

MISSISSIPPI STATE GEOLOGICAL SURVEY

WILLIAM CLIFFORD MORSE, PhD.
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BULLETIN 74

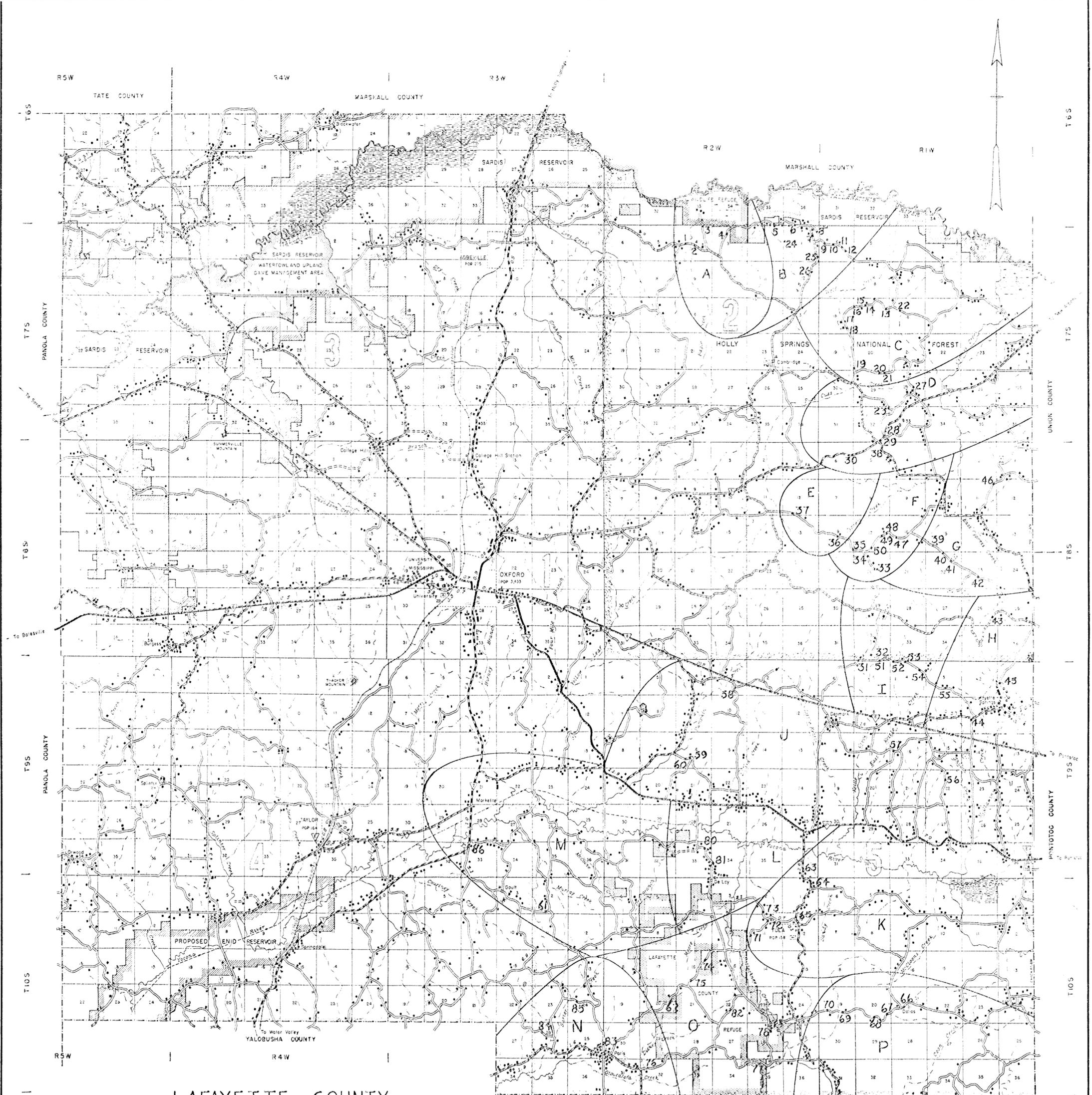
LAFAYETTE COUNTY IRON ORES

By

JAMES SAMUEL ATTAYA, M.S.

UNIVERSITY, MISSISSIPPI

1952

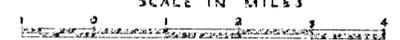


LAFAYETTE COUNTY
IRON ORES

JAMES SAMUEL ATTAYA

MISSISSIPPI STATE GEOLOGICAL SURVEY
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SCALE IN MILES



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LETTER OF TRANSMITTAL

Office of the Mississippi Geological Survey
University, Mississippi
February 29, 1952

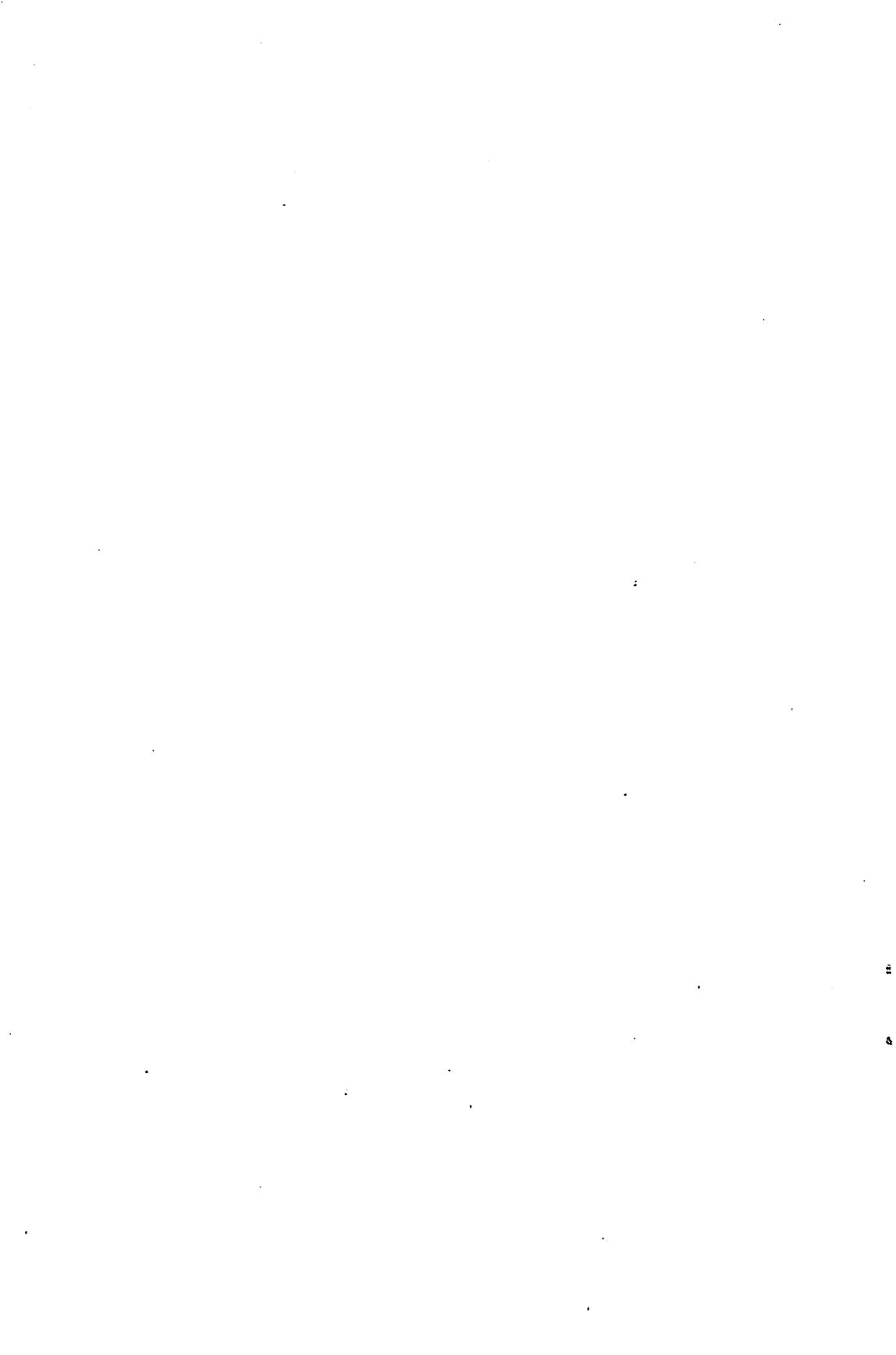
To His Excellency,
Governor Hugh Lawson White, Chairman, and
Members of the Geological Commission

Gentlemen:

Herewith is Bulletin 74, Lafayette County Iron Ores, by James Samuel Attaya. It has been prepared to meet the further demand for information on the amount of iron ore available in the various counties of Mississippi. In Lafayette County the mineable ore has been conservatively estimated at 6,401,872 long tons.

Very Sincerely yours,

William Clifford Morse,
Director and State Geologist



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LAFAYETTE COUNTY IRON ORES

JAMES SAMUEL ATTAYA, M.S.

INTRODUCTION

At the present rate of consumption, the major deposits of iron ore in the United States will yield less and less with each passing year. Already several of the major steel corporations are spending hundreds of millions of dollars in Latin America and elsewhere to develop iron ore deposits to bolster, and eventually to replace, the fast dwindling supplies of the United States. It, therefore, becomes necessary to take an inventory of the smaller ore deposits of this country to determine whether or not they are usable under existing economic conditions. Mississippi has some of these smaller deposits.

DESCRIPTION AND GEOLOGIC DISTRIBUTION

The ores of Lafayette County are similar in every respect to the ores of Webster County.

“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 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.”

The oxide ores, limonite ($2\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$) and hematite (Fe_2O_3), are the most abundant. Siderite (FeCO_3) is the least abundant of the three ores present in the county, although the nature of the oxides suggests their origin from carbonate ore. With the exception of a very few “beds” of hematite, the ore masses commonly have an outer concentric shell of limonite and a core of hematite. Less Commonly, but nevertheless in many instances, the mass

¹Vestal, Franklin Earl, Webster County Iron Ores; Miss. Geol. Survey Bull. 73, pp. 7-8, 1951.

consists of a core of carbonate ore, an intermediate shell of hematite, and an outermost concentric shell of limonite. From this order, it is easy to surmise that the ore was originally all carbonate, but that oxidation has progressed to the stage that practically all the carbonate has been altered. This type of ore is generally dense and massive, having few or no macroscopic voids. On the other hand, some of the limonite ore is very cavernous and honeycombed, having practically no siderite or hematite in it. Nearly all this "pure" limonite is in the form of irregular bodies defined by flat surfaces, in contradistinction to the curved-surface forms of the altered siderite ore. Possibly the honeycombed ore formed as limonite originally, without having gone through the process of oxidation just described.

Still another type of ore is the hematite "beds" that are practically barren of siderite and limonite. These bodies are somewhat more granular than the hematite and limonite formed from the oxidation of siderite. In addition, the type tends more toward concretionary masses. This difference in texture and in body shape implies that the ore is in its original, unaltered state. It must be stated here that beds of hematite are few in Lafayette County, and the tonnage estimates are based on the specific gravity of limonite, as it composes the bulk of the ore.

The iron ores of Lafayette County are confined to the Ackerman formation which crops out in a belt 7 to 10 miles wide extending the entire length of the county north and south.

The areas of greatest indications of ore are in the hills south of the Tallahatchie River in the extreme northeastern part of the county, and in the hills south of the Yocona River in the southeast corner of the county. In fact, all of the ore of any consequence is in Range 1 West, and the extreme northern and southern portions of Range 2 West.

ORE FIELDS AND TONNAGE ESTIMATES

For the purpose of convenience and simplicity, the system of designating ore concentrations in Webster County is also used herein, except for a minor modification. Ore fields are designated by capital letters and by name, as in Bulletin 73, but the outcrops are numbered instead of lettered. This modification is used to allow the individual beds of ore in each outcrop to be lettered

so that correlation of beds from one outcrop to another and from one field to another may be attempted. In this manner the persistence of the beds can be suggested to some degree.

Most of the ore outcrops in Lafayette County, as in all Mississippi, consist of discontinuous masses, of which the distorted ellipsoid is the most common. Obviously then, the volume of an ellipsoid is a major factor in computing tonnage of ore (see Summary for details).

The mineable acreage is determined by the amount of overburden which can be removed economically, and this in turn, is determined by the aggregate thickness of the ore "beds."

The specific gravity of the ore is 3.1. This figure is considerably lower than that for pure limonite (3.6 to 4.0 or for hematite (about 5.26). This figure was determined by specific gravity tests that allowed for void space (porosity) within the ore.

A. BAGLEY CREEK FIELD

No. 1. In the west valley wall of Bagley Creek (NE 1/4, SW. 1/4, Sec. 4, T. 7 S., R. 2 W.) 0.3 foot of "cellular" limonite is exposed. Because of excessive overburden and discontinuity, this bed is not of commercial value.

No. 2 In the east valley wall of Bagley Creek (NW. 1/4, SE. 1/4, Sec. 4, T. 7 S., R. 2 W.) are exposed five "beds" of ore which are designated a, b, c, d, and e in order from oldest to youngest. Bed a, 0.3 foot thick, is overlain by clay; Beds b, c, and d, each 1.0 foot in thickness, are separated by about 3.0 feet of clay; and Bed e, 0.3 foot thick, is subjacent to the thin overburden. Bed e is probably the same as that in the west wall of the creek.

No. 3. Near the level of the Tallahatchie flood plain and 0.5 mile northeast of Outcrop 2, beds of limonite ore (NE 1/4, Sec. 4, T. 7 S., R. 2 W.) correlative with Outcrop 2 are at the surface.

No. 4. Still farther to the east (NW. 1/4, NE. 1/4, Sec. 3, T. 7 S., R. 2 W.), along the main gravel road, two beds of ore, each 0.7 foot in thickness, crop out. These beds are also represented in Outcrops 2 and 3.

Inasmuch as Outcrops 1, 2, 3, and 4 are connected with each other by one or more beds whose extent can be conveniently

terminated up and down dip, these outcrops constitute a field. By averaging thicknesses and allowing for overburden 80 acres are considered workable in this field, with a total yield of 168,032 long tons. This estimate allows an average of 2,100 long tons an acre, which conforms very well with actual production an acre in Webster County.

B. RIVERSIDE CHURCH FIELD

No. 5. About 0.5 mile west (SE. 1/4, SE. 1/4, SE. 1/4, Sec. 35, T. 6 S., R. 2 W.) of Riverside Church on the Rocky Ford Road is an exposure of three thick beds of limonite ore. These beds are porous and granular and seemingly highly weathered. They are designated a, b, and c in ascending order of position. Bed a is 1.2 feet thick and is separated from Bed b by 1.0 foot of silt; Bed b is 2.0 feet thick and is separated from Bed c by not more than 5 feet of silty clay. Both beds are continuous across the road and for several yards on either side. Bed c is an ellipsoidal mass 2.0 feet in maximum thickness, and is 6.0 feet long. It is probably well developed under the hill.

No. 6. About 200 yards west of Riverside Church (SW. 1/4, SE. 1/4, SW. 1/4, Sec. 36, T. 7 S., R. 2 W.) two beds of ore crop out in the west valley wall of a small stream. These beds are granular and porous, much like those in exposure 5. Bed a is 1.0 foot thick and Bed b is 1.5 feet thick.

No. 24 Several outcrops of limonite (SW. 1/4, NW. 1/4, Sec. 1, T. 7 S., R. 2 W.) are present 1.3 miles along the ridge southwest of Riverside Church. The beds (two) are most likely stratigraphically higher than those of 5 and 6 and probably neither exceeds 1.0 foot in thickness.

No. 7. About 0.5 mile southeast (SW. 1/4, NE. 1/4, Sec. 1, T. 7 S., R. 2 W.) of Riverside Church four "beds" of limonite ore are exposed. Bed a is represented by an ellipsoidal mass 1.0 foot in maximum thickness; Bed b, 5.0 feet higher, is 0.7 foot thick; Bed c, in position 5.0 feet above Bed b, is 0.4 foot in thickness; and Bed d, not more than 5 feet above Bed c, is 1.0 foot thick. All these "beds" are represented by ellipsoidal or pillow-shaped masses.

No. 8. This exposure (NE. 1/4, NE. 1/4, Sec. 1, T. 7 S., R. 2 W.) about 0.3 mile east of 7, shows the lowest bed of 7.

No. 9. This exposure is of a sandy bed of ore 0.5 foot thick, on the Rocky Ford Road (SW. 1/4, NW. 1/4, Sec. 6, T. 7 S., R. 1 W.). Because of its thinness and its poor quality, the bed is not considered to be of commercial value.

No. 10. About 0.2 mile east of Outcrop 9, are two very good beds of limonite (Near center, Sec. 6, T. 7 S., R. 1 W.) on the north side of the road. Bed a is 1.6 feet thick, and Bed b, 3.0 feet above, is 1.8 feet thick; both beds are fairly continuous. These two beds of ore are covered by less than 10 feet of overburden. Drainage is very good.

No. 11. Approximately 0.3 mile east (NW. 1/4, SE 1/4, Sec. 6, T. 7 S., R. 1 W.) of 10, lenticular masses of limonite 0.7 foot in thickness crop out in the roadcut. This bed is probably the same as Bed b of outcrop 7.

No. 12. Farther southeast, 0.2 mile from 11, and about 30 feet higher, are masses of oxide ore 0.5 foot to 2.0 feet in thickness (Near center, Sec. 6, T. 7 S., R. 1 W.). This bed is probably the same as Bed d of Outcrop 7.

No. 25. About 1.0 mile southeast of Riverside Church on the north-south gravel road (SE. 1/4, SE. 1/4, Sec. 1, T. 7 S., R. 2 W.) a single bed of limonite 1.0 to 1.5 feet thick is exposed for a distance of 20 yards. This bed is probably the same as one of those in Exposure 24, and thus would be continuous below the crest of the ridge.

No. 26. At this locality (NE. 1/4, Sec. 12, T. 7 S., R. 2 W.), 0.5 mile southwest of 25, two zones of scattered limonite concretions 0.5 foot in thickness are at the surface. Because the overburden is very thin, and because the thickness of ore probably increases under cover, this small area might prove workable.

For the entire Riverside Church Field, the estimate is 1,738,030 long tons as estimated from the beds severally.

C. LIBERTY CEMETERY FIELD

No. 22. Just in front of the Liberty Hill High School (C., NW. 1/4, Sec. 16, T. 7 S., R. 1 W.) are lenticular masses of ore 0.6 foot thick. Although the ore is thin, the overburden is less than 5 feet and drainage is excellent.

No. 13. Half a mile west of 22, and just north of Liberty Cemetery (SW. 1/4, NE. 1/4, NE. 1/4, Sec. 17, T. 7 S., R. 1 W.) a well-developed zone of limonite masses 1.3 feet in thickness is exposed in the roadcut. In the immediate area, relief is great, but the advantage of dumping off the slopes and also of excellent drainage make the site favorable. This bed probably lies 10 to 15 feet higher than that of 22.

No. 14. Near the head of a tributary branch of Wolf Creek (NW. 1/4, Sec. 17, T. 7 S., R. 1 W.) two zones of ore crop out beside the road. Bed a consists of poorly developed masses of limonite 0.5 foot in thickness. Bed b, also 0.5 foot in thickness, is better developed than is Bed a. Acreage is large and drainage is very good.

No. 15. About 0.2 mile west of 14 (NW. 1/4, NW. 1/4, Sec. 17, T. 7 S., R. 1 W.) a bed of limonite masses 0.7 foot in thickness probably represents Bed b of 14. Here, too, drainage and overburden are favorable.

No. 16. Still farther west (NW. 1/4, NW. 1/4, Sec. 17, T. 7 S., R. 1 W.) 0.2 mile from 15, a rather earthy zone of limonite 0.8 foot in thickness is exposed beside the road. Although this material itself is not of high quality, it probably becomes better under the overburden. It lies about 20 feet, stratigraphically, above the bed in 15.

Nos. 17 and 18. The outcrops of ore in this area (Secs. 17, 18, 19, 20, T. 7 S., R. 1 W.) are the best in the county. The writer has not been able to determine definitely the exact number of beds, but the existence of seven different zones or beds is known. In front of a church and cemetery (SE. 1/4, SE. 1/4, Sec. 18, T. 7 S., R. 1 W.) six beds are exposed in the slope. Bed a is a poorly developed zone of limonite concretions 0.3 foot in thickness embedded in gray plastic clay; Bed b, 19.0 feet above Bed a, is ellipsoidal masses of limonite 0.6 foot in thickness; and Bed c, 22.0 feet above Bed b, is a fairly continuous mass of hematite 1.5 feet thick. Bed c is exposed at a number of places south along the strike. Bed d, 6.0 feet above Bed c, constitutes a well-developed zone of limonite masses 1.0 foot in thickness; Bed e, 24.0 feet above Bed d, is represented by limonite masses 0.4 foot thick; and Bed f, 6.0 feet above Bed e, is a well-developed zone of limonite masses 1.5 feet in thickness. Bed g, about 5 feet higher than Bed f and

about 1.0 foot thick, is exposed about a mile east of the church on a ridge road in Section 20. For several hundred feet along the ridge road in this section, the ground is more or less paved with huge masses of ore. In the geologic reconnaissance survey of the county, this area was mapped as Meridian.¹ The error was made because the elevation of the ridge of Outcrops 17 and 18 was greater than the elevation of the Ackerman-Meridian contact at Spring Hill School, which is 3.5 miles farther east. At Spring Hill School, the contact is approximately 400 feet, whereas the elevation of this particular ridge is a maximum of 500 feet, but nevertheless the ridge is Ackerman clay from bottom to top. These elevation differences further substantiate the presence of structure along Cypress Creek and Woodson Ridge.

No. 19. About 1.0 mile south (Cors. Secs. 19, 20, 29, 30, T. 7 S., R. 1 W.) of the church mentioned in 17 and 18, is another excellent exposure. Roughly 100 yards west of the road a 0.5-foot thickness of limonite crops out. In the roadside ditch an almost continuous bed of limonite masses 1.3 feet thick give indication of heavy ore under the hill. Drainage and acreage are very favorable.

No. 20. East of 19, about 0.7 mile, (NW. 1/4, NE. 1/4, Sec. 29, T. 7 S., R. 1 W.) in the roadside ditch, a large kidney-shaped mass of limonite lies near the base of a clay section which is underlain by fine silty yellow sand. Although this mass is more than 1.0 foot in thickness, the zone is likely to be poorly developed because of its close association with sand. Above this zone by 13.0 feet is a 0.5-foot bed of limonite, seemingly well developed. Drainage is good. Adequate acreage would depend on the presence of other beds not exposed.

No. 21. About 0.2 mile east of 20, numerous masses of limonite 1.8 feet in thickness (NE. 1/4, NE. 1/4, Sec. 29, T. 7 S., R. 1 W.) probably represents the lower bed of 19 and 20. If this relation exists, a large area for mining could be counted on in Section 20.

For the whole field, a tonnage estimate of 679,140 long tons of ore should be conservative.

¹Attaya, James Samuel, Lafayette County Geology. Miss. Geol. Survey Bull. 71, Plate 2, 1951.

D. PHILADELPHIA SCHOOL FIELD

No. 27. About 0.3 mile northeast of Caswell School (NE. 1/4, NW. 1/4, SE. 1/4, Sec. 28, T. 7 S., R. 1 W.) just above flood-plain level of Puskus Creek, three poorly developed beds of limonite masses, each bed 0.5 foot thick, are exposed beside a farm house. Drainage is excellent but acreage is small.

No. 23. Approximately midway between Mississippi Highway 30 and Puskus Creek, north of Philadelphia School (NE. 1/4, NE. 1/4, NE. 1/4, Sec. 32, T. 7 S., R. 1 W.), and directly in front of a farm house, numerous large blocks of oxide ore have slumped and washed down the hill to the extent that the number of beds could not be determined. Nevertheless, an aggregate thickness of 2.0 feet of ore can be conservatively estimated.

No. 28. Just northeast of the intersection of the Philadelphia School road and Highway 30, a 0.7-foot-thick mass of limonite is exposed in the highway cut (SE. 1/4, Sec. 32, T. 7 S., R. 1 W.). This bed is seemingly poorly developed.

No. 29. The same bed as shows at 28 (same general location).

No. 30. About 1.0 mile southwest of 28 and 29, two beds of oxide ore 1.5 feet thick are exposed in a cut of Highway 30 (SE. 1/4, NE. 1/4, Sec. 6, T. 8 S., R. 1 W.). These beds, separated by 4.0 feet of clay, are probably at the same stratigraphic position as Bed f at 17 and 18. Acreage is small, but drainage is excellent.

No. 38. South 0.2 mile of Highway 30 on the Philadelphia School road, an 0.8-foot bed of limonite crops out (NE. 1/4, Sec. 5, T. 8 S., R. 1 W.). It seems well situated for mining.

For the entire field 98,030 long tons of ore are estimated.

E. WEST CYPRESS CREEK FIELD

No. 36. About 0.5 mile west of West Cypress Creek (C., Sec. 18, T. 8 S., R. 1 W.) is an excellent exposure of five different zones of ore. Bed a is represented by limonite concretions 1.5 feet in thickness; Bed b, 16.0 feet above Bed a, is a well-developed zone of limonite masses 1.2 feet in thickness; Bed c, 7.0 feet above Bed b, is composed of nodular masses 1.6 feet thick; Bed d, 11.0 feet above Bed c, is a continuous ledge of limonite 0.8 foot thick; Bed e, 11.0 feet above Bed d, is another 0.8-foot-thick continuous ledge. Although the ore at this outcrop is comparable to that at any

other place in the county, the total available tonnage will be considerably less, comparatively, than that at some other places, due to the excessive overburden on the crest of the ridge.

No. 37. Approximately 1.8 miles northwest of 36 (C., S. 1/2, SW. 1/4, Sec. 12, T. 8 S., R. 2 W.) seemingly the same beds crop out on the opposite side of the ridge from 36. Because the relief is considerably less on the west side of the ridge than it is on the east, the number of beds could not be determined; but inasmuch as two or three were observable, all five shall be considered as being present.

For the entire field, 1,213,960 long tons of ore are estimated. Unless the various beds become excessively thin or are even absent, this estimate should not be too high.

F. DENMARK FIRETOWER FIELD

No. 33. North of Denmark Firetower 0.8 mile (SW. 1/4, SW. 1/4, NE. 1/4, Sec. 20, T. 8 S., R. 1 W.) a bed of oxide ore 1.4 feet in thickness crops out on the crest of the ridge. This bed is possibly continuous beneath the crest of the ridge which, unfortunately, is relatively narrow.

No. 34. Roughly 0.3 mile northwest (NE. 1/4, NW. 1/4, Sec. 20, T. 8 S., R. 1 W.) of 33 is exposed a bed of limonite masses 1.0 foot thick. The bed is seemingly well developed, but here too acreage is small at the top of the hill.

No. 35. A bed of hematite 1.4 feet in thickness is present 0.3 mile east of West Cypress Creek (SW. 1/4, SW. 1/4, SW. 1/4, Sec. 17, T. 8 S., R. 1 W.) and about 0.4 mile northwesterly from 34. This bed is situated at an elevation which will allow considerable mining area. Possibly it is also represented at 17 by the Bed c which is 1.5 feet thick, at the same elevation, and exactly due north (on strike) from 35. This fact strengthens the probability that many of these seemingly isolated outcrops of ore are more or less continuations of a few persistent beds.

No. 47. Approximately 1.0 mile southwest of Spring Hill School (N. 1/2, SW. 1/4, SW. 1/4, Sec. 16, T. 8 S., R. 1 W.) is an exposure of four beds of limonite. Bed a is 0.8 foot in thickness; Bed b, approximately 5 feet above, is limonite masses 1.2 feet thick; Bed c, 5.0 feet above Bed b, consists of limonite masses

0.8 foot in thickness; and Bed d, 5.0 feet above Bed c, is 2.0 feet thick. All these beds are seemingly well developed and are situated favorably for mining.

No. 48. West of 47, 0.4 mile (N. 1/2, NE. 1/4, SE. 1/4, Sec. 17, T. 8 S., R. 1 W.) a 0.5-foot bed of limonite crops out on the crown of a hill. Due to its topographic position, however, the bed is very small in area.

No. 49. West of 48, 0.2 mile (NW. 1/4, SE. 1/4, Sec. 17, T. 8 S., R. 1 W.) a well-developed bed of limonite 1.2 feet in thickness is exposed. This bed is comparable to Bed b of 47 except that it is higher than that bed should be at this location. On the other hand, the bed at 48 is higher than the bed of 49 and could thus be correlative with Bed c of 47. The reasons for making note of these possible stratigraphic relationships are: 1) If they are as suggested, they would sizably reduce the productive area of the ore; and 2) they would indicate a reverse dip to the east of 65 feet in less than 0.5 mile. Nevertheless, the tonnage will be computed as though the beds were not disturbed.

No. 50. Southwest of 49 about 0.5 mile (SE. 1/4, SE. 1/4, SW. 1/4, Sec. 17, T. 8 S., R. 1 W.) a bed of limonite 1.2 feet in thickness crops out. This bed is the same as the 1.0-foot bed at 34, 0.2 mile to the south.

The estimate for the Denmark Firetower Field is 670,668 long tons.

G. LIBERTY HILL CEMETERY FIELD

No. 39 About 0.2 mile east of Cypress Creek (SW. 1/4, SW. 1/4, Sec. 15, T. 8 S., R. 1 W.) a poorly developed bed of limonite 0.3 foot thick crops out in the road. Although this bed is hardly thick enough to warrant mention, it might be indicative of thicker unexposed beds.

No. 40. Northeast, 0.5 mile of Liberty Hill Cemetery (NE. 1/4, NW. 1/4, Sec. 22, T. 8 S., R. 1 W.) several scattered masses of limonite 0.7 foot in thickness are exposed beside the road. This outcrop, as does 39, suggests the presence of thicker unexposed ore.

No. 41. Approximately 0.2 mile west of Liberty Hill Cemetery (W. 1/2, NE. 1/4, Sec. 22, T. 8 S., R. 1 W.) is a poorly developed bed of limonite 0.5 foot thick.

No. 42. Seven-tenths mile southeast of the cemetery (NE. 1/4, SW. 1/4, Sec. 23, T. 8 S., R. 1 W.) a bed of silty limonite 0.9 foot in thickness crops out near the crest of the hill.

No. 43 This exposure is located near the head of East Cypress Creek (SE. 1/4, SE. 1/4, Sec. 26, T. 8 S., R. 1 W.). The bed is 0.8 foot thick and is fairly well developed. Because of its topographic position, its location almost along the strike, and its comparable thickness, this bed is believed to be the same as that represented at 42.

No. 46. Because the bed at this outcrop is completely isolated, poorly developed, and is in material unfavorable to the formation of considerable quantities of ore, it has been given mention here only as a matter of record. The ore is in a roadcut 1.0 mile northeast of Windham School (NE. 1/4, NE. 1/4, Sec. 11, T. 8 S., R. 1 W.).

For the entire field, 37,944 long tons of ore are estimated. This figure is probably very conservative, but actual mining only can prove the existence of more ore.

H. LAFAYETTE SPRINGS FIELD

No. 45. Approximately 0.7 mile north of Lafayette Springs (NW. 1/4, SW. 1/4, Sec. 1, T. 9 S., R. 1 W.) a 1.0-foot bed of limonite crops out on the crest of the ridge. Acreage is small due to the topographic position of the bed.

No. 44. A mile or so west of Lafayette Springs (SE. 1/4, SW. 1/4, NW. 1/4, Sec. 11, T. 9 S., R. 1 W.) at an old road intersection is a fairly good bed of limonite concretions 1.0 foot in thickness. This bed is probably the same as that at 45 inasmuch as it is almost a mile farther west and 20 feet lower than the bed at 45. Acreage is very small around the outcrop, due to topography.

No. 55. About 0.6 mile east of East Kettle Creek (NE. 1/4, SW. 1/4, Sec. 3, T. 9 S., R. 1 W.) is an exposure of limonite 1.2 feet in thickness. This bed has possibility, inasmuch as it probably underlies several acres.

For the entire field, 221,480 long tons of ore should be a conservative estimate.

I. DENMARK SCHOOL FIELD

No. 54. Just west of Denmark School (SE. 1/4, NW. 1/4, NE. 1/4, Sec. 4, T. 9 S., R. 1 W.) a 1.4-foot bed of limonite is exposed in the roadcut. The bed is seemingly well developed and is situated favorably for mining.

No. 53. Northwest 0.5 mile of 54 (NE. 1/4, NE. 1/4, NW. 1/4, Sec. 4, T. 9 S., R. 1 W.) at the top of the hill is a bed of limonite masses 1.0 foot thick. Because of the topographic position of the bed, however, the acreage is very small.



Figure 1.—Bed of limonite 1.0 foot thick, Denmark School Field (NW. 1/4, NW. 1/4, Sec. 5, T. 9 S., R. 1 W.). January 19, 1952.

No. 52. On a west prong of East Kettle Creek (NW. 1/4, NW. 1/4, NW. 1/4, Sec. 4, T. 9 S., R. 1 W.) two beds of limonite are exposed. The lower bed is 1.8 feet thick and excellently located. The upper bed is 1.0 foot thick. Both beds are well developed.

No. 51. This exposure (Southern part, SE. 1/4, Sec. 32, T. 8 S., R. 1 W.) is about 0.3 mile west of 52. The ore here is 1.8 feet thick and is most likely the same as the lower bed of 52.

No. 32. About 1.6 miles north of Highway 6 on Kettle Creek (SE. 1/4, SE. 1/4, SW. 1/4, Sec. 32, T. 8 S., R. 1 W.) is an excellent bed of hematite 1.7 feet thick. This same bed is represented at 17 by Bed c; and also at 35, 52, and 51. It seems then, that the bed could be counted on as being practically continuous half the length of the county.

No. 31. About 0.3 mile west of 32 (NW. 1/4, NW. 1/4, Sec. 5, T. 9 S., R. 1 W.) in a sharp curve of the road, a 1.0-foot bed of limonite (Figure 1) is exposed. The bed is well developed, and is well situated topographically for mining.

For the Denmark School Field, 555,660 long tons of mineable ore are estimated.

J. DENMARK FIELD

No. 56. Near the heads of Wildcat Creek and Shiloh Creek, 3.6 miles southeast of Denmark (C., N. 1/2, Sec. 22, T. 9 S., R. 1 W.), is a bed of limonite 0.7 foot thick. Being near the top of a flat ridge, the bed is suitably located for mining.

No. 57. Southeast of Denmark about 2.0 miles (SW. 1/4, NW. 1/4, Sec. 16, T. 9 S., R. 1 W.) pieces of platy iron colluvium may indicate the presence of the same bed (56).

No. 58. Just south of Highway 6 and east of Pumpkin Creek (SW. 1/4, SE. 1/4, Sec. 3, T. 9 S., R. 2 W.) is a good development of oxide masses 1.0 foot in thickness. Acreage is small here due to excessive overburden.

No. 59. North of Yocona High School 1.3 miles (SW. 1/4, NE. 1/4, SW. 1/4, Sec. 16, T. 9 S., R. 2 W.), near a road junction is a 0.6-foot bed of limonite masses. The ore is seemingly very scattered.

No. 60. About 100 yards west of 59 and about 20 feet lower is a ledge of limonite 0.8 foot thick.

Two conditions in this field prevent a high estimate of ore. The first is that the topographic elevations are less than those of most of the adjoining fields, meaning that much of the ore has been removed by erosion. The second condition is that the relief is so low in most places that outcrops are obscured under deeply weathered material.

For the Denmark Field, 148,960 long tons are estimated.

K. TULA FIELD

No. 63. On the road from Tula north to Old Highway 6 (SW. 1/4, SE. 1/4, Sec. 36, T. 9 S., R. 2 W.) is a cut exposing ore masses 0.45 foot thick. The ore is in very irregularly bedded silt and clay, and for that reason is probably not persistent.

No. 64. Half a mile nearer Tula (NE. 1/4, Sec. 1, T. 10 S., R. 2 W.), a relatively continuous bed of silty limonite 1.0 foot thick crops out in the road and around the contour of the hill east of the road. Although the material seems poor in quality at the surface, it may be better where unweathered.

No. 65. In the center of Tula, (NW. 1/4, Sec. 12, T. 10 S., R. 2 W.) and just beyond the corporate limits, north on the main road and east on a branch road, are outcrops of good oxide ore. A fairly continuous bed 1.0 foot thick underlies the village. The



Figure 2.—Outcrop of iron ore, 2.0-foot bed (upper), Tula Field (No. 73—SE. 1/4, SW. 1/4, Sec. 2, T. 10 S., R. 2 W.) about 0.3 miles west of Tula. January 19, 1952.

value of the ore, however, would not justify the property damage in mining it, so only that acreage beyond the town boundary is considered mineable.

No. 71. About 0.6 mile southwest of a road fork at the western edge of Tula (NW. 1/4, SW. 1/4, Sec. 11, T. 10 S., R. 2 W.), two beds of ore are exposed. The lower bed, 1.0 foot thick, is well developed and probably fairly persistent. The upper bed is 1.5 feet thick, but is small in acreage due to being higher on the ridge.

No. 72. Just beyond the western edge of Tula (NW. 1/4, NE. 1/4, Sec. 11, T. 10 S., R. 2 W.) is an exposure of oxide ore 2.0 feet in thickness.

No. 73. Northwest of 72 about 0.3 mile (SE. 1/4, SW. 1/4, Sec. 2, T. 10 S., R. 2 W.) are two beds of oxide ore each about 2.0 feet thick (Figure 2). This thickness of ore for two beds is unusual in Lafayette County.

For the entire field, 319,965 long tons are estimated.

L. DeLAY FIELD

No. 80. A mile north of DeLay (NE. 1/4, NE. 1/4, Sec. 33, T. 9 S., R. 2 W.), two beds of limonite crop out in the road. Bed a is 1.0 foot thick; Bed b, 3.0 feet above, is 0.8 foot thick. Both beds probably are persistent.

No. 81. North of DeLay 0.5 mile (NW. 1/4, SW. 1/4, Sec. 34, T. 9 S., R. 2 W.), several different zones of ore masses are exposed. Some of these masses are large, but they should not be depended on for much ore due to the extremely high angle of dip of the beds.

The mineable ore in the DeLay Field is considered to be 35,280 long tons.

M. MARKETTE FIELD

No. 61. Southeast of Gault 1.3 miles (SE. 1/4, SW. 1/4, Sec. 2, T. 10 S., R. 3 W.) an 0.8-foot bed of limonite shows beside the road. Overburden is considerable but contour mining would yield a sizable quantity of ore.

No. 86. On the east side of Highway 7 opposite the Oxford Airport, (NW. 1/4, Sec. 33, T. 9 S., R. 3 W.), and south along the gravel road, several discontinuous beds of limonite and siderite crop out in the roadcuts. Because these beds are so irregular in thicknesses and extent, a single bed 0.8 foot thick is considered closely representative of the mineable ore, for estimate purposes.

For the Markette Field, 39,200 long tons are estimated.

N. PARIS FIELD

No. 76. Southeasterly from Paris 1.3 miles (C., NW. 1/4, Sec. 32, T. 10 S., R. 2 W.), three beds of limonite are exposed in a roadcut. Bed a and Bed b, each 1.0 foot thick, are separated by a few feet of clay; Bed c, nearer the crest of the ridge, is 0.7 foot thick.

No. 83. North of Paris 0.3 mile (SW. 1/4, Sec. 30, T. 10 S., R. 2 W. and SE. 1/4, Sec. 25, T. 10 S., R. 3 W.) are two beds of carbonate ore that seem to merge into a single bed 1.0 foot in thickness.

No. 84. A bed of limonite 0.9 foot thick crops out on a road 1.8 miles northwest of Paris (C., NW. 1/4, Sec. 26, T. 10 S., R. 3 W.). Acreage is small, due to excessive overburden.

No. 85. In the east valley wall of Sarter Creek (SW. 1/4, SE. 1/4, NW. 1/4, Sec. 24, T. 10 S., R. 3 W.) is exposed a bed of limonite 0.7 foot thick. Because of excessive overburden, only a small area is mineable.

The Paris Field contains at least 51,548 long tons of mineable ore.



Figure 3.—Bed of oxide ore 2.0 to 3.0 feet thick, Potlockney Creek Field (No. 79—NW. 1/4, NE. 1/4, Sec. 26, T. 10 S., R. 2 W.) near Potlockney Creek. January 19, 1952.

O. POTLOCKNEY CREEK FIELD

No. 62. Northeast of Paris 2.3 miles (SW. 1/4, SE. 1/4, NE. 1/4, Sec. 20, T. 10 S., R. 2 W.) a bed of oxide ore 0.6 foot thick crops out in the road.

No. 74. Southwest of Tula 2.3 miles on the Tula-Paris road (C., NE. 1/4, Sec. 16, T. 10 S., R. 2 W.) two beds of oxide ore are at the surface. Both beds are 0.8 foot thick, but the upper bed underlies only about 1.5 acres, as it is near the crest of the ridge.

No. 75. Three-fourths mile southwest of 74 and north of a road junction (SE. 1/4, SW. 1/4, Sec. 16, T. 10 S., R. 2 W.) a bed of silty limonite 1.4 feet thick is exposed in the road. This bed is probably of better quality under the overburden.

No. 77. About 0.8 mile north of the Calhoun County line (NE. 1/4, NW. 1/4, Sec. 35, T. 10 S., R. 2 W.) and about 100 yards south of the road, a ledge of oxide ore 0.8 foot thick crops out near the base of a rise.

No. 78. About 0.8 mile westerly from the settlement of Potlockney near the top of a hill (NW. 1/4, NE. 1/4, Sec. 26, T. 10 S., R. 2 W.) on the north-south road, three beds of ore are exposed. Bed a is 1.0 foot thick; Bed b 1.5 feet thick; and Bed c, 1.0 foot thick. Unfortunately, less than an acre contains ore here due to the location of the beds at the top of the hill.

No. 79. About 300 yards north of 78, at the road junction, (same general location as 78) two excellent beds of oxide ore (Figure 3) extend across the road. The lower bed averages about 2.0 feet in thickness even though it is 3.0 feet thick in places. The upper bed is about 1.2 feet in thickness.

No. 82. Along a side road 0.5 mile southwest of the DeLay-Potlockney road (NW. 1/4, SE. 1/4, Sec. 22, T. 10 S., R. 2 W.) two good beds of oxide ore crop out on the side of the hill and in the road. The lower bed, 2.0 feet thick, is well developed. The other bed, 20.0 feet above, is 1.5 feet thick.

For the Potlockney Creek Field, 332,835 long tons are estimated.

P. DALLAS FIELD

No. 66. Where the village of Dallas once stood (NE. 1/4, NE. 1/4, SW. 1/4, Sec. 21, T. 10 S., R. 1 W.), four different beds of ore are exposed, about 75 to 100 yards east of the road junction. Inasmuch as these beds are of variable thicknesses and are seemingly discontinuous within short distances, it is estimated that a single bed 1.0 foot in thickness would nearly approximate the ore present.

No. 67. Half a mile west of Dallas (SE. 1/4, SE. 1/4, Sec. 20, T. 10 S., R. 1 W.) a single bed of oxide ore 1.0 foot thick crops out beside the road. Acreage is small.

No. 68. Almost half a mile west (C., S. 1/2, Sec. 20, T. 10 S., R. 1 W.) of 67 and about a mile west of Dallas, a 0.7-foot bed of oxide is exposed beside the road.

No. 69. A little more than a mile east of Potlockney (NW. 1/4, SE. 1/4, Sec. 19, T. 10 S., R. 1 W.) in the east valley wall of a stream, a well-developed bed of limonite 1.0 foot thick crops out. This bed should underlie a considerable area with relatively thin overburden.

No. 70. West of 69 about 0.5 mile (NW. 1/4, SW. 1/4, Sec. 19, T. 10 S., R. 1 W.), a well-developed bed of limonite masses 0.8 foot thick shows in the road. Acreage should be large.

For the Dallas Field, 91,140 long tons are estimated.

SUMMARY

Estimates of tonnage by fields for Lafayette County.

	Long tons
A. Bagley Creek Field.....	168,032
B. Riverside Church Field	1,738,030
C. Liberty Cemetery Field.....	679,140
D. Philadelphia School Field.....	98,030
E. West Cypress Creek Field.....	1,213,960
F. Denmark Firetower Field.....	670,668
G. Liberty Hill Cemetery Field	37,944
H. Lafayette Springs Field.....	221,430
I. Denmark School Field	555,660
J. Denmark Field.....	148,960
K. Tula Field.....	319,955
L. DeLay Field.....	35,230
M. Markette Field	39,200
N. Paris Field.....	51,548
O. Potlockney Creek Field	332,835
P. Dallas Field.....	91,140
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Total	6,401,872

FORMULAE AND ARBITRARY FACTORS

As stated under Ore Fields and Tonnage Estimates, the ellipsoidal mass was selected to represent the shape of the unit in the ore bodies. Then,

$$\frac{V_e}{V_p} = \frac{4/3\pi a b c}{8 a b c} = \frac{4\pi}{24} = \text{roughly } 1/2$$

V_e = Volume of an ellipsoid

V_p = Volume of a circumscribing prism

a = half the length of an ellipsoidal mass

b = half the width of the mass

c = half the thickness

Since the masses are never numerous enough to occupy all the space available, and since partly continuous beds are in some places present, a factor of two-thirds (2/3) was selected as an average for concentration of the masses. Then, $2/3 \times 1/2 = 1/3$ of the possible volume actually remains as iron ore.

Because these ellipsoidal masses are commonly honeycombed and cavernous, it was considered advisable to subtract one-twelfth (1/12) of this volume of iron ore as being relatively large hollows. This brings the final factor to one-fourth (1/4) the volume of a continuous bed having the same thickness as an ellipsoidal mass.

By actual tests, the bulk specific gravity of the ore was determined to be 3.1, which is 193.44 pounds a cubic foot—194 pounds in round numbers. Converting to long tons, a cubic foot is slightly less than 0.09 of a long ton.

The formula for long tons an acre is as follows: Square feet an acre x tons a cubic foot x a factor x thickness of the ore = tons an acre.

Substituting the correct figures:

$$\begin{aligned} 43,560 \times .09 \times 1/4 \times \text{thickness} &= \text{tons an acre} \\ 980 \times \text{thickness} &= \text{tons an acre} \end{aligned}$$

Then the tonnage for any area would be

$$980 \times \text{thickness} \times \text{acres} = \text{total tonnage.}$$

MEMORANDUM FOR THE PRESS

LAFAYETTE COUNTY IRON ORE

Field investigation in Lafayette County by the Mississippi State Geological Survey during the period, October 1, 1951-January 15, 1952, revealed considerable quantities of iron ore in the eastern third of the county. Although iron ore has long been known to be present in Lafayette County, no detailed work toward tonnage estimates had been attempted previous to this survey. The estimates herein are based on field work by James S. Attaya, Geologist. It must be stressed that not every outcrop in the county has been reported, but only those indicative of mineable areas.

The estimate, 6,401,872 long tons of mineable ore, should be considered as general only. Of this total, it is estimated that slightly more than 5,000,000 long tons are mineable north of New Highway 6, and about 1,000,000 long tons south of the highway. It is believed that considerably more than 1,000,000 tons are mineable south of the highway in the Tula, Paris, and DeLay areas, but outcrops are not available to substantiate the belief.

Detailed estimates of the ore, by fields, will soon be released by the Mississippi Geological Survey in Bulletin 74, Lafayette County Iron Ores.

Immediate Release

February 29, 1952

