MISSISSIPPI STATE GEOLOGICAL SURVEY

WILLIAM CLIFFORD MORSE, PhD. Director



BULLETIN 73

WEBSTER COUNTY IRON ORES

By

FRANKLIN EARL VESTAL, M.S.

UNIVERSITY, MISSISSIPPI

1951

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*Includes deposits of adjoining borders of Montgomery and Choctaw Counties

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LETTER OF TRANSMITTAL

Office of the Mississippi Geological Survey University, Missisippi August 4, 1951

To His Excellency, Governor Fielding Lewis Wright, Chairman, and Members of the Geological Commission

Gentlemen:

Herewith is Bulletin 73, Webster County Iron Ores, which, because of the present demand for information on these deposits in Mississippi, is being printed in advance of the complete bulletin on Webster County Geology, now being prepared.

Although these iron ores have long been known in Mississippi, the present survey has revealed many deposits heretofore unknown—resulting in the present estimate of 16,379, 826 long tons for Webster County and the adjoining borders of Montgomery and Choctaw.

Very sincerely yours,

William Clifford Morse, Director and State Geologist

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WEBSTER COUNTY IRON ORES

CONTENTS

Introduction	7	
Description and geologic distribution	7	
Ore fields and tonnage estimates	10	
A. The Maben-Mathiston Field	13	
B. The Cumberland Field	15	
C. The Clarkson Field	16	
D. The Dancy Field	17	
E. The Hohenlinden Field	18	
F. The Montevista Field	20	
G. The Bellefontaine Field	21	
H. The Walthall Field	24	
I. The Tomnolen Field	25	
J. The Salt Creek Field	26	
K. The Sand Creek Field	27	
L. The Embry Field	28	
M. The Cadaretta Field	29	
N. The Middleton Field	30	
O. The Alva Field	32	
P. The Sweatman Field	34	
Q. The Lodi Field	35	
R. The Calabrella Creek Field	37	
S. The Stewart Field	40	
T. The Eupora Field	44	
Summary	46	
Memorandum for the Press		
Iron Ore	47	

ILLUSTRATIONS

Page

.

Figure	1.—Outcrop of bed of iron ore—three miles north from Stewart	8
Figure	2.—Creek at foot of bluff of Porters Creek shale a mile south- east of Dancy	9
Figure	3.—Outcrop of iron ore—in west wall of valley three miles north of Clarkson	19
Figure	4.—Outcrop of iron ore—near top of valley wall in northern edge of Hohenlinden	20
Plate 1	.—Map Webster County Iron Ores Ba	ıck

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WEBSTER COUNTY IRON ORES*

FRANKLIN EARL VESTAL, M.S.

INTRODUCTION

This report is based on a reconnaissance survey of Webster County, northern Choctaw, and eastern Montgomery, from late November, 1950, to June, 1951. The over all purpose of the survey was the study of the geology and mineral resources and the surface features of Webster County; but even before field work was begun, a considerable interest was being shown in various quarters in the iron ore deposits of Mississippi and more particularly in the iron ore of the Webster-Montgomery-Choctaw County region, largely because of mining operations begun near Lodi, eastern Montgomery County, by a few enterprising Mississippians.

It is believed that all ore outcrops of consequence which are along or near public roads in Webster County are described in this paper and their locations indicated on the map. Also a few outcrops which are not so readily accessible are referred to. However, as stated in the Memorandum for the Press of July 20, 1951, no claim of a thorough examination of the territory is made, and no doubt other places where iron ore is at the surface will be found. Nonetheless, the Mississippi Geological Survey hopes that the present report will be of assistance and value to all people who are interested in Mississippi iron ore.

DESCRIPTION AND GEOLOGIC DISTRIBUTION

Scattered through the Tertiary strata of Mississippi are immense numbers of discrete masses and a few discontinuous beds of iron ore. The individual mass has, commonly, a shape defined by a curved surface—pillow shape, or sub-spherical, or discoidal, or ellipsoidal, or even roughly spherical—but it may have a tabular or platy, a crudely oblong, or almost any other shape defined

^{*}Includes deposits of adjoining borders of Montgomery and Choctaw Counties.

MISSISSIPPI STATE GEOLOGICAL SURVEY

8

by flat surfaces. In size it may range from several feet in length and breadth and a foot to two feet in thickness down to less than an inch in any one of its dimensions. One of these masses measured 6.5 by 4.4 by 1.8 feet. The iron minerals represented are siderite (FeCO₅) and the oxides hematite (Fe₂O₅) and limonite (2Fe₂O₅ . 3H₂O). Very commonly an individual mass of ore consists of a core of siderite inside concentric shells of hematite or



Figure 1.—Outcrop of bed of iron ore (SW. 1/4, Sec. 22, T. 19 N., R. 8 E.) three miles north from Stewart.

limonite, or both hematite and limonite; or, less commonly, of a gradation of the carbonate into the oxide. In fact, evidence is abundant and conclusive that the oxide ore came into existence through oxidation and hydration and dehydration of the carbonate, which was the original ore formed under the conditions prevailing in this region during Midway and Wilcox time. The color of most of the ore is brown, but cherry red and brick red, yellow, and even black, are not uncommon. In a few places continuous beds of ore crop out, but such beds are in general thin and probably not extensive; the maximum thickness observed in Webster County was less than two feet (Figure 1).

WEBSTER COUNTY IRON ORES

Iron ore is present here and there through the whole length and width of Webster County, at stratigraphic levels ranging from within the Porters Creek formation to the top of the Ackerman. In the eastern part of the county Mississippi Highway 15 cuts and nearby gullies and ravines have exposed several sections of Porters Creek and Naheola strata. These outcrops show that the thin-bedded Naheola especially includes many stringers of iron ore, some of which are 0.5-foot to a foot thick. More notably



Figure 2.—Creek at foot of bluff of Porters Creek shale (NW. ¼, Sec. 25, T. 16 S., R. 2 E.) a mile southeast of Dancy. Crcek floor almost paved with iron carbonate concretions.

south of Cumberland Highway 15 cuts have uncovered iron ore which is, obviously, part of broken seams, thin in general but of irregular thickness, or of "beds" of thinly scattered bowlder-like masses. Fragments of ore are strewn over all these outcrops. Furthermore, considerable iron ore is included in typical Porters Creek strata, as attested not only by thin seams and discoidal concretions exposed at the outcrops, but by hundreds of dislodged iron carbonate discs lying on the floors of the creek channels in the Porters Creek area. The writer has seen the floor of one of these creek channels (western part, Sec. 25, T. 16 S., R.2 E., Figure 2) all but paved with these small discs. However, it appears that in general the ore seams and layers of discrete masses are fewer and

9

thinner at lower stratigraphic levels, where less sand and silt is present.

West of Highway 15 in Webster County the presence of at least a little iron ore at almost every Porters Creek or Naheola outcrop suggests strongly that the ore is an omnipresent component of these two formations. As farther east, most of the units are thin and probably not extensive; but in many places good ore 0.5-foot to a foot thick crops out under overburden of 15 feet or less. Commonly, two beds are exposed, separated by only a few feet of clay.

The Fearn Springs strata, as do the Porters Creek and Naheola beds, include much iron ore, in the form of separate rounded and flattish masses and some short solid layers. Commonly the discrete unit masses of each series are on the same general level, resembling in the outcrop links of a chain or beads of a string, and where uncovered looking like an irregular pavement of smooth bowlders of various sizes. Good showings of ore are relatively few in the Fearn Springs area of the southern part of the county, because of the deep weathering and generally low relief; but farther north, where the relief is greater, exposures are more numerous. Along the Montevista-Bellefontaine road especially, and also along the road which swings in a large arc around Bellefontaine northeast of it and joins Mississippi Highway 9 a mile or so north of Walthall, iron ore is at the surface in many places.

Most of the ore is in the Ackerman formation, and the greatest concentration in the upper part of the Ackerman, so far as can be judged by outcrops. Its general features are the same as in older strata, but the outcrops indicate a greater number of ore beds or intervals, and larger individual masses. Notable examples are the Selvidge property in the Alva field, and the Hart property in the Lodi field.

ORE FIELDS AND TONNAGE ESTIMATES

For the purposes of this report the region may be discussed as twenty distinct "fields," each containing its outcrops of ore. The boundaries of the fields, represented on the map by heavy lines, are not designed to indicate the distribution of ore by geologic units; in fact, ore belonging to one and the same formation may appear in two or more fields. They are areal rather than geological boundaries, the positions of which are determined by the locations of the outcrops. Some of them coincide with natural features; the positions of others are somewhat arbitrary. Both on the map and in the text the fields are designated by capital letters, which on the map are arranged in roughly east-west order; the outcrops in each field are designated by lower case letters. The approximate extent of the mineable ground at and in the vicinity of each outcrop, insofar as it could be ascertained by a more or less rapid survey, is marked on the map by closed lines. Areas of both fields and mineable territory can be determined approximately by comparing the map space enclosed by lines with the square-mile sections of the map.

The tonnage estimates are, of course, very general. It is extremely difficult, if not impossible, to estimate accurately the mineable tonnage of ore in even a small part of the region, because of the many variable factors which must be considered; and the difficulty necessarily becomes greater if an attempt at an estimate for the entire territory is made. The more important factors involved in the problem of tonnage estimates may be named:

1) As already stated, the so-called "beds" of ore are for the most part not solid beds, but discrete concretionary masses. The term "bed" or "layer" or "stratum" is, therefore, applicable only in a general way to a kind of irregular floor or pavement or interval of such separate masses. A cross-section of this kind of "bed" appears as a chain of these more or less widely separated concretions roughly parallel with the stratification planes of the enclosing terrane.

2) Not every "bed" of ore maintains its identity for a considerable distance, although commonly the beds in undisturbed strata are fairly persistent. However, where the containing strata are cross-bedded or otherwise irregular, the ore layers may be short; two may unite, or one divide, so that an estimate of the quantity of ore in such irregular strata can be little better than a guess.

3) The individual masses are as a rule pillow-shaped, discoidal, ellipsoidal, or sub-spherical, and of dimensions ranging from several feet in length and width to only a few inches. The greatest thickness observed was about two feet.

4) A "bed" as a whole may not be of uniform thickness for any notable distance.

5) Much of the ore has been removed by erosion, not alone during the most recent period, when the present topography was fashioned, but during the long time represented by the unconformity between the Midway and the Wilcox sub-series, by that at the top of the Fearn Springs formation, and by that between the Wilcox and the Claiborne sub-series.

6) The size of the "bowlders" at the outcrop may not be any index to the size of those back from the surface. In fact, mining has shown that in some places at least the masses taken from underground are larger than those which crop out. This may be due to weathering, especially exfoliation, of the outcrop ore; or it may be entirely accidental.

7) Because the typical ore "bed" in Mississippi is composed of unconnected units, a bed may be present in a certain area and yet fail to show at the surface. Furthermore, in many places where ore crops out, the relief is too slight to bring to the surface all the beds even those which are not too deep for mining.

8) Because of the want of topographic maps, only a few relative elevations were available. Although the hand-level could be used locally, use of it to compare elevations separated by long distances was, of course, impracticable.

In view of the conditions stated and others, obviously an estimate based almost entirely on outcrops, as this estimate must be, is sure to involve considerable error. The first factor named might lead to either an overestimate or an underestimate; the second would be likely to lead to an overestimate; the third could induce error either up or down, but probably would be more likely to suggest too great a figure; the fourth could lead to error in either direction; the fifth would, no doubt, tend to encourage overestimate; the sixth could very well lead to too conservative a figure, as could the seventh; the eighth would be as likely to influence an estimate one way as another, through the imposition of a serious obstacle to correlation. In short, four of the factors named could tip the balance as well one way as the other, two of the others are more likely to lead to too high an estimate, and the other two to too small a figure. It would appear, then, that the magnitude and direction of the error should not be attributed to any single one of the factors listed.

The estimates are restricted to the ore under not more than 25 feet overburden. Of course it is understood that under exceptionably favorable conditions, such as an unusual concentration of ore under a relatively small area, overburden of a greater thickness than 25 feet might be moved economically; but the estimates are designed to apply to average conditions, insofar as they have been determined from a study of the geology and the surface features of the region and the number, thicknesses, stratigraphic positions, and relative areas of the ore beds, as ascertained or inferred from outcrops and from such mining as has been done. More specifically stated, the method of arriving at an estimate has been: The areas of the localities where ore is present under 25 feet or less of overburden were estimated, severally; the number of ore beds and their thicknesses and extent were noted for each locality: the number of cubic feet of ore was computed for each bed, a liberal allowance being made for space between ore masses and for variation of size and shape; the tonnage of each layer, so restricted, was computed at 237.5 pounds a cubic foot,* some allowance being made for hollows in the concretions, porosity, and external irregularities; and, finally, the results were added to obtain the total for the area.

A. THE MABEN-MATHISTON FIELD

The total area of the Maben-Mathiston Field, as defined herein, is about 25 square miles, of which 16 square miles are in Webster County and 9 in Choctaw. The arbitrary boundaries of the field are: On the north, a west-flowing tributary of Big Black River west of Highway 15, about the latitude of Mississippi Highway 10; on the east, Highway 15, in both Webster and Choctaw Counties; on the south, the southern slope of the Big Black-Big Bywy divide west to Phillips Creek, a little east of LaGrange; and on the west and northwest, the Big Black River. Within this

^{*}Specific gravity of limonite, 3.6 to 4.0 (Moses & Parsons); 1 cubic foot of water at 4 degrees C. 62.5 lbs.; Sp.gr. of ore used, 3.8.

14

over all region are deposits of mineable ore, as indicated by the outcrops herein described.

a) Approximately 0.65-mile north from the northern limits of Maben, a layer of ore 0.7 to 0.8 of a foot thick is conspicuous in Naheola beds of the east wall of a Highway 15 cut.

b) A stratigraphic section along a local road at a place (SW 1/4, Sec. 34, T.19 N., R.11 E.) where the road leads down the east wall of the valley of Big Black River, includes ellipsoidal masses of iron oxide several inches thick.

c) Along the Wood Junior College road which extends due north from Mathiston, some small nodular ore and larger pillowshaped concretions may be seen in the wall of a cut a mile north from U.S. Highway 82.

d) At the crossing of the Gulf, Mobile and Ohio Railroad and a southeast-northwest road in the northern part of Maben, a few rods west of the northwestern corner of Oktibbeha County, oxide ore, some of it 0.5 to 0.7 of a foot thick, crops out in the walls of the road cut.

e) Along the same road, half a mile northwest from the railroad crossing is another exposure of ore, probably the same bed.

f) Almost on the northern boundary of the corporate area of Maben, and hardly 0.2-mile west of Mississippi Highway 15, thin discoidal and platy masses of oxide ore have been exposed by a north-south road cut.

g) Other surface ore is along a road which leads northeast and north from Highway 82 in the eastern edge of Mathiston; and also at a street junction in Maben at the end of the pavement along a northeast-southwest road which parallels the railroad.

h) In Choctaw County, along the LaGrange road west from its junction with Highway 15, which junction is 1.6 miles via the highway from Highway 82 in Mathiston, iron ore crops out in several places. Oxide concretions 0.5-foot thick are at the surface 0.8-mile west of Highway 15, and thinner ore within 0.1-mile of the highway. Other beds appear from a mile to a mile and a half west of the highway, and shallow road cuts and roadside ditches approximately 2.5 to 3.0 miles west from Highway 15 expose two layers of oxide ore concretions, the upper some 0.5 to 0.7-foot thick, and the lower, 15 to 20 feet lower stratigraphically, a foot thick. A mile or a little more farther west by road, the same ore crops out and at a place a mile east of LaGrange, two beds of oxide concretions of an average thickness of 0.5 to 0.7-foot are exposed. A 0.4-foot layer shows a little farther west. The evidence appears conclusive, then, that at least three beds, each 0.5-foot or more thick, and two or three thinner layers of ore, are at or close to the surface here and there along this 5-mile length of road, and both north and south of it to varying distances—north perhaps to the valley of the Big Black, and south to the south slope of the divide between the Big Black and the Big Bywy basins.

The total area of the Maben-Mathiston Field which appears favorable for strip mining operations may be as much as four square miles, and the total tonnage which might be recovered could be some 2,500 000 long tons.

B. THE CUMBERLAND FIELD

The Cumberland Field includes a territory of approximately 10.5 square miles, south by east and south by west of Cumberland, both east and west of the Gulf, Mobile and Ohio Railroad, and west of Highway 15. The boundaries are indicated by the heavy lines on the map. Iron ore is at the surface at several places in this field.

a) Approximately 0.5-mile south by east of Cumberland, a local road cut (a little east of the center, Sec. 7, T. 20 N., R. 12 E.) has exposed a stringer of ellipsoidal masses of iron oxide 0.5-foot to 0.7-foot thick.

b) Along the road which leads south by west from Cumberland for a mile, more or less, thence west across Spring Creek, are at least three outcrops. Some three quarters of a mile southwest from the railroad crossing at Cumberland, well up towards the top of a valley wall, a chain of rounded masses of oxide ore 0.8-foot thick is bedded in the Naheola thin shale, sand, and silt beds only a relatively few feet below the top of the formation.

c) A mile farther west, and 0.4-mile west of a sand pit is an exposure of the mixture of nodular iron ore and ferruginous sandstone which was observed also at the Midway-Wilcox contact elsewhere; here it includes carbonate and oxide concretions a foot or more in diameter.

d) Half a mile still farther west, at a lower level, broken masses of oxide ore show as rough layers in road cut walls and roadside gullies. This place is half a mile or so north of the contact section (approximately on the line between Secs. 13 and 14, T. 20 N., R. 11 E.) which includes a layer of 0.5-foot to 1.0-foot iron oxide concretions, possibly correlative with the upper bed farther north.

e) Other surface iron ore may be seen along the road which leads north by west from Cumberland some 2.5 miles to Old Cumberland Baptist Church, thence west to the Dancy-Clarkson road: At the sharp bend 0.3-mile east by south of the church; some 0.65-mile west of the church (rounded masses); and in the walls of cuts a quarter of a mile to 0.55-mile farther west.

The mineable ore terrain of the Cumberland field is not more than 1.0 square mile, and the tonnage recoverable perhaps 314,364 long tons.

C. THE CLARKSON FIELD

The Clarkson Field includes the territory surrounding Clarkson within a radius of two to three miles. Roughly, it extends north as far as the north end of Savannah Lake, northeast to the old Choctaw-Chickasaw boundary, east to Big Black River, south to a little south of the Cumberland-Spring Creek road, and southwest and west to Spring Creek. The total area of the field thus limited is approximately fifteen square miles. Iron ore crops out at several places in this area, especially northeast and south of Clarkson:

a) A short distance west of the intersection (NE 1/4, Sec. 16, T. 20 N., R. 11 E.) which is two miles south of Clarkson, a shallow cut has exposed part of a discontinuous bed of 0.25-foot to 0.3-foot oxide ore in light-gray red-mottled clay and brown weathered material.

b) Three-quarters of a mile west from a) is another outcrop of probably the same bed, and about the same distance south of b) on another road, is a third exposure, of 0.25-foot to 0.3-foot ore. c) A quarter of a mile north of the intersection referred to above, bowlder-like concretionary ore of the same interval has been uncovered by a ravine on the east side of the road.

d) Half a mile east of the intersection is a small showing, but along most of this Cumberland-Spring Creek road the low relief does not admit of any outcrop of consequence. Thin ore crops out (a little east of the center of Sec. 1, T. 20 N., R. 10 E.) southwest of Spring Creek.

e) Northeast of Clarkson about a mile, and a few rods southwest of a road junction, some oxide ore is exposed by a road cut.

f) Another surface showing (about on the line between Secs. 26 and 35, T. 21 N., R. 11 E.) is the northeasternmost outcrop of the field.

The part of the Clarkson Field northwest of the village that is, the Savannah Lake region, is chiefly sand, and has no showings of ore.

The total area underlain by mineable ore probably does not exceed 320 acres, and the tonnage recoverable may not be more than 78,816 long tons.

D. THE DANCY FIELD

The Dancy Field might be thought of as the region surrounding Dancy, particularly the territory directly west of Dancy, where iron ore is at the surface here and there along the Dancy-Clarkson road. The field extends northwards to near Mantee, eastwards to Highway 15 and the Gulf, Mobile and Ohio Railroad, southwards to the double township line a mile or so north of Cumberland, and westwards to the old Choctaw-Chickasaw Boundary. The area thus defined contains about 18 square miles.

a) The section of the steep east wall of a valley a mile and a half west from Highway 15 on the Dancy-Clarkson road, contains rounded, flattish concretions of ore.

b) Also, a layer of flattish masses of oxide ore crops out 30 to 35 feet below the top of the west wall of the same valley, and at the very top, iron ore debris scattered over the surface, and disintegrating ore masses which still retain their ellipsoidal shapes, suggest the presence of much ore beneath. MISSISSIPPI STATE GEOLOGICAL SURVEY

18

c) Ore is at the surface in other places along the same road, farther west.

The deposits of mineable ore probably cover an area of not more than 0.25 square miles, and contain 105,088 tons, more or less.

E. THE HOHENLINDEN FIELD

The Hohenlinden Field comprises the territory south and southeast of Hohenlinden and north of the Clarkson Field. Its arbitrary northern limit is the Webster County-Chickasaw County line (although probably some ore in Chickasaw County properly might be included in the same field); its eastern limit the rather indefinite western boundary of the Dancy Field; its southern border line, the section line extending east-west from the northern tip of Savannah Lake; and its western boundary, the line between Ranges 11 East (1 East north of the latitude of the Calhoun County line) and 10 East. The Hohenlinden Field as thus delimited has an area of a little more than 22 square miles. Within this territory iron ore crops out in many places, most of which are in Township 21 North, Range 11 East. Very little was seen in the northeastern corner of Webster County, although at the second road junction southwest from Mantee is a small outcrop.

a) In the eastern part of Section 4, Township 21 North, Range 11 East, a mile and a half southeast of Hohenlinden, a 0.5-foot layer of oxide ore in greenish very micaceous sandy clay of the Naheola, has been exposed by a road cut.

b) A mile west from a) and a little east of the junction of the east-west road with a road leading north to Hohenlinden, two intervals of ore crop out in the west wall of a valley, along with shale and green clay.

c) On the north-south road, some 0.4-mile south from the junction, a cut exposes abundant ore and shaly sand, probably at the same stratigraphic position as the beds of the b) location. The road is on a low, almost level divide.

d) Not more than 0.1-mile north of the junction is another outcrop of ore, in gray and red sandy clay.

e) A few other cuts for this north-south road have uncovered iron ore. One of the best is 0.7-mile north of the junction referred

WEBSTER COUNTY IRON ORES

to above, and almost in Hohenlinden. All in all, outcrops in this district seem to indicate a considerable tonnage of ore.

f) Approximately 0.65-mile southwest from the road junction (SW 1/4, Sec. 9, T. 21 N., R. 11 E.), in the northeast wall of a valley, oxide ore a foot thick is exposed (SE cor., Sec. 8, or NE cor., Sec. 17, T. 21 N., R. 11 E.) by road cuts.



Figure 3.—Outcrop of iron ore (SE. 1/4, Sec. 17, T. 21 N., R. 11 E.) in west wall of valley three miles north of Clarkson.

g) Three quarters of a mile west by south from f), ore is present in a Naheola section uncovered by erosion along an old road a quarter of a mile or less north of the main road.

h) Two excellent Naheola sections (SW 1/4, Sec. 16, and SE 1/4, Sec. 17, T. 21 N., R. 11 E.) are exposed by cuts in the east and west walls of a small valley three miles north of Clarkson, along a short road which trends a little north of west. The section of the east wall includes two main beds of ore, the lower bed 0.5-foot thick and the upper 0.7-foot thick separated by 8.7 feet of sandy shale which contains thin ore. The upper bed is subjacent to 10 feet of shaly fine gray sand in which is thin ore. All the ore exposed here is iron carbonate cased in oxide. In the west wall of

MISSISSIPPI STATE GEOLOGICAL SURVEY

the valley at least three beds crop out, the two lowermost showing masses a foot in diameter (Figure 3). One of these 1.0-foot layers probably is identical with the layer of the same thickness at f), a mile north of h) along the same valley.

i) In Hohenlinden and vicinity rough layers of ore, chiefly oxide, project from the clay shale and sand walls of the road cuts (Figure 4).



Figure 4.—Outcrop of iron ore (NE. 1/4, Sec. 35, T. 15 S., R. 1 E.) near top of valley wall in northern edge of Hohenlinden.

j) On the Hohenlinden-Montevista road, southwestward for a quarter of a mile or more from a road junction (NW1/4, Sec. 6, T. 21 N., R. 11 E.) road cuts in the southeast wall of a valley expose a clay and sand section which includes two intervals of iron oxide concretions, 0.25-foot to 0.3-foot in diameter. Many of these concretionary masses are hollow except for some greenish material.

The mineable area within the Hohenlinden Field is estimated to be 1.5 square miles; and the recoverable ore, 584,552 long tons.

F. THE MONTEVISTA FIELD

The Montevista Field may be thought of as the region around the village of Montevista and south to the headwaters of Spring

20

Creek. More specifically, it extends north of Montevista to the Webster-Calhoun County line, east to the line between Ranges 10 East and 11 East, south to the line between Townships 20 and 21 North, and west and southwest to the divide between the basin of Shutispear Creek and that of Sabougla Creek. Iron ore is at the surface in many places within this area of some 26 square miles.

a) Three miles northeast from Montevista, road cuts (eastern edge, Sec. 1, T. 21 N., R. 10 E.) in the west wall of the valley mentioned under E, j), have uncovered two intervals of 0.25-foot to 0.3-foot ore in a well-bedded section of clay and sand. As in the east wall of the valley, many of the concretions contain greenish sandy material.

b) One of the most conspicuous outcrops (NE 1/4, Sec. 17, T. 21 N., R. 10 E.) some 2.7 miles southwest from Montevista, exposes ore belonging to six, possibly seven, distinct beds, all within a 35-40-foot interval that is 106 feet below the summit of the small "Mountain" up which the road trends at this place. The two lowermost of the ore beds, only 0.25-foot to 0.3-foot thick, are separated by 8.0 feet of clay; the next higher, about 1.0 foot thick, is only a foot or so above the upper of the thin beds; the next higher, 1.0 foot thick, is separated from the one below it by 5.0 feet of sandy light-gray clay, and the fifth in ascending order, also 1.0 foot thick, is 2.5 feet above the fourth, in gray clay. Some 17.5 feet higher is a sixth bed, 0.5-foot to 0.7-foot thick. All these "beds" are composed of sub-spherical or ellipsoidal or discoidal concretions in a clay matrix.

c) On the Walthall-Montevista road, some 3.0 miles northeast from Walthall, in the walls of a cut (SE 1/4 Sec. 33, T. 21 N., R. 10 E.) concretionary masses of oxide ore crop out near the top of a rise, and 15.0 feet below them a 0.7-foot to 0.8-foot bed of iron-cemented silt. The ore shows also along an old road west of the main road. The estimates for the Montevista Field are 220,028 long tons of mineable ore from 360 acres.

G. THE BELLEFONTAINE FIELD

The Bellefontaine Field comprises the territory around Bellefontaine within a radius of 2.5 to 3.0 miles. Roughly, it extends north to the east-west road 2.0 miles north of the center of the village; east to the divide between the Sabougla Creek and the Shutispear Creek drainage basins; south to the junction of Highway 9 and a local road less than a mile north of Walthall; and west to the west headwater fork of Sabougla Creek half a mile east of Embry. The total area of the field is approximately 21 square miles. Iron ore is exposed in many places.

a) Along the road which trends almost north from its junction with Highway 9 a mile or so north of Walthall, are several outcrops of iron ore. The showing nearest the highway is three quarters of a mile or a little less from the junction. At this place, laminated silt and clay enclose ore 0.7-foot thick, and a little farther north two layers of ore separated by a few inches have a total thickness of 1.5 feet. Some 250 yards still farther north a solid layer 0.5-foot thick shows for a distance of several feet, 5.0 feet below the thicker bed. The same layers crop out in an old road 50 yards to the east, and iron ore debris, scattered over the surface here and there along this low west-east ridge to a distance of approximately 150 yards suggests that the layers extend at least to the wide valley a quarter of a mile east of the main road.

b) The section of a south slope a mile and a half from the highway contains three ore beds. The lowermost, 0.8-foot thick, is exposed near the base of the slope under 26.0 feet of overburden to the road-level top of the rise, but east of the road the overburden lessens by several feet in a short distance, and the ore bed can be traced by fragments for 300 to 400 yards. In an area of possibly 10 acres here the average thickness of clay and sand overburden (which in places includes higher layers of ore) is not greater than 15.0 feet. About 8.6 feet above the lowermost ore in the road section is a bed of undetermined thickness (0.3-foot visible), and a foot or two above it is a 0.5-foot bed. The north slope of this same hill exposes three or four layers of ore, one of which is 0.75-foot thick, the others of the order of 0.3-foot.

c) Some ore is at the surface 0.5-mile to 0.6-mile farther north, and 2.0 miles from Highway 9; and some 260 yards still farther north, at the top of a low rise almost in front of a farmhouse, large ellipsoidal masses of ore are lying on the west side of the road. One of these concretions measured 2.0 feet in length and a foot in thickness. Mining conditions are not so good at this place, because of the hill west of the road and the moderately steep slope to the valley on the east. d) Along this same road almost 3.0 miles from Highway 9, and roughly 15 to 20 feet below the top of a gentle south slope half a mile long, ore from two levels is exposed (NE 1/4, Sec. 29, T. 21 N., R. 10 E.). Individual masses are 0.9-foot to 1.0 foot thick. At the very top of the rise additional ore is in sight. The locality appears to be very favorable for strip-mining operations—large areas of low rises and low slopes, where the overburden of clay, sand, and silt averages less than 15.0 feet, and in few places is more than 25.0 feet.

The right-of-way of this road being sub-parallel with the regional strike of the strata, the inference is warranted that two of the same beds are exposed at all the several places noted. Relative thicknesses, elevations, and associated strata support the inference. Furthermore, probably at least one or two of the ore beds in the "mountain" southwest of Montevista can be correctly correlated with the layers north of Walthall. In short, it seems reasonable to believe that some ore beds are extensive.

e) Two beds of 0.25-foot to 0.3-foot ore four feet apart, show along a local road about half a mile north of Bellefontaine, and 0.4-mile from the road junction with Highway 9.

f) Ore is at the surface in four or five places along the road leading south from a junction with the Bellefontaine-Embry road 1.65 miles west from Highway 9 at Bellefontaine. Some thin concretions (up to 0.3-foot thick) are bedded with sand and clayshale strata, about half a mile south of the junction, and approximately 0.4-mile farther south similar thin ore is part of the section in the south wall of a valley. The road bed at the top of this valley wall, 1.3 miles south of the Embry road, is 112 feet above the valley bottom, and here large discoidal masses of iron ore a foot thick crop out a little below the clay-sand contact.

g) The strata exposed in the vicinity of American Legion Lake include some thin ore, and at a place or two (NW $\frac{1}{4}$, Sec. 6, T. 20 N., R. 10 E.) in the hills north of the lake are oxide masses 0.5 to 0.7-foot thick, in gray clay. The main outcrop here is difficultly accessible, and although the slope is relatively low, the ore is 40 to 50 feet below the ridge top a few rods away.

The parts of the Bellefontaine Field which are reasonably favorable for strip mining and contain mineable quantities of

ore have an estimated area of 1.25 square miles and a tonnage of 950,168.

H. THE WALTHALL FIELD

The Walthall Field may be considered as consisting of an area of 31 square miles, more or less, chiefly east, south, and west of Walthall. Its northern boundary may be roughly defined as the southern limits of the Bellefontaine and Montevista fields; its eastern, as Spring Creek; its southern, as the part of the Mathiston-Walthall road which trends west by north from Spring Creek to a road junction a mile or so southeast of Walthall, and the roads which lead thence southwest and west to a junction 2.5 miles west of Highway 9; and its western boundary, a road trending in general north from that junction. Iron ore is at the surface in several places in the territory thus defined.

a) At Walthall, along Highway 9 both north and south of the intersection of the highway and an east-west road, and on both sides of the highway south of the intersection, are discoidal or ellipsoidal concretions of iron oxide embedded in a laminated very silty and sandy tan and light-gray clay, or a clayey and silty fine sand, streaked and spotted with rust. The ore masses, exposed by the highway cut and the gullies on both sides, are roughly, in two layers some three feet apart vertically, although the layers may converge beneath the surface, because lying along diagonal or otherwise irregular bedding. Individual concretions vary in size, those at the surface ranging from a few inches to 1.5 feet in diameter and 0.3 to 0.8-foot in thickness. These "bowlders" of oxide ore can be traced 250 yards along the west side of the highway. Also, they crop out east of the highway on both sides of the local road mentioned, leading into Walthall. Many of these masses are of considerable size-the largest observed measured 3.0 by 2.5 by 1.0 feet. It appears that the village is standing on discontinuous layers of iron oxide concretions. And in the walls of the Highway 9 cut at the top of the first hill 0.2-mile north of the intersection, masses of oxide ore are strung along the diagonal bedding 25 to 30 feet stratigraphically above the beds near the intersection. The parallel orientation of the ore and the strata which enclose it, at this cut and in other places where the bedding is very irregular, suggests that the ore masses in such chaotic terrane have been

moved by violent currents or by gravity from their original positions, and redeposited.

The location of this ore deposit, along a pavement highway and only five miles from a railroad, is favorable for mining operations, as is the lightness of the overburden; but of course the presence of the village of Walthall makes such operations impossible, at least on the east side of the highway. Possibly the deposit could be worked for some distance west of the highway.

b) Along the road which leads west from Walthall considerable ferruginous debris and a few larger pieces of ore are scattered about, especially half a mile or so west of Highway 9. Probably they belong to the same beds as the ore masses at Walthall. The relief is slight, although the road is on a divide.

c) At the intersection (on the line between Secs. 19 and 20, T. 20 N., R. 10 E.) of Highway 9 and a local road two miles south from the iron ore at Walthall, the gray clay just under a sharp clay-sand contact contains thin ore; and 0.35-mile west from the intersection, lignitic and light-gray clay and 0.5-foot concretionary masses of oxide ore crop out along the local road almost in front of a farmhouse. Relief is low, and over several acres the overburden is not more than 8 to 10 feet.

d) Ore outcrops are few in the part of the Walthall Field east of Highway 9. At a road junction (SW 1/4, Sec. 2, T. 20 N., R. 10 E.) iron ore debris and a few larger concretions are lying about on the surface, and insignificant showings were noted elsewhere.

The mineable ore of the Walthall Field is estimated at 170,-768 long tons from 320 acres.

I. THE TOMNOLEN FIELD

The territory north of Tomnolen, between Salt Creek on the east and Calabrella Creek on the west, extending northwards to a little beyond the Grady road and southwards to the Big Black River, is designated the Tomnolen Field. Although the total area of the field is approximately 16 square miles, the ore outcrops are limited to parts of the strip along the Grady road, which extends east-west some two miles north of Tomnolen. Specifically, a) Both east and west of the junction (about the middle of the line between Secs. 10 and 15, T. 19 N., R. 9 E.) thin iron ore is included in the sections exposed by road cuts. East of the junction two seams show, the lower one some 30 feet below the top of the rise, the upper one 3 feet above the lower. The combined thickness of the two is not more than 0.5-foot. However, in the down slope west of the junction, three layers of discoidal masses of iron carbonate and iron oxide are interbedded with gray and lignitic and bluish clay and clay-shale. A "bowlder" from the uppermost layer was 0.5-foot thick. The layers may not be continuous, inasmuch as some of the masses appear to have developed along cross-bedding. A 25-foot section is exposed. A quarter of a mile south of the road junction mentioned, pieces of ore, presumably from the same beds, were found on the slope.

b) A quarter of a mile west of the road junction, in front of a church and cemetery, gray clay and two beds of oxide ore are at the surface on the north side of the road. The discoidal concretions here are 0.3-foot to 0.4-foot thick, and the layers separated by three to four feet of clay. These ore seams probably are correlative with the upper two in the west slope from the junction. Much of the surface immediately south of the road is lower than the outcrop, but at some distance farther south low hills are of elevation sufficient to include the ore. Overburden is slight north of the road, but perhaps two to three acres are occupied by the church and cemetery. The same ore can be traced some 200 yards down slope to the west from the outcrop in front of the cemetery.

Iron ore shows here and there along this east-west road for perhaps three-quarters of a mile.

Some thin ore crops out in the hills of Choctaw County, across the valley of the Big Black River south of Tomnolen.

The estimates for the Tomnolen Field are: area of mineable ore, 160 acres; ore available 118,224 long tons.

J. THE SALT CREEK FIELD

The area here named the Salt Creek Field comprises some six square miles in the headwater territory of Salt Creek north of and contiguous to the Tomnolen Field. The only ore outcrops observed are along an east-west road two miles north of the Grady road.

a) The west wall of the valley of the east headwater tributary of Salt Creek shows a good section (SW 1/4, Sec. 35, T. 20 N., R. 9 E.) of sand and clay, including weathered masses of iron ore 0.7-foot to 0.8-foot thick and as much as 2.0 feet long. The presence also of concretions 0.25-foot to 0.3-foot thick suggests that two ore beds are here, although not observed in place. The valley wall is a low, broad, level-topped ridge, of which only a slight thickness overlies the iron ore.

b) In the low sloping west wall of the valley of the main Salt Creek, blocks of oxide ore 0.5-foot to 0.7-foot thick crop out in road cuts and roadside gullies. Weathering has split some of them into thin slabs.

The mineable territory of the Salt Creek Field may be as much as 320 acres. If so, the ore which can be economically recovered should be at least 288, 992 long tons.

K. THE SAND CREEK FIELD

Included in the Sand Creek Field is the territory drained by the southern part of the upper reaches of Sand Creek, an area of approximately sixteen square miles north and northwest of the Salt Creek Field. Ore is at the surface in four or five places.

a) A 0.5-foot seam of oxide ore projects from the north wall of a road cut (NW 1/4, Sec. 32, T. 20 N. R. 9 E.) some 0.4-mile west by north from the bridge over Sand Creek, at the contact between gray iron-stained clay below, and red sand above. The same bed shows a few rods farther east, in front of a farmhouse.

b) A little below the middle of the slope of the southeast wall of the valley of Sand Creek, 0.5-foot ellipsoidal masses of oxide ore are exposed by a roadside gully (NE cor., Sec. 28, T. 20 N., R. 9 E.). The rusty laminated shale which in many places contains ore crops out here and there southwards along the valley wall and along a north-south road. Relief is slight over a large area.

c) A ravine section (NW 1/4, Sec. 19, T. 20 N., R. 9 E.) of the west wall of the valley of a tributary of Sand Creek, includes

three layers of concretionary oxide ore. The lowermost, 0.2-foot thick, is separated from the next higher, some masses of which are 0.3-foot thick and more than a foot long, by 7.5 feet of bluish and greenish silt and silty clay, and the uppermost, 0.5-foot thick, is 7.0 feet still higher, almost at the very top of the rise here, although it is under greater overburden a little farther east.

d) Some three quarters of a mile north by east of c), cuts along a quarter of a mile of road (SW 1/4 of NE 1/4, Sec. 18, T. 20 N., R. 9 E.) up the gentle slope of the east wall of the same valley have uncovered a sand, silt, and clay section which contains discoidal masses of oxide ore from four beds, the lowermost (?) of which is a foot thick. Large ore masses, probably from the same 1-foot bed, crop out a little northwest of the road junction at the top of the slope.

e) A quarter of a mile or less southeast of d), road cuts (SE 1/4, Sec. 18, T. 20 N., R. 9 E.) in the same valley wall expose flattish masses of iron ore 0.4-foot to 0.5-foot thick. Almost certainly they are from one of the beds which show in the d) section and probably in the c) section also.

It seems highly probable that the ore of outcrops c), d), and e) belongs to the same beds, which at one time were continuous through this region.

It is estimated that at least a square mile of the Sand Creek Field contains mineable ore, and that the tonnage can be very conservatively placed at 264,674.

L. THE EMBRY FIELD

The territory around Embry, most of it south, southwest, and west of the village, is herein designated the Embry Field. It extends northwards to the northern boundary line of the southern half of Township 21 North; eastwards to the west headwater fork of Sabougla Creek, or to the western boundary of the Bellefontaine Field; southwards to the northern boundary of the Sand Creek Field, and westwards to a short distance west of the southnorth roads which are sub-parallel to the line between Ranges 8 and 9 East. The area thus delimited, is approximately 19.5 square miles, in which four main outcrop tracts were noted:

a) A quarter of a mile or less southeast of a road junction (NE cor., Sec. 8, T. 20 N., R. 9 E.) clay and iron ore are exposed

28

on the northwest slope of a low hill, by roadside gullies; and an iron ore layer in the contiguous southeast slope a little farther north, 15 feet above the culvert between, consists of pillow-shaped or ellipsoidal masses two of which measured 1.3 to 1.5 feet long and 0.7-foot to 0.8-foot thick. The same layer (?) crops out in the slope a few rods southeast of the junction, 35 to 40 feet above the culvert; individual masses 2.0 feet long project from the walls of the road cut.

b) Oxide ore shows in several places along the almost abandoned road eastwards from the junction mentioned under a). No doubt it belongs to the beds which are exposed near the junction. Relief along here is slight; considerable ore at the surface seems to indicate a sizeable tonnage under light overburden.

c) About 0.8-mile north from the road junction referred to in the descriptions of outcrops a) and b) ore from a 0.3-foot layer has been uncovered along a road extending north by east to Embry, and 0.2-mile farther north at approximately the same elevation, the same thickness of ore is at the surface. The location of these two small outcrops with relation to a) and b) seems to indicate that the ore is from the same beds.

d) Two and a half to three miles southwest of Embry and approximately 1.5 miles north of a road junction, road cuts (western part, NE 1/4, Sec. 1, T. 20 N., R. 8 E.) in a steep hill slope have exposed two layers of oxide ore. The lower layer, 25 to 30 feet below the top of the slope, is 0.4-foot to 0.5-foot thick; the upper, a few feet above the lower, is only about 0.25-foot thick.

It is believed that mineable ore underlies at least 0.75 square mile of the Embry Field, and that a tonnage estimate of 229,880 is very conservative.

M. THE CADARETTA FIELD

For the purposes of this report, territory on both sides of the wide valley of Sabougla and Lindsay Creeks, in the northern part of the county, is included in the Cadaretta Field. The northern boundary is the Webster County-Calhoun County line; the eastern boundary may be considered as along the divide between the drainage basins of Sabougla Creek and Shutispear Creek; the southern boundary is the line which marks the southern limit of the northernmost three rows of sections of Township 21 North; and the western boundary, a line parallel to the Embry-Cadaretta road a little west of it. The total area is 30 square miles, but except for one or two isolated showings, ore outcrops have been noted only along Highway 9 and along the Embry-Cadaretta road.

a) Along Highway 9 at the Webster County-Calhoun County line is an outcrop of light-gray shaly clay containing 0.3-foot iron oxide concretions, near the top of a gentle rise.

b) Two miles southeast from the county line, a Highway 9 cut through sand for the most part has brought some ore to the surface; and 0.2-mile to 0.3-mile farther southeast another cut, at a lower elevation, has been made through shale which contains a little ore.

Such scattered outcrops along the highway are evidence of the presence of at least thin beds of iron ore in the clay and shale strata of this region, but no very considerable deposit was observed.

c) Approximately two miles southeast from Cadaretta, in front of the C. H. Woods home, iron oxide ore shows in both walls of a road cut (NE 1/4. Sec. 11, T. 21 N., R. 8 E.) and along a short ridge south of the road. A tenth of a mile farther northwest another road cut has uncovered additional ore. Along this 250 yards or less of road, three beds of concretionary oxide ore crop out. The thickest is 0.8-foot thick, the other two 0.4-foot to 0.5-foot thick, average. Individual masses are ellipsoidal or pillow-shaped. The terrane is hilly, but the deepest ore seen is not more than a maximum of 25 feet below the tops of the ridges. Probably the ore beds extend north-south through the ridges for a considerable distance.

The mineable terrane of the Cadaretta Field is believed to have a minimum area of 0.75 square mile and to contain at least 394,080 long tons of ore.

N. THE MIDDLETON FIELD

The Middleton Field comprises 15 to 16 square miles in the northwestern corner of the county, in the area of the headwaters of a tributary of Sabougla Creek south and southwest of Cadaretta. Almost all the outcrops observed are along or near the Embry-Alva road, from the road junction (NE cor., Sec. 22, T. 21 N., R. 8 E.) southwest to the road junction near the center of Section 29 some two miles northeast of Alva.

a) Roadside gullies in the up slope northeast of the junction (NE cor., Sec. 22, T. 21 N., R. 8 E.) have exhumed iron ore concretions from two layers, the lower of which, a few feet above the base of the slope, is 0.7-foot to 0.8-foot thick, and the upper, near the top of the slope, 0.3-foot to 0.5-foot thick. The upper of these beds crops out also near the top of the next rise, 0.2-mile southwest of the junction.

b) A little less than half a mile northwest of the junction referred to, iron oxide ore and gray clay have been exposed by roadside gullies in both slopes of a low ridge, the top of which is approximately 45 feet above the junction. The ore appears also in the south slope of a low rise 0.2-mile farther northwest, and in a third place a quarter of a mile or more still farther northwest (maximum thickness 0.5-foot).

c) Another showing of iron ore is 0.3-mile northeast of a road forks (SE 1/4, NW 1/4, Sec. 17, T. 21 N., R. 8 E.), 20 feet more or less below the top of a valley wall. It can be traced southwestwards almost to the junction.

d) A layer of 0.75-foot to 0.8-foot sandy ore crops out in the walls of a road cut approximately a mile and a quarter north of the road junction (near the center, Sec. 29, T. 21 N., R. 8 E.) which marks the southwest corner of the Middleton Field.

e) The part of the Embry-Alva road southwest of the junction (NE cor., Sec. 22, T. 21 N., R. 8 E.) is across a series of low rounded ridges, of approximately the same elevation, separated by narrow valleys. None of these ridges has its crest more than 20 to 25 feet above the adjacent valleys. In front of the Middleton home, 0.8mile southwest of the road forks in Section 22, ellipsoidal masses of oxide ore, 0.8-foot thick from two layers separated by 5 to 6 feet of gray clay, are exposed in the northwest wall of the road cut. Slightly lower in the section a solid tabular bed, 0.8-foot to 1.0 foot thick, of weathered grainy ore, projects from the gray clay walls of a roadside gully. It may be identical with beds of the same character observed in Fields K and R and elsewhere. If it is, such correlation would indicate that this bed at least is persistent over considerable areas. That the ore at the Middleton home extends to some distance northwest of the road is proved by outcrops in the back yard of the dwelling and in the hill slope farther northwest.

f) Along the road 0.3-mile more or less southwest of the Middleton home, is a second outcrop of one of the ore beds. It is in a low rise, under not more than 5 to 6 feet overburden.

g) A quarter of a mile southwest of f) about 15 feet below the top of a rise somewhat higher than others along this road, a 0.7-foot to 0.8-foot bed of sandy ore is exposed, and the same layer shows near the top of another hill a quarter of a mile still farther southwest.

h) Thick iron ore is at the surface a mile southwest of the Middleton home, in a gully across the road northwest from a small white frame house (SE 1/4 Sec. 21, T. 21 N., R. 8 E.). It appears to be from two beds separated by only a foot or two of gray clay. One mass of ore here measured 3.0 feet long, 2.0 feet wide, and 1.0 foot thick. The ore is in a low ridge, under 5.0 to 10.0 feet overburden.

i) Approximately 0.65-mile southwest from h) near the top of the west wall of a valley, two layers of sandy iron ore are interbedded with laminated sand and clay. The ore beds are some 3.0 feet apart, and the lower one is 10.0 feet below the abandoned house which stands on the top of the ridge. The individual masses are pancake-shaped; one measured about 2.0 feet in diameter and 0.4-foot to 0.5-foot in thickness.

The ore of the several outcrops along the western half of the Embry-Alva road, described in the foregoing paragraphs, almost certainly belongs to three or four beds. The road trends roughly down dip, the relief is small, and the general slope of the surface is westwards.

It is estimated that two square miles of the Middleton Field are underlain by ore within easy reach, in quantity conservatively expressed by the figure 1,274,192 long tons.

O. THE ALVA FIELD

The Alva Field, which may contain more iron ore than does any other terrane of equal extent in Mississippi, comprises the region surrounding Alva, Montgomery County. By far the greater part of it is in Webster County, east, southeast, and south of Alva. Specifically, the field may be thought of as extending northwards to the east-west road a mile and a quarter north of Alva, or to the valley a mile north of Alva; eastwards, to the western boundary of the Embry Field; southwards, to the southern boundary-line of the northern half of Township 20 North, Range 8 East; and westwards, to or a little beyond the Lodi-Alva road in Montgomery County. In this area of approximately 24 square miles are many outcrops of ore, the more important of which may be noted.

a) The 100-foot stratigraphic section of the south wall of the valley of the south headwater branch of the East Fork of Butupan Bogue, along the north-south road one-half to three-quarters of a mile north by east of Alva, includes a 0.7-foot to 0.8-foot layer of iron oxide concretions some 30 feet above the base of the section, and two thin beds of sandy ore 33.5 to 35.0 feet higher. The sandy ore may be correlative with the flattish, roughly circular masses referred to under i) of the Middleton Field. A few rods east of this road section ore crops out at a farmhouse.

b) Along the Alva-Tomnolen road, a little less than 2.5 miles southeast of Alva, on the Selvidge property are outcrops of one of the greatest accumulations of iron ore in Mississippi. The most prominent outcrops observed (SE cor. Sec. 5, or NE cor. Sec. 8, T. 20 N., R. 8 E.) are in the slopes at the head of a valley on the southwest side of the road. The number of ore intervals here has not been determined with certainty, but is at least four, and probably five or six. Before any excavation had been done, rounded masses of oxide and carbonate ore projected from the slope at several different levels, within a vertical interval of 40 feet or more. Later, strip-mining on a small scale, and prospecting by means of removing overburden with a bulldozer, exposed much more ore. Fifty to 60 tons were shipped out, and heaps of ore masses of various shapes and sizes were left scattered over the area, especially along the road. Many of the individual lumps were of relatively large size: one measured 6.5 feet long, 4.4 feet wide, and 1.8 feet thick. The total thickness of the ore beds at this place has been estimated at 8.0 feet. The estimate probably is not too great. Furthermore, the dividing ridge which contains the Selvidge property ore extends far northwards, northwestwards, and southwards, and reconnaissance northwards has found many outcrops of ore half a mile to a mile or more from the public road. In fact, the showings are sufficiently numerous and the beds are of positions and thicknesses sufficiently in conformity with the positions and thicknesses of the beds at the large outcrop, to warrant the conclusion that the ore layers are continuous except for breaks made by erosion, even where they can not be traced with certainty. Almost certainly, then, the same beds appear in different fields, especially along the strike.

c) Along the Alva-Lodi road, eastern Montgomery County, from a hilltop 1.3 miles south from Alva to a quarter of a mile farther south, oxide ore crops out here and there. Farthest north the 0.4-foot to 0.5-foot concretions are at slight depth, but some 0.2-mile farther south, in the walls of a road cut (NE 1/4, Sec. 12, T. 20 N., R. 7 E.), in front of a farmhouse, where the best outcrop is, the ore is thicker (0.8-foot) and under an overburden of less than 5.0 feet up to 15.0 feet. Two beds can be identified at the house, and the material north of there may be from a higher bed.

The part of the Alva Field where ore is close enough to the surface to mine, probably is several square miles in extent; but the estimate given herein, two square miles, applies only to the area easily accessible from the two main roads. The total mineable ore under the two square miles is believed to be at least 2,889,920 long tons.

P. THE SWEATMAN FIELD

The Sweatman Field is in the vicinity of Sweatman, northeastern Montgomery County. It comprises a large part of the territory of the middle and upper reaches of Mouse Creek and Little Mouse Creek, tributaries of the East Fork of Batupan Bogue, which can be considered the northern boundary of the field. The eastern boundary is the divide a little west of the Alva-Lodi road; the southern limit, the southern boundary-line of the northern half of Township 20 North, Range 7 East; and the western boundary, the line between Range 6 East and Range 7 East. The total area thus delimited is approximately 23 square miles,

The largest outcrops are at and near old Sweatman (common corner, Secs. 5 and 6, T. 20 N., R. 7 E. and Secs. 31 and 32, T. 21 N., R. 7 E.) 0.7-mile to 1.0 mile west of the road junction. At the old

Sweatman road junction (NE cor., Sec. 6, T. 20 N., R. 7 E.) numerous ellipsoidal, sub-spherical, and pillow-shaped concretions of oxide ore are scattered over the surface of a small flat-topped nose between Mouse Creek and a tributary; and similar masses project from the walls of road cuts northwest and east of the junction. The ore belongs to two layers, individual masses of which are a foot or more in thickness.

Southeast from the old Sweatman deposit the ore can be traced for a short distance, and farther southeast the ore level is well below the tops of the ridges. However, in much of the region overburden is excessive. The deposit at old Sweatman is only about eight miles by a fairly good graveled road from U. S. Highway 51 at Duck Hill.

The mineable area is estimated as 320 acres and the ore obtainable as 472,896 long tons.

Q. THE LODI FIELD

The Lodi Field includes a little of eastern Montgomery County and more of western Webster County. Roughly, its northern limit may be thought of as marked in Montgomery County by the east-west road which joins the Lodi-Alva road in the western part of Section 13, Township 20 North, Range 7 East, and in Webster County by the same road and a line east along the same general course almost to Calabrella Creek; its eastern boundary line could coincide with the line between the eastern and western halves of Township 20 North, Range 8 East; its southern limit could be the line between Townships 19 and 20 North, and its western boundary the Lodi-Alva road. The total area within the limits thus fixed is approximately 14 square miles.

a) The most prominent ore exposure of the Lodi Field is the result of strip mining and prospecting by the Kilmichael Mining Company on the Hart property (SW 1/4, Sec. 25, T. 20 N., R. 7 E., Montgomery County) 1.3 miles north of Lodi and 0.2-mile northeast of the junction of the Lodi-Alva road and a local road. Excavations have been made both north and south of the local road in the low west wall of the valley of a headwater tributary of Wolf Creek. Before mining began, a few concretionary ore masses 0.7-foot to 0.8-foot thick projecting from the walls of a road cut and roadside gullies in the slope at two or three levels,

and ferruginous debris scattered over the surface here and there, were the only evidences of the presence of iron ore; but in the first period of mining, drag-line and bulldozer brought up several hundred tons of oxide ore from the three quarters of an acre or less worked over. Most of the mining was on the north side of the road. Two layers of ore were discovered, the upper of which was in most places four to five feet below the surface, and the lower layer seven to eight feet deeper. In few places were the excavations more than 15 feet deep. Some of the individual masses were of considerable size; one of the largest measured 5 feet long, 2.8 feet wide, and 0.8-foot thick. The mining 200 yards or so south of the road, in a "nose" of the lower part of the valley wall, uncovered a greater tonnage per unit area, and larger individual "bowlders" than did the work north of the road. However, a smaller area is under relatively light overburden than on the north side.

The second period of mining, which began in July, 1951, is on a much larger scale than the first. By the end of July an area of perhaps two or three acres on the south side of the road had been stripped down to the ore level by bulldozer and drag-line. The overburden removed ranged in thickness from almost nothing to 15 to 20 feet or more as the excavation was carried farther westwards into higher ground. After removal of the overburden, the ore is dug out by drag-line and trucked to a stock-pile on the steeper slope west of the Lodi-Alva road, from where, after washing it will be hauled to the shipping point. Before the end of July the stock-pile contained an estimated 3,600 tons of ore, which, the operators stated, had been mined from an acre of ground. Obviously, if the tonnage from this small block of terrane is an index to that of every mineable acre in the Lodi Field, the estimate of total tonnage given in this report-985,200 long tons for 1.25 square miles—is much too low; but, for reasons hereinbefore given, uniformity of deposits through a wide territory is unlikely. However, it seems to have been discovered that in the terrane now being mined, the irregularity of structure has caused a greater concentration of ore. Masses developed along diagonal and otherwise irregular bedding and possibly around clay balls, have filled space in an interval which might have been barren of ore if the structure had been regular. This may be due to the disturbed or mixed up ground affording freer circulation of the iron-bearing sub-surface water. Where such a condition obtains, outcrops will not be a reliable guide to the quantity of ore present.

b) Northeast of the workings some 0.45-mile, in the east wall of the valley, ore crops out along the same local road (NE 1/4, Sec. 25, T. 20 N., R. 7 E., Montgomery County) at an elevation slightly greater than that of the pits.

c) On the Pyron property (NW 1/4, Sec. 20, T. 20 N., R. 8 E., Webster County) 0.85-mile east of a road junction, are evidences of a large tonnage of oxide ore. Two beds of ore underlie low ridges, on one of which the Pyron farmhouse stands, and the beds can be traced by surface "bowlders" a considerable distance eastward. Ore crops out also in the road cut 0.4-mile to 0.5 mile west of the house, and at the road junction 0.85-mile west of the house. The mineable area in this immediate vicinity may be 15 to 20 acres.

d) In the east wall of the valley of a tributary of Wolf Creek, east of Lodi, and almost on the Montgomery County-Webster County line, two beds of ore are present, as indicated by outcrops in road cuts and gullies. A mile or a little less east by north from the road junction at Lodi, on the north side of the road, pillowshaped concretions of oxide ore show at two levels, 14.0 feet and 21.5 feet above the creek flat. Similar masses crop out in the nearby road cut, and the ore intervals can be traced a quarter of a mile along the valley wall southward, by fragments of ore. The greatest thickness observed was 0.8-foot.

e) Approximately half a mile south of the road forks 1.3 miles east of Lodi at the top of the east wall of the valley referred to in d), two beds of oxide ore crop out in the road and in the slope north of it, almost in front of a farmhouse (on the line between Sec. 6, T. 19 N., and Sec. 31, T. 20 N., R. 8 E.). The beds, 0.5-foot to 0.8-foot thick, are near the top of the west wall of the valley of Wolf Creek, under 10 to 15 feet of overburden.

R. CALABRELLA CREEK FIELD

The strip of territory which includes Calabrella Creek Valley and the country on both sides to varying distances has been named the Calabrella Creek Field, for the purposes of this report. It extends northwards to within two miles of the line between Townships 20 North and 21 North, Range 8 East; eastwards, to the western boundaries of the Sand Creek, Salt Creek, and Tomnolen Fields; and westwards, to the Lodi and Stewart Fields. The total area is 25 to 26 square miles. Iron ore is at the surface in several localities:

a) The most prominent series of outcrops (SE 1/4, Sec. 11, SW 1/4, Sec. 12, NE 1/4, Sec. 14, T. 19 N., R. 8 E.) is along a northeast-southwest road and short branch roads north of it four to four and a half miles north of Stewart and a mile west by south from Calabrella Creek. Ore shows here and there for a mile along the main road and for an equal distance along the two branch roads. The showing farthest northeast, at the road junction (NW 1/4, Sec. 13), consists of only a few pieces of thin siliceous oxide ore. Some 0.4-mile west by north from the junction, along the old branch ridge road, iron ore debris is scattered about, and only 0.15-mile east of the west end of the branch road, iron ore masses 0.5-foot to 0.6-foot thick crop out. At the junction the flat-topped ridge is underlain by 0.5-foot ore, and the overburden is only 5.0 to 8.0 feet. Probably the entire ridge between the junctions, almost a mile long, is underlain by at least one layer of 0.5-foot ore at mineable depth. The topography is of low relief for half a mile northwest of the west junction mentioned (about middle point of line between Secs. 11 and 14, T. 19 N., R. 8 E.) and gray clay is exposed; iron ore is probably present at slight depth.

b) In front of the Boatman store (NW 1/4, Sec. 13) on the northeast-southwest road, a few concretions of 0.3-foot ore are exposed in the low east wall of a small valley, and 0.2-mile farther southwest, near the base of the west wall of the same valley, other concretions show in the shale sides of the road cut.

c) Approximately 0.45-mile farther southwest, is the base of a long section exposed by road cuts and roadside gullies in the southwest wall of a valley, adjacent to the Sheppard and Richardson properties. The total section includes 130 feet of strata, almost all clay shale or clay, but several beds of iron ore. The lowest ore, stratigraphically, is a 0.3-foot bed only 5.0 feet above the base of the section; a 1.0 foot blocky layer of sandy ore is 38.0 feet higher, and another 5.0 feet still higher. At about 55.0 feet above the base of the section is a 1.3-foot interval of ellipsoidal masses of ore which are strung 100 feet along the face of the cut. A layer of 0.5-foot concretions is in the section 5.0 feet higher, and at the top of the rise reached by the road, only a few feet below the clay-sand contact, are other iron ore "bowlders." Thus in the 117foot stratigraphic section along the 0.4-mile length of road, six beds of iron ore crop out. Although the thicker ore is under heavy overburden at this particular spot, much of it could be won by contour mining, and the same beds are much nearer the surface a little farther north along the strike. Farther southwest, the gentle slope of the Richardson property hill shows only two or three thin seams of ore.

d) In the southeast corner of Section 3. Township 19 North, Range 8 East, 0.2-mile southeast of a road junction, iron oxide concretions from one layer crop out in the walls of a road cut. One such "bowlder" measured 1.5 feet long and 0.4-foot to 0.5-foot thick. The bed dips southwest at a rather high angle, the overburden is heavy; and the length of outcrop, only 50 to 60 feet.

e) Ore is at the surface along the same road half a mile farther northeast, and 0.15-mile yet farther northeast, several large masses, one of which measured 2.5 feet long, 1.5 feet wide, and 0.8-foot thick, are exposed a few rods southwest of a road forks. Ore crops out also northeast of the junction, and at places a quarter of a mile and 0.6-mile southeast of it.

f) In the lower part of the west wall of the valley of Calabrella Creek, a few rods north of a road junction (SW 1/4, NW 1/4 Sec. 26, T. 20 N., R. 8 E.) "bowlders" of oxide ore 0.5-foot to 0.8-foot thick have been exposed by a cut through a low ridge. A quarter of a mile or less farther north and at a lower level two more layers show, the upper of which is approximately the same thickness as that nearer the junction, and the lower, thinner and sandier.

Some smaller fragments, and other evidences of the presence of iron ore can be seen here and there along the road for a quarter of a mile at least south by east of the junction. The region is the gently sloping west wall of Calabrella Creek Valley, consisting in part of low rounded ridges where overburden is relatively light. It is only half a mile or so west of the main Alva-Tomnolen road.

g) At and near the junction (a little south of the center, Sec. 15, T. 20 N., R. 8 E.) of the Alva-Tomnolen road with a road from

the northeast, road cuts and gullies have exposed a section of 105 feet of strata, including three iron ore intervals. The section extends from the bridge, a quarter of a mile northwest of the junction, to the top of the ridge 0.2-mile northeast of the junction. The lowermost ore, 10.0 feet above the base of the section, is 0.5-foot thick; the middle layer, 34 feet higher stratigraphically, has the same thickness, and the upper bed, 6.5 to 7.0 feet above the middle bed, is 0.6-foot thick. Very little of the ore near the road junction is mineable, because of excessive overburden; but in the northwest wall of the valley ore from two layers, the upper of which is 1.0 foot thick, crops out, where the overburden is medium to heavy.

h) South by west from g) some three quarters of a mile and 0.6-mile southwest of a road junction a cut (NW 1/4, Sec. 22, T. 20 N., R. 8 E.) through a low ridge west of Calabrella Creek Valley has uncovered iron oxide concretions 0.5-foot thick.

The mineable area of the Calabrella Creek Field is estimated as 1.5 square miles and the quantity of ore as 570,912 long tons.

S. THE STEWART FIELD

The Stewart Field comprises approximately 30 square miles in the southwestern corner of Webster County north of Stewart, and 13 square miles in western Choctaw County, south of Stewart. The Webster County part of it is bounded on the north by the Lodi Field, on the east by the Calabrella Creek and Tomnolen Fields, and on the south and west by Montgomery County. The Choctaw County part extends from the Big Black River on the north to the line between Townships 18 North and 17 North on the south, and from the line between Range 9 East and Range 8 East on the east to Montgomery County on the west. Iron ore is at the surface in many places. Some of the outcrops, chiefly those of Webster County, are described briefly herein.

a) Approximately three and a quarter miles north from U. S. Highway 82 at Stewart and a little northwest of a road junction at a negro school (SE 1/4, Sec. 22, T. 19 N., R. 8 E.) is an outcrop of the thickest single bed of iron ore seen in Webster County. This solid bed of ore, 1.5 feet to 2.0 feet thick, projects from the low northeast wall of a shallow road cut (Figure 1). The main outcrop is several yards long, and the bed can be traced southeast-

40

wards a hundred yards or so along the road, by two or three smaller outcrops. Also, float ore presumably from the same layer, is lying in a ravine a few rods northeast of the road. However, the ore bed at the outcrop is only three to four feet under the surface, and is in a low narrow ridge or "nose" which merges with much higher ground at and near the road junction. Only a few yards from the road on both sides, the surface is lower than the ore. Furthermore, reconnaissance at the same level along the slopes of the hills east and northeast of the outcrop, between two roads, failed to find any ore except a showing of a 0.25-foot to 0.3-foot layer at two places in an old farm road half a mile northeast of the main exposure. In much of the region explored, the overburden is too great for profitable mining, even if the ore bed is present and maintains the thickness it has at the road outcrop.

b) Patches of both float ore and ore in place in two or three localities near the main Stewart road farther south seem from their positions to be remnants of the a) bed, or at least of the same general ore interval. A quarter of a mile south by east of the outcrop of thick ore, concretions of oxide ore 0.5-foot or more thick are lying in the roadside gully and are scattered over the ridge west of the road. A little west of the road junction half a mile or more south of a), one layer of ellipsoidal concretions 0.6foot thick is included in the shale-sand section, at a level 12 feet below the top of the ridge. The almost level ridge top extends north for 200 to 300 yards, and west along the road 0.2-mile to a junction, and beyond. South from the junction for a considerable distance the surface is above the level of the ore bed. The bed is under light cover, then, over an area of probably 80 acres.

c) A little ore crops out in an abandoned northeast-southwest road near the eastern edge of the Stewart Field, and in the walls of the road cuts (NW cor., Sec. 23, T. 19 N., R. 8 E.) half a mile or so southwest of the Richardson hill, Calabrella Creek Field. The small ellipsoidal concretions, in much broken up and tilted shale, probably belong to one of the thin beds of the Richardson property.

d) Along and near a northeast-southwest road a mile, more or less, west by south of a), concretionary oxide ore is at the surface in two or three places. Approximately 0.8-mile southwest of the junction of this road with the main Stewart road, erosion of 42

the slope south of the road and east of an abandoned farmhouse (NW 1/4, Sec. 28, T. 19 N., R. 8 E.) has exposed many masses of ore, some in place in ravine walls, others float scattered on the surface of a terrace of several acres extent. Overburden here is light, but unfortunately the ore, seemingly from two beds, is only 0.25-foot to 0.3-foot thick.

e) Less than 200 yards west of the short road which leads to the abandoned house, ore masses from two layers in 20 to 25 feet of gray clay are exposed by a road cut and a ravine in the lower part of a long slope. The ore beds may be the same as those in the slope east of the house.

f) Another outcrop of oxide ore along the same northeastsouthwest road is near a farmhouse, a quarter of a mile to 0.3-mile northeast of the road junction in the southeast quarter of the northeast quarter of Section 29, Township 19 North, Range 8 East. Two beds of ore are present, and the concretions have a maximum thickness of some 0.7-foot. Relief is low and overburden light all along here. A short distance farther southwest, the same two beds of ore crop out in the southwest wall of a small valley.

g) East from the junction referred to in f) about 0.55 mile, concretions of oxide ore 0.5-foot to 0.7-foot thick have been exposed by a road cut through the upper part of the west wall of the main southward-trending valley for 0.1 mile, and show also in the slope north of the road. Almost certainly they belong to the same beds as the ore at f) and probably that at d) and e).

h) North from the road intersection (center, Sec. 29, T. 19 N., R. 8 E.) 0.6-mile, 0.3-foot to 0.4-foot "bowlders" of oxide ore crop out in a low ridge where overburden is only 8 to 10 feet thick; and 0.6-mile farther north, 0.4-foot to 0.5-foot masses of ore are enclosed in lignitic and light-gray clay in a low rise. Only one ore layer shows along this road, so far as observed, but the overburden is thin almost everywhere.

i) Several outcrops in Sections 29 and 30, Township 19 North, Range 8 East, suggest that this entire region is underlain by two or three beds of ore. South of the intersection in the center of Section 29, in the face of the clay hill, two layers of 0.5-foot to 0.7-foot concretions are at the surface; east of the intersection, at a lower level, are other ore "bowlders"; west of the intersection 0.2-mile to 0.3-mile, in some 20 feet of gray iron-stained clay, ellipsoidal masses of oxide ore 0.8-foot thick from two intervals, are exposed. In the walls of a shallow road cut (SW 1/4, Sec. 29, T. 19 N., R. 8 E.) 0.15-mile northwest of a road junction 0.4-foot to 0.5-foot concretions of ore are bedded in gray and red clay. Another outcrop is a short distance west of the road junction in the eastern part of Section 30, Township 19 North. Range 8 East, and another 0.2-mile north of the junction in the center of Section 30, in the face of a clay terrace. All the surface showings mentioned under i) are in the divide which extends southwest and west through Sections 28, 29, and 30. Overburden is relatively light in most places.

j) In the extreme southwestern corner of Webster County and in contiguous parts of Montgomery County are several' iron ore outcrops, specifically south, west, and north of the intersection (NW 1/4, Sec. 31, T. 19 N., R. 8 E.). At A. C. May's home, half a mile or less south from the intersection, and about the same distance north from a junction in Montgomery County, ellipsoidal concretions of 0.5-foot to 0.6-foot oxide ore are exposed in the walls of a road cut. A guarter of a mile south of the May outcrop, in a wooded ridge almost on the county line, ore is more abundant. West of the Section 31 intersection, and at a lower elevation, 0.5-foot "bowlders" from at least two ore layers are embedded in the clay along a small tributary of Wolf Creek, and north of the intersection similar masses appear in a road cut. A little ferruginous debris, probably from the same beds, is scattered over the surface in Montgomery County west of Wolf Creek and east of the Lodi road.

k) Iron ore, chiefly oxide, is at the surface in many places in western Choctaw County, notably in the region south of Stewart. At the Free Will Baptist Church (southern part, Sec. 22, T. 18 N., R. 8 E.) ore a foot thick crops out along the north-south road, and is at slight depth under a considerable area. Also, west of the intersection (Sec. 27, T. 18 N., R. 8 E.) here and there along the road are other outcrops of 0.5-foot to 0.8-foot ore masses. In front of the school (western part, Sec. 26), ore concretions are lying at the foot of the low slope; and road cuts and gullies southeast and south of the school have exposed the iron oxide "bowlMISSISSIPPI STATE GEOLOGICAL SURVEY

ders" in several places. At one place, at least two or three feet of the uppermost part of a ridge for a distance of 200 yards or more appeared to be iron ore. All in all, the numerous outcrops, the relatively considerable thickness of the beds, and the extensive area which shows evidences of the presence of ore, suggest strongly that the region contains a very large quantity of ore—enough to warrant the estimate, 1,050,880 long tons, published for this part of the Stewart Field. The estimate for the mineable area (3.5 square miles) of the entire Stewart Field is 2,758,560 long tons.

T. THE EUPORA FIELD

The Eupora Field comprises the part of Webster County around Eupora bounded by Field A on the east, Field H on the north, and Fields I, J, and K on the west; also the northern part of Choctaw County west of Phillips Creek to the line between Range 9 East and Range 10 East. The total area is approximately 45 square miles. No territory south of the Big Black-Big Byway divide is considered part of the Eupora Field. Iron ore, almost all oxide, is conspicuous along the Choctaw County road which trends west by south, a little south of the valley of Big Black River and subparallel to it.

a) The farthest east of the outcrops is a mile or so east of the road junction at La Grange, in the east wall of the valley of Phillips Creek. The one layer at this place, up to a foot thick, is part of the ore of the Maben-Mathiston Field. Half a mile farther west is another exposure.

b) Approximately 0.15-mile west from the intersection (SW 1/4, Sec. 15, T. 19 N., R. 10 E.) of Highway 9 and the local road referred to, iron ore 0.9-foot thick crops out 8.0 feet below the top of a low rounded ridge which extends at essentially the same elevation perhaps half a mile on each side of the road, north and south. A few rods farther southwest, along a southwest slope, the ore is exposed to a thickness of two feet, in places as one bed, and elsewhere apparently as two beds very close together. The width of the ore belt in the ridge is 330 feet.

c) A quarter of a mile farther southwest, in the lower part of the east side of a flat-topped ridge of roughly the same elevation, large slabs of red micaceous ore, 0.6-foot to 0.8-foot thick,

44

project from the walls of a roadside ravine and form a slight ridge across the road. The maximum overburden is 16.0 feet of gray clay. A little thin ore of a higher bed, is exposed 0.3-mile farther on.

d) Southwest of c) 0.6-mile to 0.8-mile, ellipsoidal masses 0.8-foot thick from two layers show at the surface. The overburden of gray, lignitic, and bluish clay is very light. West of this outcrop thin ore shows here and there, but no bed of consequence in a little less than three miles.

e) Two layers of ore (SE cor., Sec. 24, T. 19 N., R. 9 E.), each about a foot thick, project their rounded "bowlders" from the surface a little below the top of a low rise. One mass from the lower layer was a foot thick and 2.5 feet long. The overburden of several acres is only 15 to 20 feet even for the lower bed. However, the irregular bedding of the containing strata might lead to an overestimate of the quantity of ore at this place.

f) Along Highway 9, south of the intersection with the La-Grange road 1.35 miles, oxide ore 0.8-foot or more thick crops out in the walls of a highway cut and in a nearby abandoned road (northern part, Sec. 27, T. 19 N., R. 10 E.). It is typical of many showings scattered over northern Choctaw County near but outside the territory included in Fields A, S, and T. The county as a whole contains an immense tonnage of ore, but a description of it must be reserved for another paper.

The estimates for the Eupora Field are: mineable area, 1 square mile in Choctaw County; ore obtainable, 1.208,512 long tons.

MISSISSIPPI STATE GEOLOGICAL SURVEY

SUMMARY

Estimates of iron ore tonnage by fields—Webster County and adjoining borders of Montgomery and Choctaw Counties.

		Long tons
А.	The Mathiston and Maben Field	2,500,000
B.	The Cumberland Field	314,364
C.	The Clarkson Field	78,816
D.	The Dancy Field	105,088
E.	The Hohenlinden Field	584,552
F.	The Montevista Field	220,028
G.	The Bellefontaine Field	950,168
H.	The Walthall Field	170,768
I.	The Tomnolen Field	118,224
J.	The Salt Creek Field	288,992
к.	The Sand Creek Field	264,674
L.	The Embry Field	229,880
M.	The Cadaretta Field	394,080
N.	The Middleton Field	1,274,192
О.	The Alva Field	2,889,920
P.	The Sweatman Field	472,896
Q.	The Lodi Field	985,200
R.	The Calabrella Creek Field	570,912
S.	The Stewart Field	2 758,560
Т.	The Eupora Field	1,208,512
	Total	16,379,826

Immediate Release July 20, 1951

MEMORANDUM FOR THE PRESS

IRON ORE

Field study during the last several months, of the iron ore deposits of Webster, Choctaw, Montgomery, and Lafayette Counties, Mississippi, by the Mississippi State Geological Survey and other interested people, has resulted in the discovery of many outcrops not heretofore seen, and a much greater quantity of ore than has heretofore been known to exist. Although the presence in Mississippi of considerable deposits of carbonate and oxide ore has been known for perhaps a century or more, no detailed exploration of the deposits has been attempted until recently. Some forty years ago a little ore was mined in Marshall and Benton Counties and efforts made to establish an industry; but the venture failed, not because of insufficient quantity of ore or poor quality, but chiefly because of lack of mining machinery capable of doing the job economically. However, the present revival of interest in Mississippi iron ore comes at a time when adequate equipment is available. Furthermore, not only has it been found that the total quantity of mineable ore of excellent quality is much greater than it has been believed to be, but that the ore is aggregated locally in larger deposits. The estimates herein, of the quantity in Webster County, including part of northern Choctaw and eastern Montgomery, are based on field work by F. E. Vestal, Geologist, who does not pretend to have reached every acre of the territory or to have found every outcrop. Necessarily the estimates are based on probabilities, as suggested by surface exposures of ore, and may be far from accurate; but a determined effort has been made to keep the error on the conservative side-that is, the estimates are more likely to be too small than too large.

The estimate, 16,379,826 long tons of mineable ore for the territory specified, two-thirds or more of which is in the western part of the County, should be considered only as suggesting the total tonnage present. "Mineable ore", for the purpose of the estimate, means ore under 25 feet or less overburden. Although representing twenty ore "fields" only 25 square miles of actual ore terrane entered into the calculations. Thus it will be seen that

48 MISSISSIPPI STATE GEOLOGICAL SURVEY

1,024 long tons to the acre is the average for the territory. Some areas will produce much more than that; others much less.

The Mississippi State Geological Survey will in the next few months publish a report on the geology and mineral resources of Webster County—a report which will contain a detailed description of the iron ore deposits, including the locations of all the major outcrops.

(Detailed estimates on file at the State Geological Survey Office.)

[Later, it was decided to print the Webster County Iron Ores as a separate Bulletin (73).]

MISSISSIPPI STATE GEOLOGICAL SURVEY WILLIAM CLIFFORD MORSE, DIRECTOR



BULLETIN 73 PLATE 1

