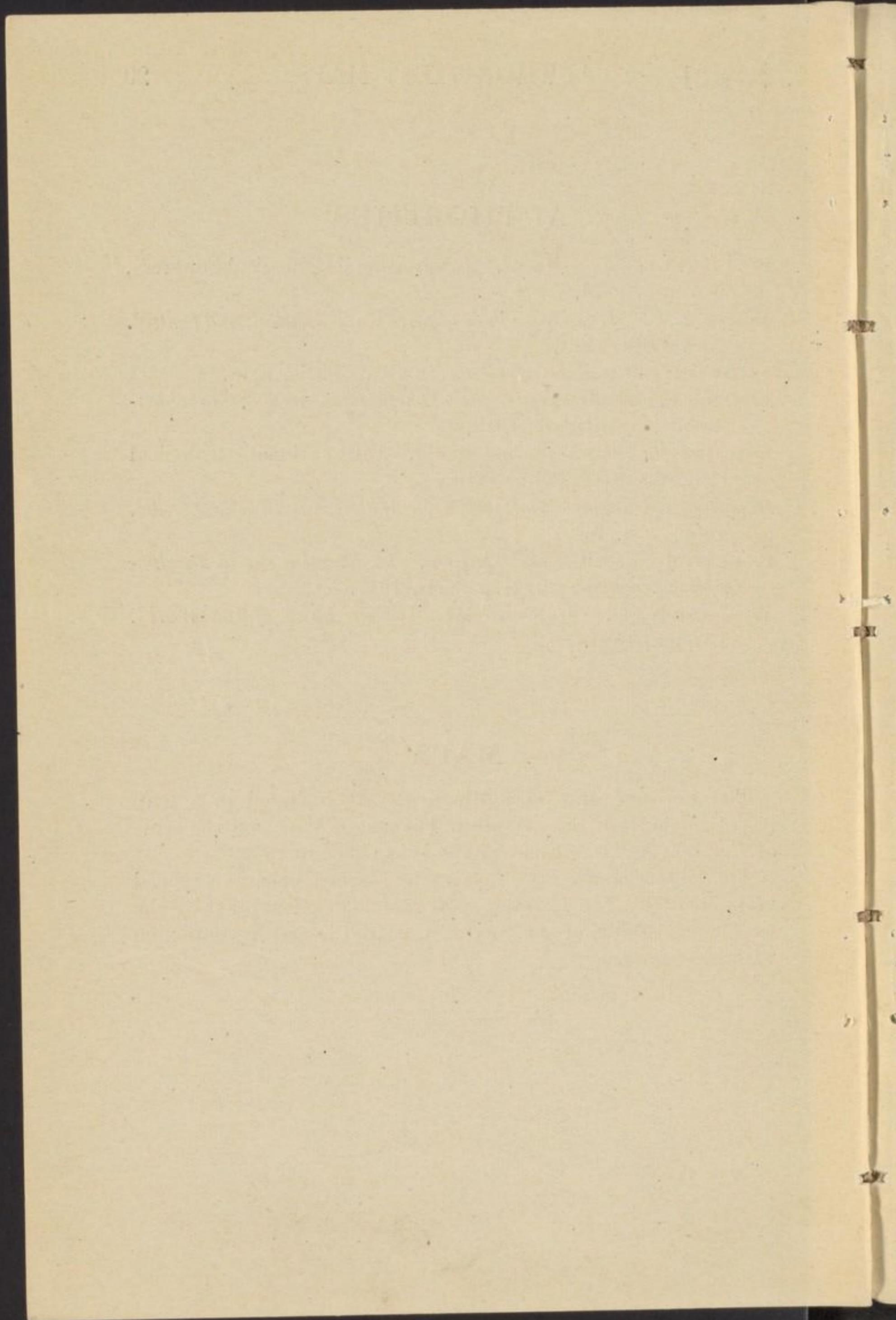
## AUTHORITIES

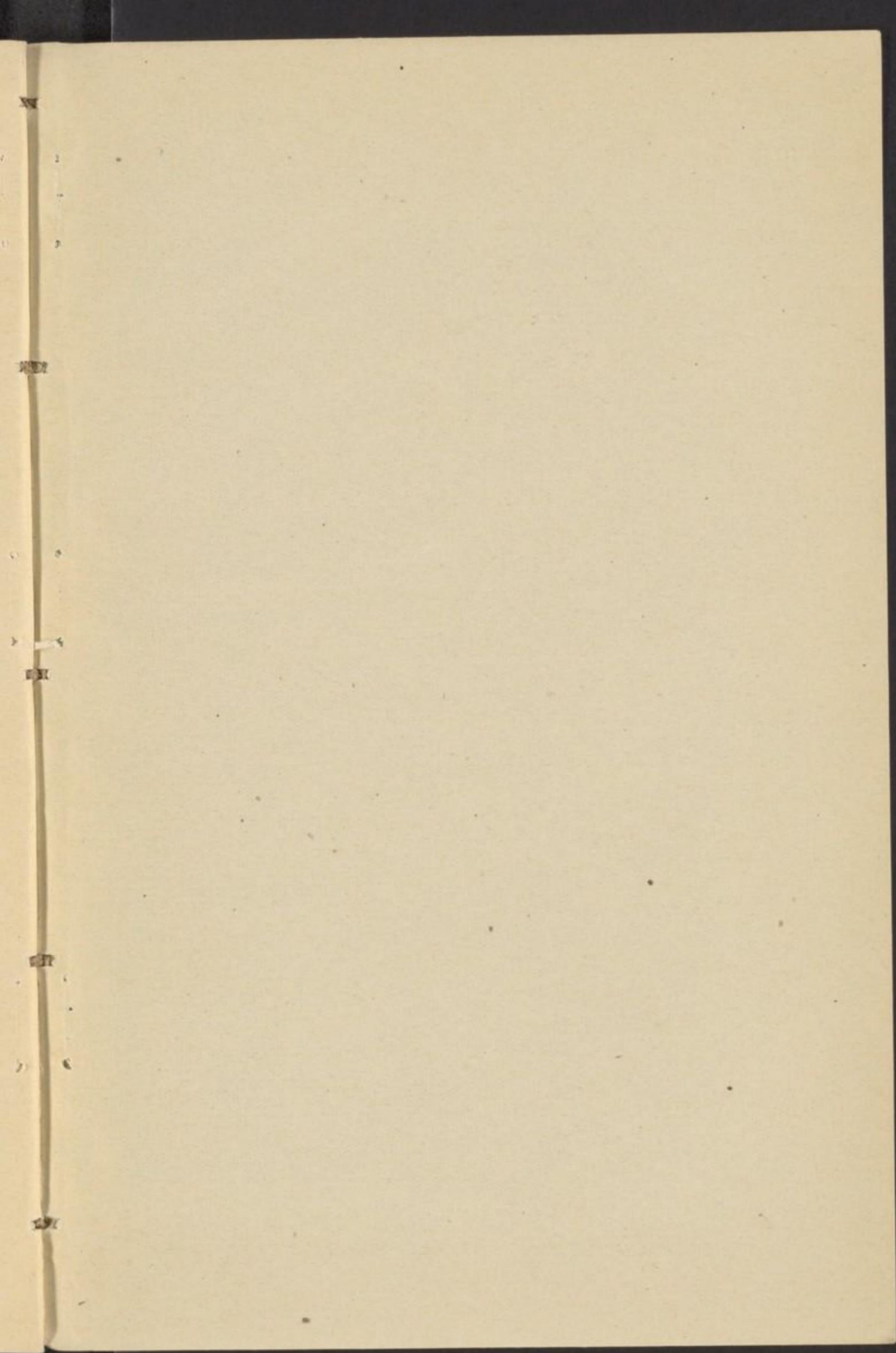
- Coal Resources of the World.* International Geological Congress, Toronto, 1913.
- ECKEL, E. C. *Iron Ores: their occurrence, valuation, and control.* New York, 1914.
- FIRASSON, LOUIS. *La Question du Fer.* Paris, 1918.
- FRECH, F. *Deutschlands Steinkohlenfelder und Steinkohlenvorräte.* Stuttgart, 1912.
- Iron Ore Resources of the World.* International Geological Congress, Stockholm, 1910.
- Report of the Royal Commission on Waterways in France, &c.* 1909. Cd. 4841.
- ROBERT-MULLER, C. *Le Charbon.* In *Enquête sur la Production Française*, vol. iv. Paris, 1917.
- WALMESLEY, O. *Guide to the Mining Laws of the World.* London, 1894.

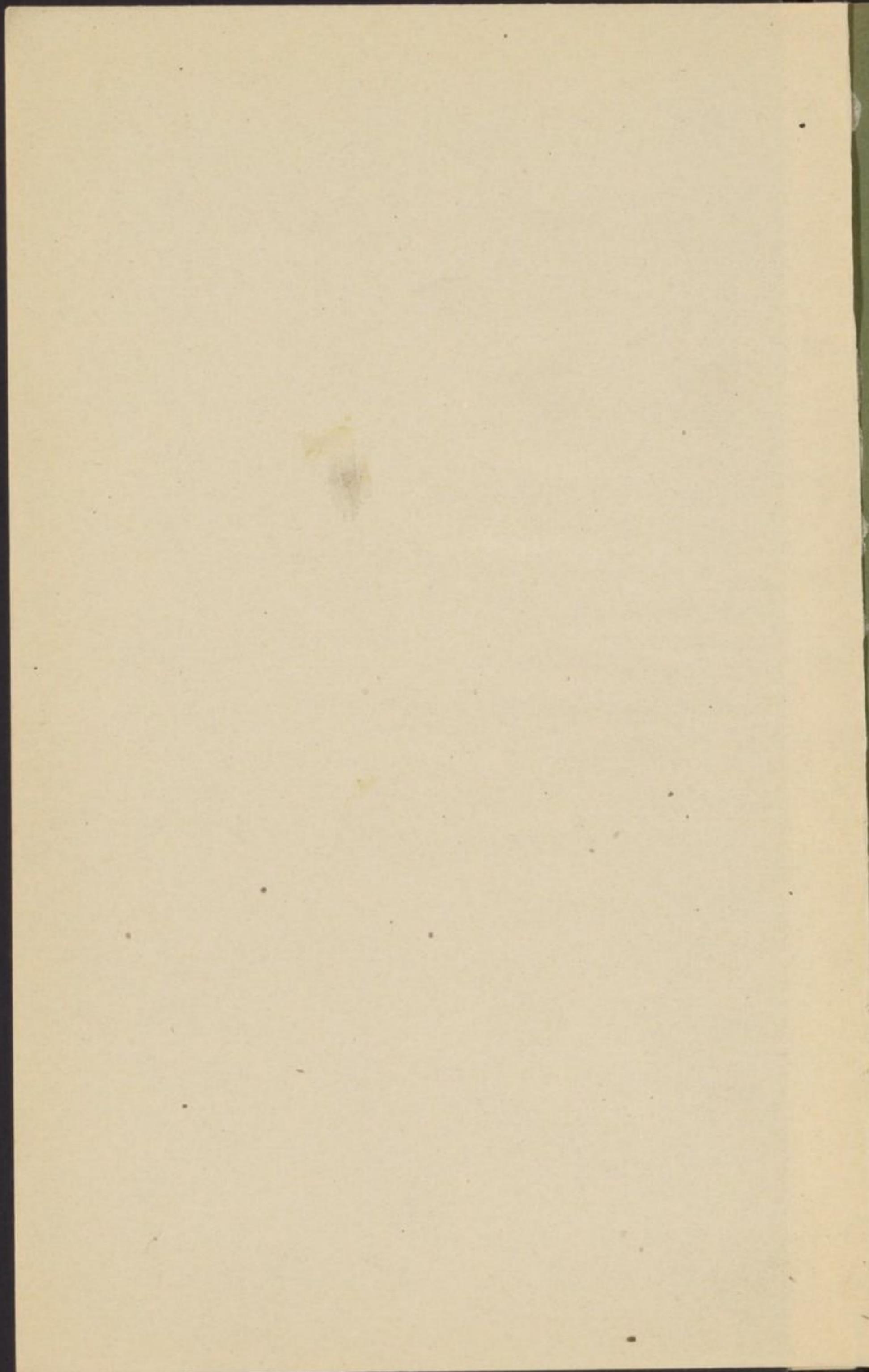
## MAPS

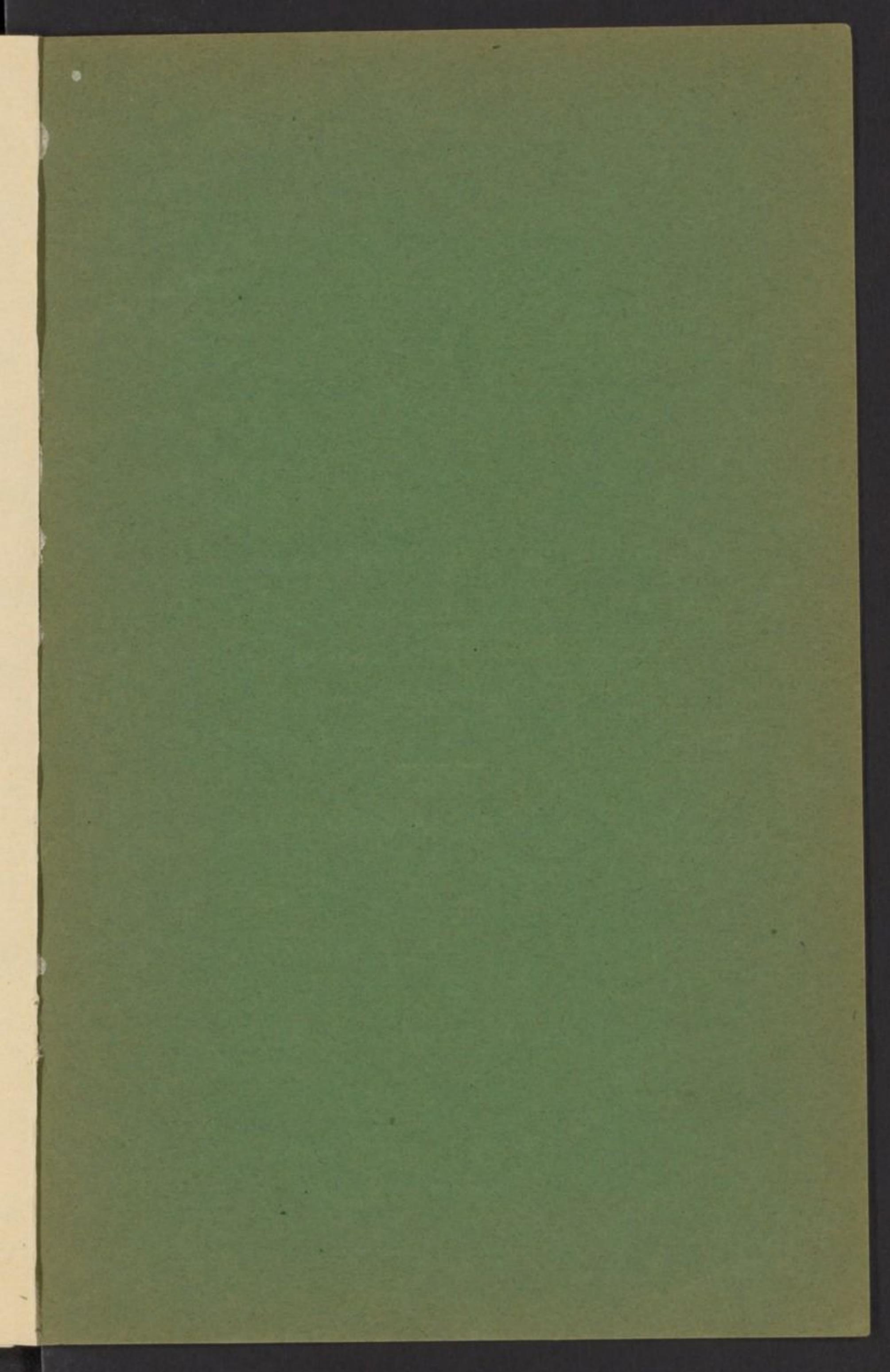
The Lorraine and Saar Minefields are included in a map (G.S.G.S. 3024) of the 'Western Theatre of War', on the scale of 1 : 1,000,000, published by the War Office in 1915.

The Minefields are given, on a much larger scale, in a special map, entitled 'The Lorraine-Saar Minefield', compiled by the Intelligence Dept. of the Naval Staff, and issued in connexion with this series.









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