COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

BULLETIN No. 120

# Magnetic Survey of the Savage River and Long Plains Iron Deposits, Northwest Tasmania

BY

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This Bulletin describes magnetic surveys of the Savage River and Long Plains iron deposits in northwest Tasmania made by the Bureau of Mineral Resources, Geology & Geophysics between 1957 and 1962. The results of the surveys are shown as vertical magnetic field contours.

The Bulletin includes a discussion of the theoretical magnetic anomaly due to an infinitely long dipping vein of infinite depth extent, and gives an interpretation for the magnetic anomalies observed on a selection of traverses.

The drilling completed at Savage River and Long Plains as at May 1964 is summarised and compared with magnetic profiles. Recommendations for additional drilling are made, particularly in areas where drilling has not been done.

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# 1. INTRODUCTION

The Savage River and Long Plains deposits of iron ore are about 50 air miles southwest of Burnie, in northwest Tasmania. Their location is shown in Plate 1. The deposits are intersected by the Savage River. The Long Plains deposits are south of the Savage River deposits and extend southwards to the Waratah-Corinna road. The deposits occur in a rugged area, covered generally by thick forest and dense scrub.

The occurrence of iron at the Savage River has been known since the 1870s. The deposits were traversed by a packing track used by miners travelling to the Specimen Reef goldfield north of the Savage River. According to Reid (1921) the bed and banks of the Savage River had been worked for alluvial gold since 1880, and for osmiridium over a few years prior to 1921. Considerable exploration for gold was carried out by means of adits between 1895 and 1898.

The Savage River area was first considered as a possible source of iron ore by Twelvetrees and Reid (1919), who estimated reserves of high-grade ore at about 20 million tons. The area was examined later by Woolnough (1939), who considered that the conclusions of Twelvetrees and Reid were optimistic in regard to both the quality and quantity of the iron ore.

At the request of the Tasmanian Department of Mines an aeromagnetic survey of northwest Tasmania was made by the Bureau of Mineral Resources (BMR) during 1956. Two notable magnetic anomalies were observed and these suggested the existence of large iron deposits; the two anomalies correspond to the Savage River and Long Plains deposits. The results of the aeromagnetic survey are shown as magnetic contours in Plate 1.

A reconnaissance ground magnetic survey was done by BMR during 1957 along traverses north and south of the Savage River in the area corresponding to the Savage River aeromagnetic anomaly. The survey consisted of magnetic readings at a horizontal interval of 50 feet along seventeen traverses having a total length of 27,000 feet (Keunecke, 1958). This survey further indicated the existence of extensive iron deposits.

Following the reconnaissance survey by BMR, test diamond-drilling was done by the Tasmanian Department of Mines both north and south of the Savage River. This drilling confirmed the existence of a large occurrence of iron ore consisting mainly of magnetite and extending to depth. A vehicle track was constructed from the Waratah-Corinna road to the southern part of the 1957 reconnaissance area to provide better access to the deposits.

The Long Plains aeromagnetic anomaly also was investigated. This was done by Rio Tinto Australian Exploration Pty Ltd, as part of its exploration programme in Tasmania; the investigation included some magnetic work and one diamond-drill hole near the northern end of the Long Plains deposits.

The reconnaissance magnetic survey made by BMR and the test drilling done by the Department of Mines indicated that a detailed magnetic investigation of the Savage River deposits was warranted. During the summer of 1960, BMR made a detailed magnetic survey of an area south of the Savage River including that covered by the 1957 reconnaissance survey south of the Savage River, but extending considerably farther south (Sedmik, 1961). The area of that survey is now referred to as the Central Area (Plate 1).

Drilling by the Department of Mines in the Central Area continued during the survey. By the end of 1960, ten drill holes had been completed: two north of the Savage River and eight in the Central Area south of the Savage River. A helicopter was used to transport drilling equipment into the area north of the Savage River. The results of the drilling are described in Technical Reports of the Tasmanian Department of Mines (Symons, 1959; Hughes, 1960; and Hughes, 1961).

The detailed magnetic survey was continued during the summer of 1961, when areas north and south of the Central Area were surveyed. These areas are referred to as the Northern Area and Southern Area respectively (Plate 1). The Northern Area includes the area north of the Savage River investigated during the reconnaissance survey of 1957. No previous work had been done in the Southern Area. The results of the 1960 and 1961 magnetic surveys at Savage River are described by Eadie (1962).

Early in 1961 Industrial and Mining Investigations Pty Ltd was granted an exploration licence over an area embracing the Savage River and Long Plains iron deposits. Drilling done subsequently in the Central and Northern Areas was financed by this company. By May 1964, twenty-six drill holes had been completed in the Central and Northern Areas, including the original ten holes drilled under contract for the Department of Mines. The geological logs of drill holes Nos. 3-13, 15, and 16 are described by Symons (1963).

Oredressing research was done on samples of Savage River ore at the metallurgical research laboratory of the Tasmanian Department of Mines to determine the most satisfactory method of beneficiation to produce a grade of ore suitable for smelting. The results of this reserch are described by Manson (1959, 1960, and 1962).

Late in 1961 metallurgical tests were carried out in the United States of America on Savage River iron ore for Industrial and Mining Investigations Pty Ltd. During the tests four and a half tons of Savage River magnetite ore were smelted in a Strategic-Udy 100-kVA furnace to produce a low-carbon pig-iron low in residual titanium and vanadium. The metal produced was refined in a three-ton oxygen-electric furnace to produce carbon steel. The results of the tests were considered to be successful.

BMR next made a detailed magnetic survey of the Long Plains deposits and a reconnaissance survey of the area between the Long Plains and Savage River deposits during the first half of 1962. These areas are referred to as the Long Plains Area and the Reconnaissance Area respectively (Plate 1). The results of these surveys (Eadie, 1963) indicated that the Long Plains deposits are more extensive than previously reported on the basis of a geological examination (Tetlow, 1960a).

A detailed geological survey of the Savage River and Long Plains iron deposits was made during 1963 and 1964 by the Tasmanian Department of Mines (Urquhart, 1966).

In August 1963 Industrial and Mining Investigations Pty Ltd entered into an agreement with Pickands Mather and Co. of Cleveland, USA, to make an economic assessment of the Savage River deposits. This was to include drilling and metallurgical tests as well as an investigation of transport and harbour possibilities.

A joint investigation of the Savage River deposits was commenced later in 1964 by Pickands Mather and Co. (International), a subsidiary of Pickands Mather and Co. of Cleveland, and Mitsubishi Shoji Kaisha Ltd of Tokyo, to consider the possibility of producing a minimum of two million tons of pellets of high-grade iron ore a year over a period of 20 years for export to Japan.

## 2. GEOLOGY

The geology of the Savage River and Long Plains iron ore deposits and of the area nearby has been described by Twelvetrees and Reid (1919), Woolnough (1939), Hughes (1958), Tetlow (1960a and 1960b), and Urquhart (1966). The most detailed geological examination of the Savage River-Rocky River region, and of the Savage River and Long Plains iron deposits, was that of Urquhart, made during the field seasons of 1963 and 1964. The following summary is based on his report.

In discussing the geological history of the Savage River-Rocky River region, Urquhart suggests that Precambrian sediments were deposited in deep water, possibly a miogeosyncline. With the onset of compression from east and west, part of the geosyncline was faulted into a narrow elongated basin. A progressive rise with shortening possibly accompanied deformation, but shearing was not active. Deformation ended with the uplift of the folded rocks at the close of the Precambrian to form the southern extent of the Rocky Cape Geanticline. Basic and ultrabasic igneous rocks containing magnetite, chromite, and osmiridium invaded Cambrian sediments in the Bald Hill area, and basic magnetite-bearing amphibolite, probably Cambrian in age, was emplaced along lithologic and probably structural boundaries in Precambrian rock. Parallel and curving fracture zones in the amphibolite were subsequently recrystallised into greenschist zones, along which iron was later introduced. Acid igneous rock was emplaced, probably in the Cambrian, as a dyke separating Precambrian schist and amphibolite in the Rocky River area.

The area of Precambrian rock continued to supply sediment until the Lower Devonian. The Tabberabberan Orogeny, a major orogeny in Tasmania, occurred between Lower and Middle Devonian, and folding, jointing, and probably faulting can be attributed to this period of mountain building. The last phase of this activity was the introduction of large plutonic bodies of granite (Meredith Granite) and related igneous rocks into anticlinal axes of arcuate folds which were roughly parallel to the geanticlinal margins. The region was denuded between the Devonian and late Cretaceous, and a peneplain formed in the early Cainozoic.

Tertiary terrestrial sediments containing tin, gold, and chromite were transported from the north and east and deposited in shallow freshwater lakes. The sedimentary phase was succeeded by Tertiary basalt flows which were of far greater extent than the present outcrops indicate. The peneplain was disrupted by uplift in the late Tertiary and dissection, which commenced in the Pleistocene, has resulted in the youthful topography evident today.

Recent alluvial deposits in the major rivers and creeks carry gold, osmiridium, chromite, and tin, but the deposits are no longer economically important.

According to Urquhart, Precambrian Whyte Schist trends north from the Rocky River deposit near the junction of the Whyte and Rocky Rivers, and ranges in strike from N10°W to N20°E. The beds dip steeply to the east at an angle between 70° and vertical. The regional strike changes to a direction about N20°E roughly midway between the southern Savage River deposit and the Long Plains deposit, but the steep dip of the rock remains unchanged.

The amphibolite bodies in the Savage River-Rocky River area are disposed along the general line of strike in Whyte Schist. The amphibolite body containing the Savage River deposits increases in width from the southern to the northern area, and is aligned roughly parallel to an adjacent amphibolite body on the western side, in which magnetite does not occur.

Based mainly on the relation of the magnetite to the host rock, Urquhart classifies the magnetite deposits of the Savage River and Rocky River region into (a) the Savage River type, (b) the Savage River South and Long Plains South-Brown Plains type, and (c) the Rocky River type. Two of these types occur in the Savage River and Long Plains areas.

In the Savage River type, magnetite is located within schistose (or originally schistose) zones of the amphibolite mass. This type is dominant in the Northern Area and in the Central Area at Savage River, and is also found in deposits to the south. In the Savage River South and Long Plains South-Brown Plains type, magnetite is localised at the contact of an amphibolite body and a metasediment, or is concentrated in the amphibolite. This type occurs in the Southern Area at Savage River and in the Long Plains Area (referred to by Urquhart as the Long Plains South-Brown Plains area).

Urquhart discusses the structural control of mineralisation by schistosity in the Savage River type. He states that correlation of the ore, amphibolite, and greenschist zones between adjacent drill holes is difficult, and suggests that zones of schistosity curve, ramify, interconnect, and vary in width in the main mass of the amphibolite, along both strike and dip of the deposit.

Urquhart considers that the magnetite deposits are of hydrothermal origin and that the magnetite formed by deposition in permeable greenschist channels and replacement outward from these zones. He regards the deposits as being Cambrian in age.

Impurities in the ore consist of silica, alumina, titanium, manganese, phosphorus, sulphur, and vanadium. Urquhart gives the following as the maximum content of these impurities in assays of core sections:

| | | |
|---|---|---|
| $SiO_2$ | 46.6% | (From DDH 11) |
| $Al_2O_3$ | 15.2% | (From DDH 11) |
| Ti | 1.6% | (From DDH 17) |
| Mn | 0.19% | (From DDH 4) |
| P | 1.40% | (From DDH 18) |
| S | 15.4% | (From DDH 16) |
| V | 0.44% | (From DDH 14) |

The average impurity of ore in the Central Area was calculated by Urquhart using the percentages given by Symons (1963) for low- and medium-grade ore, and is as follows:

| | |
|---|---|
| Ti | 0.42% |
| P | 0.15% |
| S | 4.7% |
| V | 0.27% |

Silica and alumina generally show a decrease with increase in ore grade.

According to Urquhart the depth of weathering determined by diamond-drilling ranges from 30 to 120 feet with an average of 100 feet. Ore within the oxidised zone is composed of magnetite, haematite, and limonite, and is enriched to a grade ranging from about 60 to 67 percent iron. Weathering and leaching have removed pyrite from the magnetite, leaving vugs and cavities in the limonitic ore.

On the basis of drilling, Urquhart (1966, p. 85) has estimated the ore reserves in the Central Area at Savage River as 99 million tons averaging 37.6 percent iron. The results of oredressing tests by Manson (1959, 1960, and 1962) on Savage River ore indicate that fine grinding and magnetic separation of the estimated ore reserves would yield about 53 million tons of magnetite concentrate of grade about 68 percent iron.

The ore reserves of the Northern Area estimated by Urquhart from drilling are about 16 million tons (op. cit. p. 87). He feels that additional drilling may prove a further 14 million tons.

## 3. TRAVERSE LAYOUT AND TOPOGRAPHIC SURVEYING

The Savage River and Long Plains iron deposits occur in an area of thick forest and dense scrub, which necessitated the clearing of vegetation along the lines to be used as traverses.

The traverse layout for the detailed magnetic surveys at Savage River during 1960 and 1961 is shown in Plate 2. The traverse layout for the magnetic survey in the Long Plains and Reconnaissance Areas during 1962 is shown in Plate 3.

At the beginning of the geophysical surveys, vehicle tracks gave access from the Waratah-Corinna road to the northern part of the Long Plains Area and the northern part of the Savage River Area. Towards the end of the 1961 magnetic survey at Savage River a vehicle track was made in the Northern Area, which was later linked by road with the Central Area on the completion of a bridge across the Savage River in 1962. Previously the Savage River had to be crossed by means of a "flying fox", except when the water level was sufficiently low to cross on foot. During the 1962 survey the vehicle track to the northern part of the Long Plains deposit was extended northwards to join the track in the Southern Area at Savage River. At that stage, only the northern and southern parts of the Long Plains Area could be reached by vehicle; access to the rest of this area was by means of a walking track cut during the survey.

A detailed discussion of the traverse layout and surveying is given in Appendix 2.

# 4. BAROMETRIC LEVEL SURVEY

A level survey of the Northern, Central, and Southern Areas at Savage River was made during 1961 by officers of BMR using Askania microbarometers. A level survey of the Long Plains Area was made during 1962 by surveyors of the Department of the Interior, also using Askania microbarometers.

The use of microbarometers for measuring elevation depends on the variation of atmospheric pressure with elevation. The atmospheric pressure decreases with increasing elevation according to a known function. Barometric levelling is much quicker and cheaper, but less accurate, than spirit levelling.

The purpose of the level survey was to provide surface contour maps to show the relation of the deposits (indicated by the magnetic results) to the topography, and to provide surface profiles for use in interpreting the magnetic results and selecting drill sites. The topographical contours will also assist in planning the further development of the area.

For the Savage River level survey, the Long Plains Trig. Station (SPM 2843) was used as the origin of levels. This station is situated at the right side of the Waratah-Corinna road near the turn-off to the Savage River deposits at about 21 miles from Waratah. For the Long Plains level survey, the Blackguards Hill Trig. Station (SPM 2846) was used as the origin of levels.

At Savage River the elevation of a main base station was determined by the "leap-frog method" using two microbarometers and a series of stations along the vehicle track between the Long Plains Trig. Station and the main base station, a distance of about five miles. The mean of two determinations was used to give the elevation of the main base station relative to mean sea level.

The elevation of a sub-base on each traverse at Savage River was determined relative to that of the main base, and hence relative to mean sea level, using the "leap-frog method". The sub-base was generally located at the zero peg of the traverse. At Long Plains the elevation of a sub-base at the zero peg of each traverse was determined by surveyors of the Department of the Interior using conventional spirit levelling methods.

Microbarometer readings were taken at each peg (horizontal interval 50 feet) along the traverses at both Savage River and Long Plains. Additional readings were taken at abrupt changes in slope. The pressure drift during the period between successive readings at the sub-base was assumed to be linear in determining the elevation of each station relative to the sub-base.

A surface profile was drawn for each of the traverses. Topographical contour maps for the Northern, Central, and Southern Areas at Savage River and for the Long Plains Area were prepared from these profiles, and are shown in Plates 4 to 7 respectively. As the contour maps have been based only on levels along the traverses, abrupt changes and irregularities in topography between traverses have not been taken into account. However, the approximate courses of most creeks have been shown, and the contours in the vicinity of the creeks have been inferred.

## 5. MAGNETIC SURVEY

Detailed magnetic surveys of the Savage River deposits were made by BMR during the summers of 1960 and 1961, and a detailed magnetic survey of the Long Plains deposits was made during the summer of 1962. A reconnaissance magnetic survey of the area between the Long Plains and Savage River deposits was also made during 1962. The boundaries of these survey areas are shown superimposed on the aeromagnetic map of total intensity giving the results of the airborne survey made by BMR during 1956 (Plate 1).

The applicability of the magnetic method at Savage River and Long Plains depends on the fact that the iron in these deposits occurs mainly as magnetite, which is highly magnetic and gives rise to a magnetic anomaly.

The depth of weathering and paucity of outcrop at Savage River and Long Plains militated against making a detailed geological examination of these areas; therefore initial investigation of the areas depended primarily on the magnetic method. The purpose of the magnetic survey was to locate and outline the areas of iron mineralisation, to obtain more detailed information on the occurrence of ore within these areas, and to select drill sites to test the ore indicated by the magnetic results.

An ABEM MZ-4 torsion magnetometer was used for the 1960 and 1961 magnetic surveys at Savage River; two of these magnetometers were used for the 1962 magnetic survey at Long Plains and in the Reconnaissance Area.

At Savage River and Long Plains, readings of the vertical magnetic field were made at intervals of 25 feet along the traverses; in the area between Savage River and Long Plains the intervals were 50 feet. In an area of highly irregular magnetic field at the northern end of the Long Plains deposits a very detailed survey was made with readings at intervals of either two and a half or five feet along traverses, depending on the degree of irregularity.

The vertical magnetic field at each station was measured relative to that at a base station located at 700W on Traverse A in the Central Area at Savage River.

A profile of observed vertical magnetic field was drawn for each traverse, and these profiles were used to prepare the contour maps.

## 6. MAGNETIC RESULTS

Magnetic contour maps for the Northern, Central, and Southern Areas at Savage River and for the Long Plains Area at a contour interval of 10,000 gammas are given in Plates 8, 9, 10, and 11 respectively. In Plate 12 the contours in an area of highly disturbed magnetic field at the northern end of the Long Plains deposits are shown. No magnetic contour map is shown for the Reconnaissance Area as the survey there did not reveal any anomalies of significance.

At Savage River the magnetic anomaly that extends continuously from Traverse F20 in the north of the Northern Area to Traverse 6500S in the Southern Area indicates an iron-bearing zone about $3\frac{1}{4}$ miles long. In addition two isolated magnetic anomalies in the southern part of the Southern Area indicate the presence of two orebodies there.

At Long Plains the magnetic anomaly that extends continuously from Traverse L250N near the Waratah-Corinna road to Traverse L11,500N indicates an iron-bearing zone about 2 miles long. The northern end of the Long Plains deposits is about $3\frac{1}{2}$ miles south of the southern end of the Savage River deposits.

The magnetic results indicate that the iron-bearing zones at both Savage River and Long Plains vary in width along their length, and that the width of the zone at Long Plains is generally less than that at Savage River. The ore occurs within these zones as lenses, which are elongated in a northerly direction and are of variable length, width, and depth. More than one lens may occur across the width of a zone. In such a case the zone will include barren or weakly mineralized rock separating the lenses.

The characteristics of a magnetic anomaly such as its amplitude, width, gradient, and shape are determined by several factors including the depth, shape, location, and magnetic properties of the body that causes the anomaly. These characteristics must be considered together in assessing the significance of an anomaly. A theoretical discussion of magnetic anomalies is given in Chapter 7 below. In later chapters the theoretical anomalies will be compared with observed anomalies, and the observed anomalies will be compared with drilling results.

## 7. THEORETICAL CONSIDERATION OF MAGNETIC ANOMALIES

It is necessary to consider a magnetic anomaly as a whole, and not just some isolated feature such as its amplitude, when making an assessment of its importance. The reading at each station is an integration of the influences of all the magnetic material that affects the magnetometer at that station. Sharp anomalies of large amplitude caused by local, near-surface magnetic material may be superimposed on a smooth anomaly caused by a large magnetic body at depth. Isolated local effects of little importance can often be recognised and eliminated to reveal the more important component of the anomaly, which arises from a larger body at greater depth. On the other hand an extensive occurrence of highly magnetic material near the surface will contribute the major component of an anomaly, and can obscure the influence of magnetic material at depth.

The form of a magnetic anomaly is determined by many factors such as the geographical location, shape, dimensions, depth, attitude, and magnetic properties of the body that causes the anomaly.

The variables associated with location are the magnitude and direction of the Earth's magnetic field; these can be regarded as constant throughout the survey area. The variables related to dimensions depend on the shape of the body and are those necessary to define the size of the body, such as the length and radius of a vertical cylinder, or the width and depth extent of an "infinite" vertical vein. However, a body may be so irregular in shape that its dimensions cannot be defined simply. The depth is the depth below the surface to a particular part of the body, such as the top of a vertical cylinder or the top of a vein. The depth may vary along a traverse and will depend on surface topography. The magnetic properties of the body include its susceptibility and remanent magnetisation. These properties may be measured, although often only with difficulty, and may vary throughout the body. Such variables place limitations on the quantitative interpretation of magnetic anomalies.

The influence of some of these variables, which should be understood in making even a qualitative appraisal of magnetic anomalies, will be discussed and illustrated with reference to the magnetic anomaly due to an infinitely long dipping magnetic vein of infinite depth extent as illustrated in plan and vertical section in Figure 1. A study of the anomaly due to such a vein appears useful in understanding the magnetic results at Savage River and Long Plains, although the actual mode of occurrence of the iron in these deposits is much less simple than that depicted in the diagram.

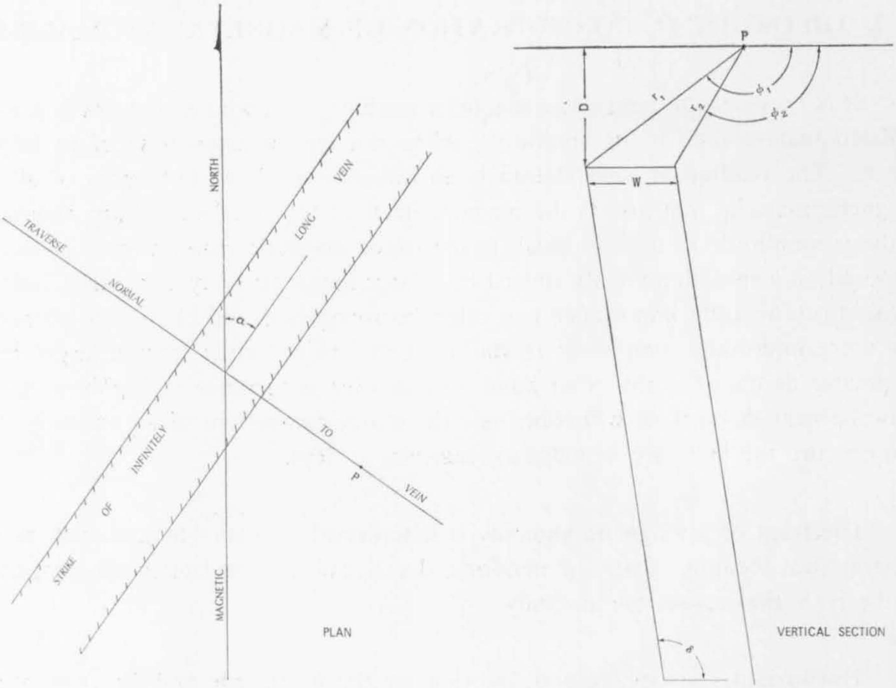


**Figure 1. Infinitely long dipping vein of infinite depth extent.**

$$\Delta Z = 2\,k \sin\delta\ (H_0 \sin\alpha \sin\delta + Z_0 \cos\delta)\ \log_e(r_2/r_1)$$
$$- (H_0\ \sin\alpha\cos\delta - Z_0\ \sin\delta)\ (\phi_1 - \phi_2)$$

where $\alpha$, $\delta$, $r_1$, $r_2$, $\phi_1$, and $\phi_2$ are as shown in Figure 1. $H_0$ and $Z_0$ are the horizontal and vertical components of the Earth's undisturbed magnetic field in the area, and $k$ is the magnetic susceptibility contrast between the vein and the adjacent rock (Cook, 1950).

The value of $\delta$ lies between zero and $\pi/2$ for a vein dipping west, and between $\pi/2$ and $\pi$ for a vein dipping east. For a vertical vein, $\delta = \pi/2$.

The value of $\alpha$ lies between zero and $\pi/2$ for a vein striking east of north, and between zero and $-\pi/2$ for a vein striking west of north. For a vein striking due north, $\alpha = 0$.

The equation may be written:

$$\Delta Z = A \log_e(r_2/r_1) - B\ (\phi_1 - \phi_2)$$

where

$$A = 2\,k\ \sin\delta\ (H_0 \sin\alpha \sin\delta + Z_0\ \cos\delta) \text{ and}$$
$$B = 2\,k\ \sin\delta\ (H_0 \sin\alpha\cos\delta - Z_0\ \sin\delta).$$

$A$ and $B$ depend on the dip, strike, susceptibility, and geographical location of the vein, and are constants for given values of $\alpha$, $\delta$, $k$, $H_0$, and $Z_0$.

The functions $\log_e(r_2/r_1)$ and $(\phi_1 - \phi_2)$ depend on the depth $D$ and width $W$ of the vein, and on the position of point P. If P is distant $nW$ from the point on the traverse above the centre of the vein, it can be shown that $\log_e(r_2/r_1)$ and $(\phi_1 - \phi_2)$ are functions of $n$ and the depth-to-width ratio $D/W$, where $n$ is any number.

Thus $\log_e(r_2/r_1)$ and $(\phi_1 - \phi_2)$ can be determined as functions of $n$ for each value of $D/W$, and $\Delta Z$ can be calculated as a function of $n$ for given values of $A$ and $B$. This means that if the dip, strike, and susceptibility of the vein, and the horizontal and vertical components of the Earth's magnetic field, are known or assumed, the functions $A(\alpha, \delta, k, H_0, Z_0)$ and $B(\alpha, \delta, k, H_0, Z_0)$ can be determined, and the magnetic anomaly due to a vein of any assumed depth and width can be calculated using a family of curves giving $\log_e(r_2/r_1)$ and $(\phi_1 - \phi_2)$ as functions of $D/W$ and $n$.

The influence of the depth and width of a magnetic vein on the vertical magnetic anomaly arising from it is illustrated in Plate 13. The theoretical magnetic anomalies have been calculated for a series of veins of different depths and widths for assumed values of $\alpha$, $\delta$, $k$, $H_0$, and $Z_0$. The assumptions used and the theoretical profiles obtained are shown.

The influence of the depth of cover of a magnetic vein on the magnetic anomaly arising from it is illustrated in Plate 13(a), where the anomalies due to three veins of equal width but different depths are shown. A vein of width 100 feet is considered, and the depth is taken as 25, 50, and 100 feet in A, B, and C respectively. A comparison of the three anomalies shows that as the depth increases the anomaly decreases in amplitude, increases in width, and has less steep gradients.

The influence of the width of a magnetic vein on the magnetic anomaly arising from it is illustrated in Plate 13(b), where the anomalies due to three veins of equal depth but different widths are shown. A vein at a depth of 50 feet is considered, and the width of the vein is taken as 50, 100, and 200 feet in A, B, and C respectively. A comparison of the three anomalies shows that as the width of the vein increases the anomaly arising from it increases in both amplitude and width.

Vein B is identical in 13(a) and 13(b); this facilitates a comparison between the two sets of theoretical anomalies shown in (a) and (b).

The amplitude of the anomaly decreases as the depth-to-width ratio increases. The relation between amplitude and the depth-to-width ratio is shown in Plate 13(c). It can be seen that the decrease in amplitude with depth is such that for a vein of width 100 feet and depth 1,000 feet the amplitude of the anomaly is less than 2,500 gammas. Thus, although the magnetic vein considered in the examples is assumed to have an infinite depth extent, only a minor contribution to the anomalies is made by that part of the vein at a depth greater than 1,000 feet from the surface.

On the other hand the amplitude of an anomaly due to a vein of given width whose depth-to-width ratio is small increases rapidly as the depth decreases. Thus, a major contribution to an anomaly is likely to be made by the part of the vein nearest the surface. This is illustrated in Plate 13(d) where the anomaly due to a vein of width 100 feet and depth extent 25 feet is shown for different depths. The depth to the top of the vein is taken as 25, 50, and 75 feet in A, B, and C respectively. It is seen that the influence of the vein increases considerably with decreasing depth.

In each case a vein dipping east and striking east of north has been considered. The dip and strike assumed are the same throughout, and are reasonable values for the Savage River area. Because the assumed dip is not vertical and the assumed strike not north, the anomalies shown are asymmetrical. The influence of dip and strike on the symmetry of an anomaly is discussed and illustrated later.

The theoretical magnetic anomaly arising from two parallel dipping magnetic veins is illustrated in Plate 14(a). Two veins, each of width 50 feet and depth 50 feet, are considered. The separation between the veins is taken as 0, 25, 50, and 100 feet in A, B, C, and D respectively. In Case A, the two veins constitute a single vein the same as B in Plate 13(a). A comparison of the four anomalies shows that, as the separation between the veins is increased, the anomaly decreases in amplitude and increases in width. When the separation is sufficiently large, two distinct peaks are observed in the anomaly, one corresponding to each vein.

The effect of topography on the magnetic anomaly due to a dipping magnetic vein is illustrated in Plate 14(b). A vein of width 100 feet is considered, and the theoretical magnetic anomaly is calculated for three traverses having different surface profiles as shown in A, B, and C. The depth of cover at the point on each traverse above the centre of the vein (the zero point) is 50 feet. In B the anomaly has a marked asymmetry with respect to the peak, which is displaced to the west of zero, and it has a greater amplitude than the anomaly in A. West of the peak the anomaly decreases rapidly to a well defined minimum. East of the peak the anomaly decreases much more gradually, and more gradually than in A. In C the anomaly has two peaks which are displaced east and west of zero. Each has a greater amplitude than the anomaly in A. West of the western peak the anomaly decreases rapidly to a well defined minimum. East of the eastern peak the anomaly decreases rapidly at first to about zero and then gradually to a minimum which is not clearly defined.

It is seen that topography may have a significant influence on the observed magnetic anomaly due to a given body. The influence of topography is pronounced at Savage River and Long Plains.

The functions $A\ (\alpha, \delta, k, H_0, Z_0)$ and $B\ (\alpha, \delta, k, H_0, Z_0)$, defined earlier in this chapter, depend on the strike, dip, and susceptibility of the magnetic vein and on the horizontal and vertical components ($H_0$ and $Z_0$) of the Earth's undisturbed magnetic field. The values of $H_0$ and $Z_0$ are effectively constant throughout a particular survey area. The effects of dip, strike, and susceptibility on the magnetic anomaly due to a magnetic vein are illustrated in Plate 15.

The effect of dip on the magnetic anomaly is illustrated in Plate 15(a) by considering a north-striking vein of given depth, width, and susceptibility. A vein of depth 50 feet, width 100 feet, and susceptibility 0.2 c.g.s. is assumed; the magnetic anomaly is shown for the vein dipping 75°W, vertically, 75°E, and 60°E in A, B, C, and D respectively. The anomaly is symmetrical for the vertically dipping vein, but becomes increasingly asymmetrical as the departure of the dip from vertical increases. For an easterly dipping vein the gradient of the anomaly west of the peak is greater than that to the east. The amplitude of the anomaly decreases somewhat as the departure of the dip from vertical increases.

The effect of strike on the magnetic anomaly is illustrated in Plate 15(b) by considering a vertical vein of given depth, width, and susceptibility. A vein of of depth 50 feet, width 100 feet, and susceptibility 0.2 c.g.s. is assumed; the magnetic anomaly is shown for the vein striking 15°E, north, 15°W, and 30°W in A, B, C, and D respectively. The anomaly is symmetrical for a north-striking vein, but becomes increasingly asymmetrical with increasing departure of the strike from north.

The effect of susceptibility on the magnetic anomaly is illustrated in Plate 15(c) by considering a north-striking vertical vein of given depth and width. A vein of depth 50 feet and width 100 feet is assumed; the magnetic anomaly is shown for a vein of susceptibility 0.3, 0.2, and 0.1 c.g.s. in A, B, and C respectively. This illustrates that the vertical magnetic field is directly proportional to susceptibility, and that the susceptibility is merely a numerical multiplier.

The susceptibility is usually approximately proportional to the amount of magnetite present, and consequently is roughly proportional to the grade of a magnetite ore.

In Plate 15, vein B is identical in (a), (b), and (c). This facilitates a comparison between the three sets of theoretical anomalies shown.

## 8. COMPARISON OF THEORETICAL AND OBSERVED MAGNETIC PROFILES

Five of the anomalies observed at Savage River and Long Plains have been selected for interpretation using models in which the ore is assumed to occur in infinitely long dipping veins of infinite depth extent as considered in the previous chapter. The anomalies chosen represent a number of different types.

The interpretation is based on the determination of a model (i.e. a spatial distribution of magnetic ore) for which the theoretical vertical anomaly is similar to the observed anomaly. The assumptions made for the models are considered a reasonable approximation to conditions at Savage River and Long Plains.

The values of the functions $A(\alpha, \delta, k, H_0, Z_0)$ and $B(\alpha, \delta, k, H_0, Z_0)$ are calculated for assumed values of $\alpha$, $\delta$, $k$, $H_0$, and $Z_0$. The values of $H_0$ and $Z_0$ are known for the Savage River-Long Plains area, the value of $k$ is based on laboratory measurements of susceptibility made on Savage River and Long Plains iron ore (although considerable variation in susceptibility is found for different samples), the value of $\delta$ used corresponds to an assumed dip of 75°E, and the value of $\alpha$ used is chosen to correspond to the strike implied from the magnetic results of the particular anomaly being considered. The topography used in each case is the actual topography along the traverse. The number of veins is decided and the depth and width of each vein are adjusted to produce a theoretical anomaly that matches the observed anomaly. The accuracy of the interpretation depends largely on the correctness of the assumptions made before depths and widths are calculated.

Figures 2 to 6 show the interpretations of the five observed anomalies, which are described below. In each case the assumptions made are marked on the figure.

### *Traverse D4, Northern Area, Savage River* (Fig. 2)

A theoretical anomaly similar to the observed anomaly may be obtained from three parallel veins of which the two outside veins come close to the surface as shown. These two veins give rise to two peaks having very steep gradients.

### *Traverse 4500S, Central Area, Savage River* (Fig. 3)

A theoretical anomaly similar to the observed anomaly may be obtained from two parallel veins as shown. This provides a good example of the pronounced influence of topography on the form of a magnetic anomaly, as was illustrated in Plate 14(b). The anomaly due to the two veins has a single peak.

### *Traverse 10,000S, Southern Area, Savage River* (Fig. 4)

A theoretical anomaly similar to the observed anomaly may be obtained from two parallel veins as shown. The veins are sufficiently far apart for the anomaly to have a peak corresponding to each vein. In the model the western vein is narrower than the eastern vein, but is closer to the surface. This results in the western anomaly having a greater amplitude and steeper gradients than the eastern anomaly, but a width less than that of the eastern anomaly.

### *Traverse L7000N, Long Plains Area* (Fig. 5)

A theoretical anomaly similar to the observed anomaly may be obtained from a number of parallel veins as shown. Such a model can explain the irregular nature of the observed anomaly, and also the steep gradients at each side of an anomaly of such breadth. The irregular form of the observed anomaly is probably determined largely by the near-surface distribution of iron ore. Although the model shown may be a good approximation to the distribution of iron ore close to the surface, it is likely that the actual distribution at depth will depart from that given in the model. The ore probably occurs in concentrations separated by more or less barren rock, but continuity from the surface to depth as assumed is not likely.

### *Traverse L250N, Long Plains Area* (Fig. 6)

A theoretical anomaly similar to the observed anomaly may be obtained from a single vein as shown. However, a similar theoretical anomaly could be obtained from a broader vein of lower susceptibility closer to the surface.

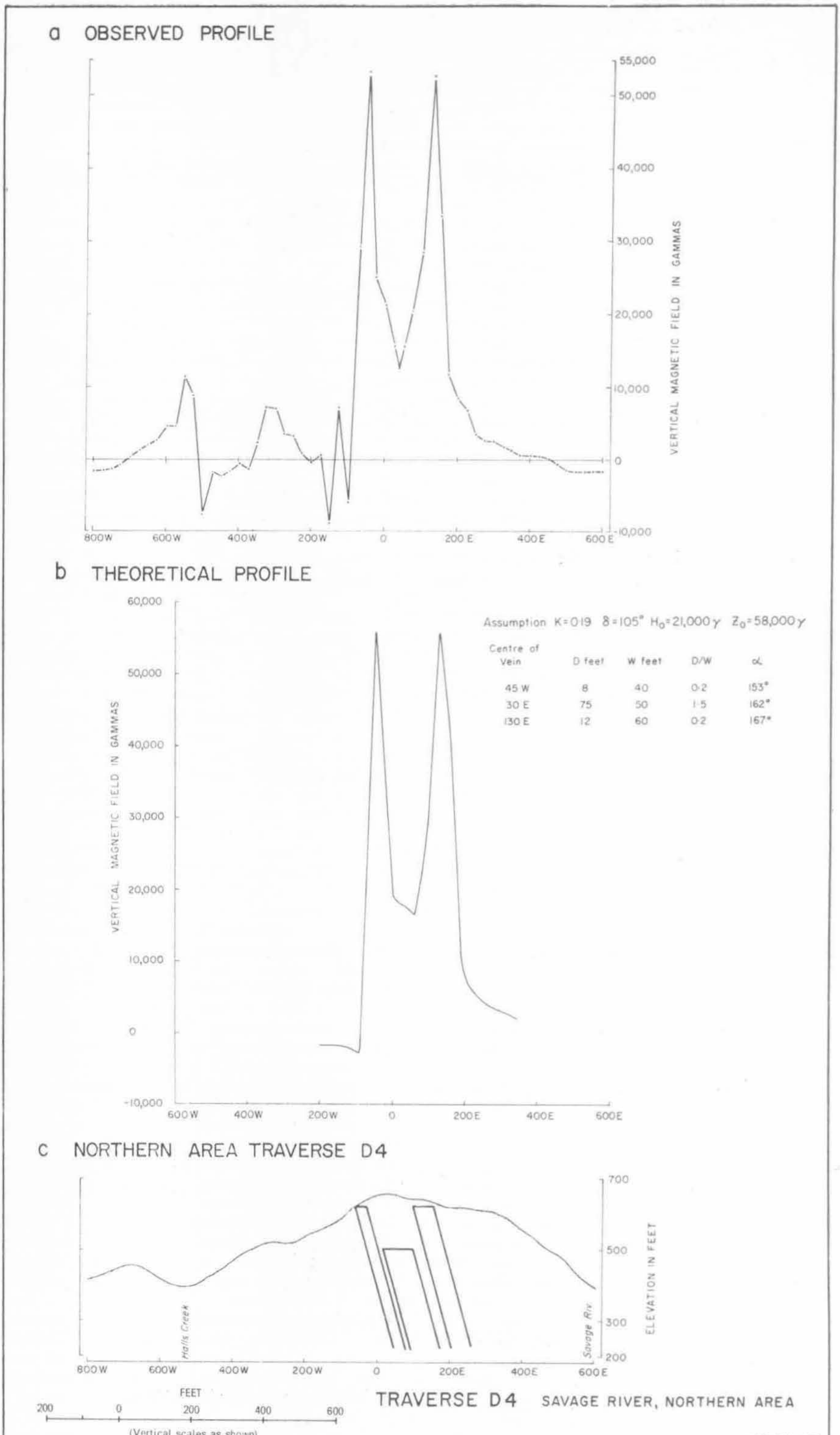


**Figure 2. Traverse D4, Northern Area, Savage River. Comparison of observed and theoretical profiles.**

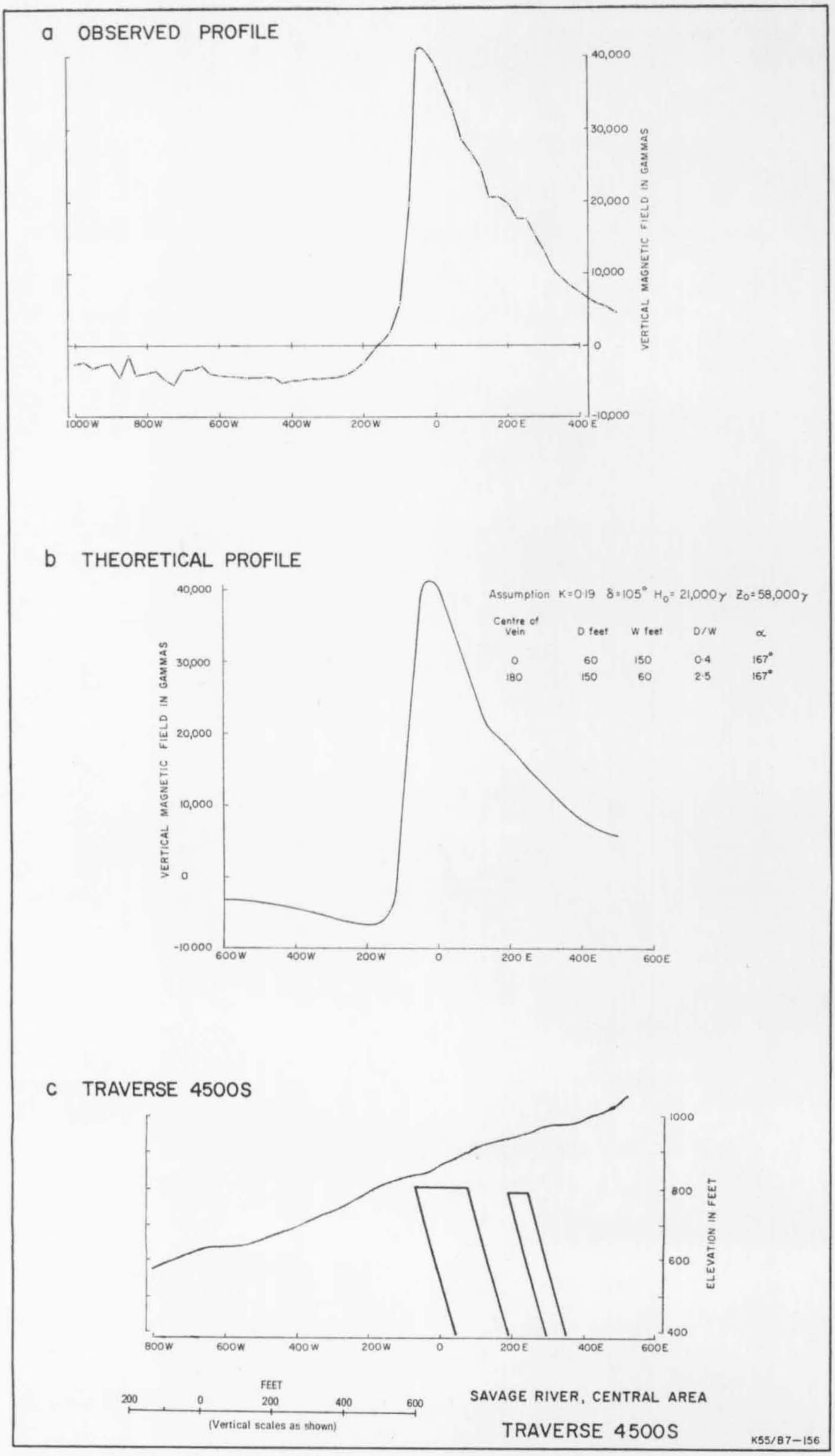


**Figure 3. Traverse 4500S, Central Area, Savage River. Comparison of observed and theoretical profiles.**

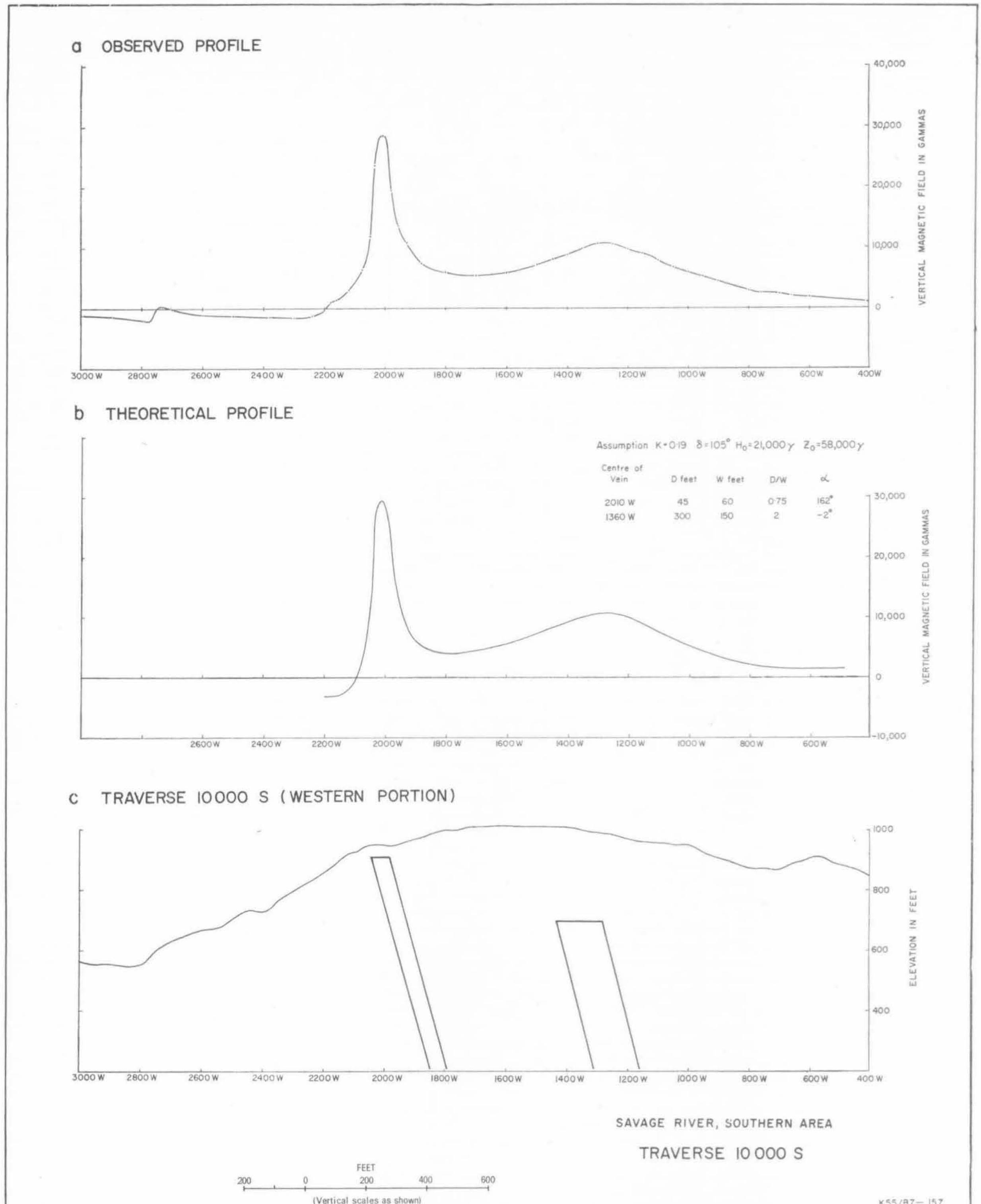


**Figure 4. Traverse 10,000S, Southern Area, Savage River. Comparison of observed and theoretical profiles.**

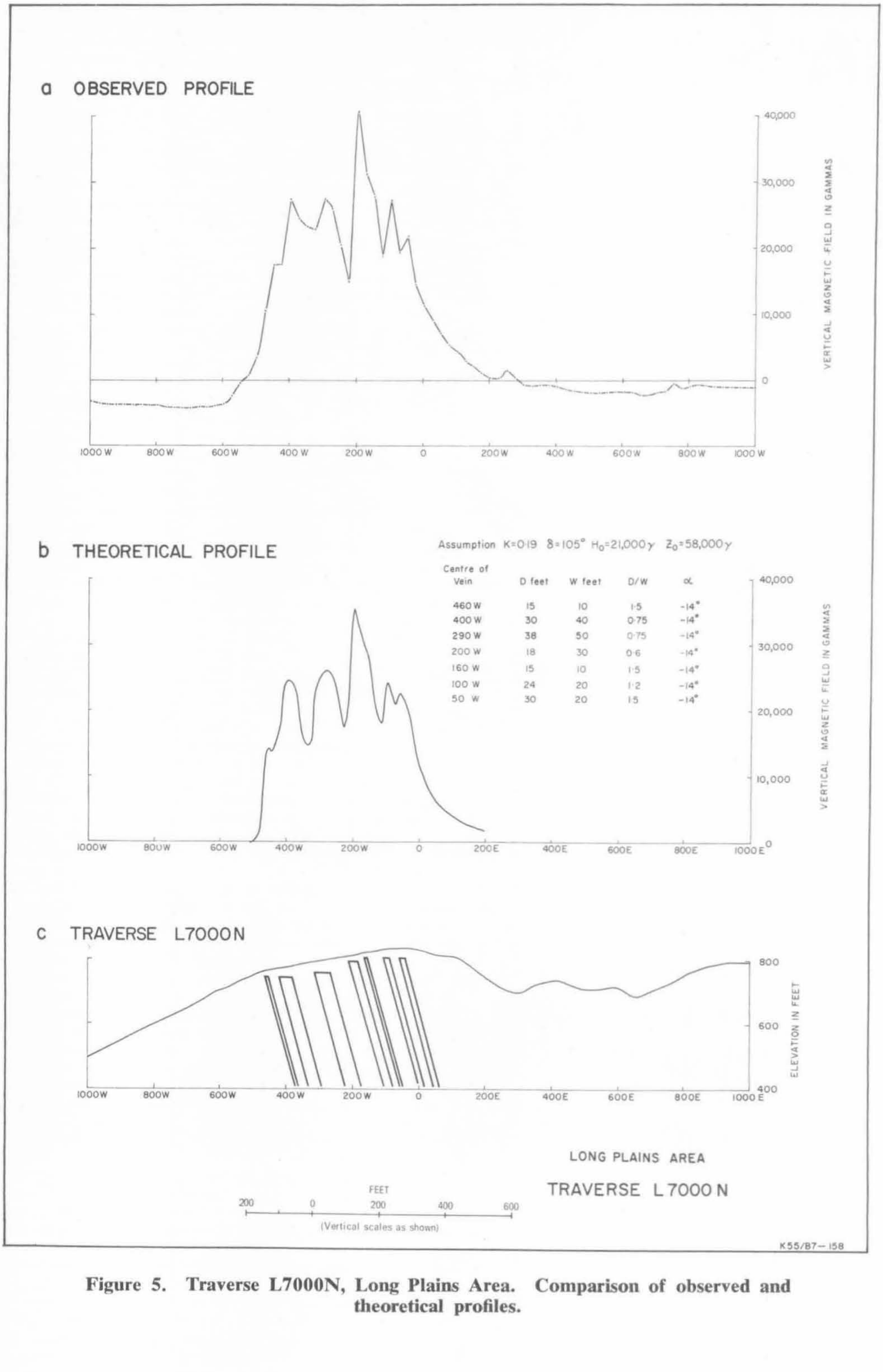


**Figure 5. Traverse L7000N, Long Plains Area. Comparison of observed and theoretical profiles.**

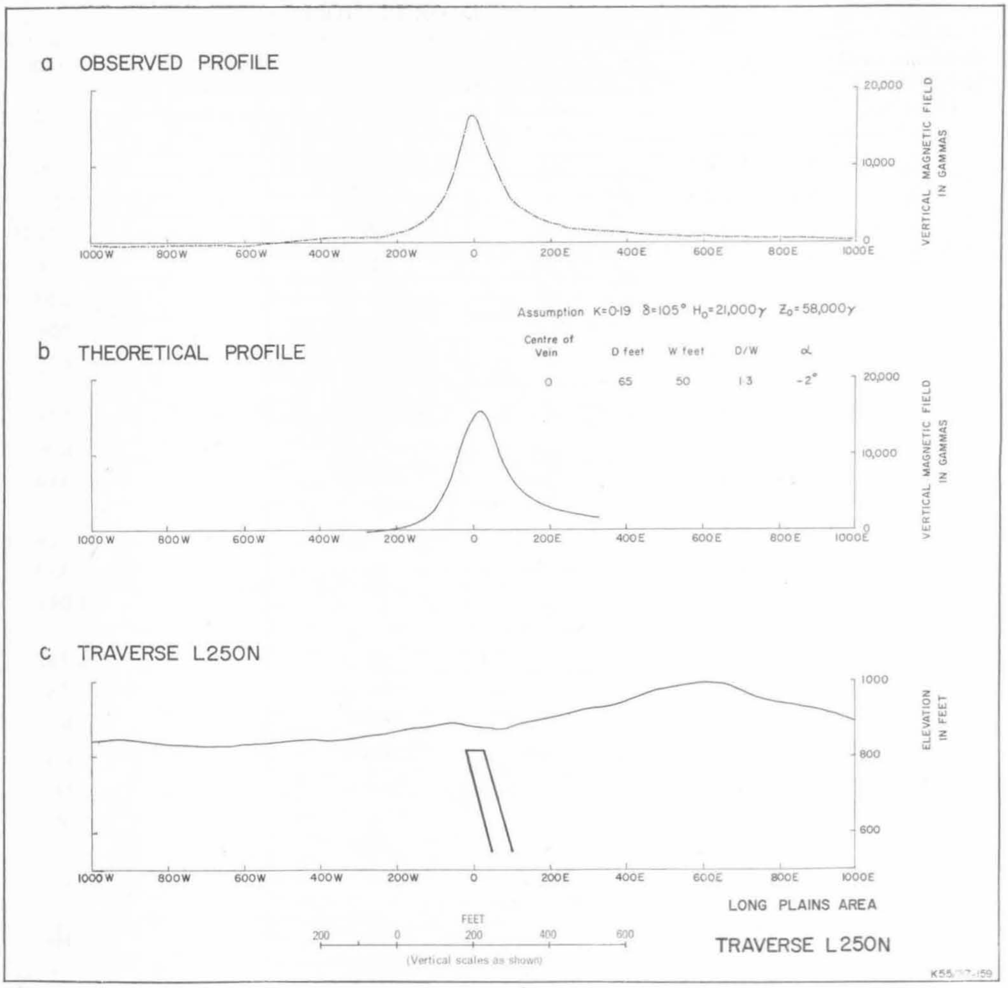


**Figure 6. Traverse L250N, Long Plains Area. Comparison of observed and theoretical profiles.**

## 9. DRILLING COMPLETED

By May 1964, twenty-six drill holes had been completed at Savage River. Of these, the first ten were financed by the Tasmanian Department of Mines, and the remaining sixteen by Industrial and Mining Investigations Pty Ltd. All the holes are located in the Northern and Central Areas. In addition one hole was drilled at Long Plains by Rio Tinto Australian Exploration Pty Ltd.

The area, site, depression, and length of each drill hole are given in Table 1. The horizontal projection of each hole is shown on the appropriate magnetic contour map. All holes were drilled towards west except DDH Nos. 1 and 8, which were drilled towards east, and DDH No. 24, which was vertical.

TABLE 1. COMPLETED DRILL HOLES

| Diamond Drill Hole Number (DDH No.) | Area | Site: Traverse | Site: Station | Depression at Collar (degrees) | Length (feet) |
|---|---|---|---|---|---|
| 1 | NORTHERN | E | 300W | 41 | 668 |
| 2 | NORTHERN | E5 | 241E | 45 | 863 |
| 3 | CENTRAL | B8 | 414W | 45 | 944 |
| 4 | CENTRAL | B | 850W | 45 | 954 |
| 5 | CENTRAL | C | 450W | 60 | 1,020 |
| 6 | CENTRAL | C | 450W | 40 | 704 |
| 7 | CENTRAL | C12 (30 ft south) | 500W | 45 | 877 |
| 8 | CENTRAL | A | 1600W | 40 | 554 |
| 9 | CENTRAL | A | 1600W | 49 | 666 |
| 10 | CENTRAL | 750S (25 ft north) | 75E | 45 | 440 |
| 11 | CENTRAL | 250S | 80E | 55 | 526 |
| 12 | CENTRAL | 250S | 270W | 82 | 350 |
| 13 | CENTRAL | 1500S (10 ft north) | 0 | 65 | 1,011 |
| 14 | NORTHERN | H1 | 0 | 60 | 1,545 |
| 15 | CENTRAL | 2000S | 70E | 50 | 734 |
| 16 | CENTRAL | 2500S | 66W | 60 | 673 |
| 17 | NORTHERN | D7 | 190W | 67 | 203 |
| 18 | NORTHERN | C28A | 100W | 55 | 600 |
| 19 | NORTHERN | C33 | 100E | 60 | 489 |
| 20 | NORTHERN | D2 | 60E | 63 | 195 |
| 21 | CENTRAL | B8 (9 ft south) | 585W | 47 | 172 |
| 22 | CENTRAL | B8 | 990W | 45 | 160 |
| 23 | CENTRAL | 750S (25 ft north) | 275W | 47 | 297 |
| 24 | CENTRAL | BO8 (70 ft south) | 20E | 90 | 73 |
| 25 | NORTHERN | D18A (20 ft south) | 460E | 65 | 749 |
| 26 | NORTHERN | D30 | 200E | 64 | 595 |
| L1 | LONG PLAINS | L11,100N (15 ft south) | 345E | 45 | 639 |

## 10. COMPARISON OF OBSERVED MAGNETIC PROFILES AND DRILLING RESULTS

Drilling has been done only in the Northern and Central Areas at Savage River and at the north of the Long Plains Area, generally on traverses where a broad magnetic anomaly with steep gradients indicated a substantial occurrence of iron ore close to the surface. In order to compare magnetic observations with drilling results, the magnetic profile, surface profile, and drilling results are illustrated for the following selected traverses:

Northern Area:

Traverse E5, DDH2 (Fig. 7)

Traverse D30, DDH26 (Fig. 8)

Traverse D2, DDH20 (Fig. 9)

Traverse C33, DDH19 (Fig. 10)

Traverse C28A, DDH18 (Fig. 11)

Central Area:

Traverse C, DDH5 and 6 (Fig. 12)

Traverse B8, DDH3, 21, and 22 (Fig. 13)

Traverse B, DDH4 (Fig. 14)

Traverse 750S, DDH10 and 23 (Fig. 15)

Traverse 1500S, DDH13 (Fig. 16)

Long Plains Area:

Traverse L11,100N, DDHL1 (Fig. 17)

The grade of the veins intersected, expressed as percentage of iron soluble in hydrochloric acid, is shown on the drill sections. For the purpose of illustration a value of 40 percent has been assumed as the division between medium- and low-grade ore.

The magnetic anomalies illustrated have steep gradients and are due largely to the influence of iron ore close to the surface. In each case, iron ore has been intersected during drilling and its location corresponds to that of the main magnetic anomaly. This indicates that the ore extends down to some depth.

Where ore occurs close to the surface, the magnetic anomaly has steep gradients. The main magnetic anomaly may be used to estimate the width of the main iron-bearing zone, i.e. the width measured horizontally over which the main iron concentrations occur. The zone may include iron concentrations of various grades, and these may be separated within the zone by barren rock. The width of the zone estimated from the magnetic results is likely to be a reasonable approximation to the actual width, particularly near the surface. However, the width may vary with depth.

The concept of an iron-bearing zone may be illustrated by reference to the theoretical models shown in Plate 14(a), where the width of the zone is 100, 125, 150, and 200 feet in A, B, C, and D respectively.

An estimate of the width of the zone may be made by considering the position of the steep gradients bounding the main magnetic anomaly. For instance, on Traverse B8 (Fig. 13) the main magnetic anomaly is located between 400W and 1200W and indicates a main iron-bearing zone of width about 750-800 feet. Drilling is necessary to obtain detailed information on the occurrence of iron within the iron-bearing zone.

The features of the magnetic profile within the main anomaly for each of the traverses considered will be determined largely by the distribution, grade, and magnetic properties of the near-surface iron ore. The iron concentrations may vary in grade with depth, as seen for instance on Traverse C (Fig. 12), so that the features of the magnetic profile need not correlate with iron concentrations intersected during drilling, particularly at depth.

## 11. DRILLING RECOMMENDED

As at May 1964 no drilling had been done in the Southern Area at Savage River, and only one hole had been drilled at Long Plains. Drilling recommendations are given for testing the deposits in these areas. Recommendations are also given for further testing in the Northern and Central Areas. The observed magnetic profile and surface profile with drilling recommendations are given for each traverse on which drilling is recommended (Figs. 18-41).

The area, site, depression, and length of each recommended drill hole are given in Table 2. The horizontal projection of each hole is shown on the appropriate magnetic contour map. In all cases the direction of the recommended hole is west along the traverse except for the vertical hole 50 feet south of Traverse E2A (along the line joining E2A and E2) and the holes on Traverses 4500S and 5400S, which are 20-25° southwest and 15° northwest of the traverse direction respectively. The drilling recommendation on each traverse has been made with reference to both the magnetic and surface profiles.

On a traverse where the magnetic profile is relatively smooth, a theoretical interpretation of the magnetic anomaly has been made to ascertain the probable location of the main iron concentrations, and drilling recommendations have been made on this basis. An example of this is the magnetic anomaly on Traverse 4500S in the Central Area at Savage River (Fig. 27). The drilling recommended here is designed to intersect the main interpreted orebody shown in Figure 3.

TABLE 2. RECOMMENDED DRILL HOLES

| Area | Site Traverse | Site Station | Depression (degrees) | Length (feet) | Figure Number |
|---|---|---|---|---|---|
| NORTHERN | F16A | 400E | 45 | 600 | 18 |
| NORTHERN | F1A | 400E | 45 | 900 | 19 |
| NORTHERN | F1A | 400W | 60 | 300 | 19 |
| NORTHERN | 200 ft south of E2A | 300E | 55 | 900 | 20 |
| NORTHERN | 50 ft south of E2A | 0 | 90 | 800 | 20 |
| NORTHERN | D34A | 300E | 50 | 1,100 | 21 |
| NORTHERN | D23A | 150E | 50 | 450 | 22 |
| NORTHERN | H1 | 425W | 50 | 800 | 23 |
| CENTRAL | C3 | 50W | 45 | 400 | 24 |
| CENTRAL | C3 | 300W | 45 | 600 | 24 |
| CENTRAL | COB8 | 500E | 45 | 900 | 25 |
| CENTRAL | B8O | 250E | 45 | 900 | 26 |
| CENTRAL | 4500S | 300E | 55 | 700 | 27 |
| SOUTHERN | 5400S | 200E | 55 | 750 | 28 |
| SOUTHERN | 6000S | 100E | 45 | 550 | 29 |
| SOUTHERN | 9000S | 1100W | 45 | 550 | 30 |
| SOUTHERN | 9500S | 1100W | 60 | 700 | 31 |
| SOUTHERN | 9500S | 1750W | 55 | 450 | 31 |
| LONG PLAINS | L11,250N | 600E | 45 | 600 | 32 |
| LONG PLAINS | L10,250N | 350E | 45 | 800 | 33 |
| LONG PLAINS | L9250N | 250E | 45 | 600 | 34 |
| LONG PLAINS | L8000N | 100W | 55 | 450 | 35 |
| LONG PLAINS | L7000N | 250E | 50 | 1,000 | 36 |
| LONG PLAINS | L7000N | 0 | 50 | 700 | 36 |
| LONG PLAINS | L6000N | 100E | 50 | 800 | 37 |
| LONG PLAINS | L5000N | 150E | 60 | 1,000 | 38 |
| LONG PLAINS | L5000N | 125W | 50 | 550 | 38 |
| LONG PLAINS | L4000N | 100E | 45 | 575 | 39 |
| LONG PLAINS | L3250N | 380E | 50 | 625 | 40 |
| LONG PLAINS | L1750N | 150E | 50 | 400 | 41 |

On a traverse where the magnetic profile has steep gradients and irregular features, the main magnetic anomaly has been used to estimate the width and near-surface location of the main iron-bearing zone. An example of such a profile is that observed on Traverse L5000N at Long Plains (Fig. 38). The central features of this profile are determined largely by the distribution, grade, and magnetic properties of the near-surface iron ore. The drilling recommendation on such a traverse has been made on the assumption that the iron-bearing zone indicated by the magnetic anomaly extends to depth, and that its location at depth corresponds approximately to the main magnetic anomaly. This seems a reasonable assumption in the light of drilling already done.

## Northern Area, Savage River

The magnetic anomalies on Traverses F16A, F12A, F7, and F1A in the north of the Northern Area indicate a large body of iron ore which probably occurs mainly at depth but approaches the surface locally. Drilling is recommended on Traverse F16A (Fig. 18) and on Traverse F1A (Fig. 19) to test the deposits in this area where no drilling has been done. The drill hole on Traverse F16A and the drill hole at 400E on Traverse F1A are designed to test the deposit at depth, although the hole on Traverse F16A is likely also to intersect ore close to the surface. The drill hole at 400W on Traverse F1A is designed to test a local anomaly, which indicates a body of ore close to the surface.

The magnetic profiles on Traverses E7, E5, E2A, and D34A are basically similar in form. Each has a broad component with steep gradients indicating an extensive occurrence of ore near the surface. Each also has a broad base of more moderate gradients (becoming increasingly pronounced from south to north), indicating the presence of ore at depth and suggesting that the deposit increases in width at depth. The magnetic results indicate a major occurrence of ore in this area, in which two holes have been drilled to date. The drill holes intersected ore corresponding to the magnetic anomaly. The drilling results for Traverse E5 are shown in Figure 7. Two drill holes are recommended for further testing in this area (Fig. 20), one between Traverses E2A and D34A sited 200 feet south of 300E, and the other 50 feet south of 0 on Traverse E2A. The latter is a vertical hole to test the continuity of the deposit with depth. Drilling is also recommended on Traverse D34A (Fig. 21).

The magnetic profile on Traverse D23A is relatively smooth and is different in form from those observed on Traverses D30 and D18A, where drilling has been done. The anomaly has a lower amplitude, more moderate gradients, and a smaller width than the anomalies on Traverses D30 and D18A, and is probably due to two or more fairly closely spaced concentrations of ore forming a narrow zone. A drill hole is recommended to test the anomaly on Traverse D23A (Fig. 22). The drilling results for Traverse D30 are shown in Figure 8.

Reasonably broad anomalies with steep gradients were observed on Traverses C33, C28A, C28D, H1, and H1A in the south of the Northern Area; they correspond approximately to a topographical ridge. The magnetic results indicate an extensive occurrence of ore close to the surface. This is supported by an ore outcrop observed on some of the traverses. Drilling on Traverses C33, C28A, and H1 intersected ore at depth. The drilling results for Traverses C33 and C28A are shown in Figures 10 and 11 respectively. Drilling on Traverse H1 intersected ore at a depth of more than 1,200 feet beneath the ridge. Drilling recommended on Traverse H1 to test the deposit at shallower depth is shown in Figure 23, which also shows the results of drilling for the completed hole on Traverse H1.

## Central Area, Savage River

As considerable drilling has already been done in this area (Table 1), additional drilling is recommended on only a few traverses.

Two drill holes are recommended on Traverse C3 (Fig. 24) at the north of the Central Area. The one sited at 50W is designed to test the anomaly that extends from about 50W to 300W. The one sited at 300W is designed to test the broader anomaly that extends from about 300W to 700W and corresponds to the ridge. Both anomalies are probably due to several fairly closely spaced concentrations of ore coming close to the surface.

A drilling recommendation is given on Traverse COB8 (Fig. 25) to test a broad anomaly with steep gradients indicating an extensive occurrence of ore. Drilling has been done on Traverse C, where the magnetic profile is similar in form to that observed on Traverse COB8. The drilling results for Traverse C are shown in Figure 12.

Drilling is recommended on Traverse B8O (Fig. 26) to test a broad, complex anomaly with steep gradients. The anomaly indicates a broad iron-bearing zone and an extensive mass of ore close to the surface. The anomaly has some similarity to that observed on Traverse B8 but is not as broad. Drilling has been done on Traverse B8, and the results of drilling are shown in Figure 13. The anomaly on Traverse BO8 is probably due to concentrations of medium-grade ore separated by low-grade ore and barren rock, as on Traverse B8.

Drilling is recommended on Traverse 4500S, which is the southernmost traverse in the Central Area. This recommendation is more appropriately discussed with the drilling recommendations for the Southern Area.

### Southern Area, Savage River

No drilling has been done in this area, where three separate ore deposits are indicated by the magnetic results (Plate 10).

The most interesting anomaly in the Southern Area is continuous with the anomaly at the south of the Central Area and extends south to beyond Traverse 6500S. The anomaly is fairly uniform along strike and indicates a deposit striking in a northerly direction. The cause of the magnetic irregularities in the vicinity of Traverse 5500S is not known, but they may be associated with faulting.

Drilling is recommended on Traverse 4500S (Fig. 27 and Fig. 3), Traverse 5400S (Fig. 28), and Traverse 6000S (Fig. 29) to test this deposit. The anomalies are relatively smooth and indicate a main orebody corresponding to the peak of the anomaly. The recommended drill holes are designed to intersect this body. The magnetic profile indicates that a second, but less important, body occurs to the east of the main body.

The other two anomalies occur in the southern part of the area and indicate two bodies of ore striking in a northerly direction and plunging towards the south. The bodies crop out on Traverse 9000S. The irregularities in the western anomaly on this traverse are due to the influence of near-surface ore. The bodies do not appear to extend as far north as Traverse 8500S, where the weak anomaly observed is probably due to basalt. The anomalies indicate that the eastern deposit is broader than the western deposit but plunges to the south more steeply.

Drilling is recommended on Traverse 9000S (Fig. 30) to test the eastern deposit, and on Traverse 9500S (Fig. 31) to test both deposits. The observed magnetic profile on Traverse 10,000S was compared with a similar theoretical profile calculated for two parallel veins (Fig. 4).

### Long Plains Area

In this area the only hole drilled is located near the northern end of the deposits. The drilling results for this hole are shown in Figure 17.

Recommendations for drilling to test the Long Plains deposits, which extend for about two miles, are made on ten traverses spaced at intervals ranging from 750 to 1,500 feet (Table 2). A discussion of the magnetic results is given only for the traverses on which drilling is recommended.

Traverse L11,250N (Fig. 32) is situated near the northern end of the Long Plains deposits in an area that is highly disturbed magnetically. The magnetic profile indicates an iron-bearing zone about 600 feet wide. The smooth anomaly between about 400E and 550E indicates a body of ore about 70 feet wide. The anomaly with very steep gradients between about 200E and 350E indicates a body of ore about 125 feet wide coming very close to the surface. Drilling is recommended to test these anomalies. The anomaly between 200W and 200E is very irregular, probably owing to the influence of near-surface iron.

On Traverse L10,250N (Fig. 33) the magnetic profile indicates an iron-bearing zone more than 400 feet wide. However, the main anomaly is west of 125E and indicates a zone about 320 feet wide in which the ore occurs as several bodies coming close to the surface. Drilling is recommended to test the iron-bearing zone over its full width.

On Traverse L9250N (Fig. 34) the anomaly indicates an iron-bearing zone about 300 feet wide in which the ore occurs as several bodies coming close to the surface. A drill hole is recommended to test this zone.

On Traverse L8000N (Fig. 35) the main anomaly with peak at 275W indicates that the ore occurs mainly as a single body in a zone about 120 feet wide. Drilling of this anomaly is recommended. A sharp, narrow anomaly with peak at the baseline indicates a shallow, narrow body of ore; this is likely to be of less economic interest.

On Traverse L7000N (Fig. 36) the anomaly indicates an iron-bearing zone about 400 feet wide in which the ore occurs as several bodies coming close to the surface. Two drill holes are recommended to test this broad zone. The observed magnetic profile on this traverse was compared previously with a theoretical profile calculated for a series of parallel veins (Fig. 5).

On Traverse L6000N (Fig. 37) the anomaly indicates an iron-bearing zone about 270 feet wide in which the ore occurs as several bodies coming close to the surface. A drill hole is recommended to test this zone.

On Traverse L5000N (Fig. 38) the anomaly indicates an iron-bearing zone about 450 feet wide in which the ore occurs as several bodies coming close to the surface. Two drill holes are recommended to test this broad zone.

On Traverse L4000N (Fig. 39) the main anomaly is located west of zero and indicates an iron-bearing zone about 220 feet wide in which the ore occurs as several bodies coming close to the surface. A sharp, narrow anomaly with peak at 25E indicates a narrow, near-surface body; this is likely to be of less interest. The recommended drill hole will test both these anomalies.

On Traverse L3250N (Fig. 40) the magnetic profile is relatively smooth and has a broad base with moderate gradients. Steeper gradients are observed locally. The anomaly is possibly due to the combined influence of a wide body of ore at depth, located east of zero, and relatively narrow bodies of ore coming close to the surface.

On Traverse L1750N (Fig. 41) the anomaly indicates that the ore occurs in a single body or two closely spaced bodies of total width about 100 feet coming close to the surface and extending to depth. A drill hole is recommended to test this anomaly.

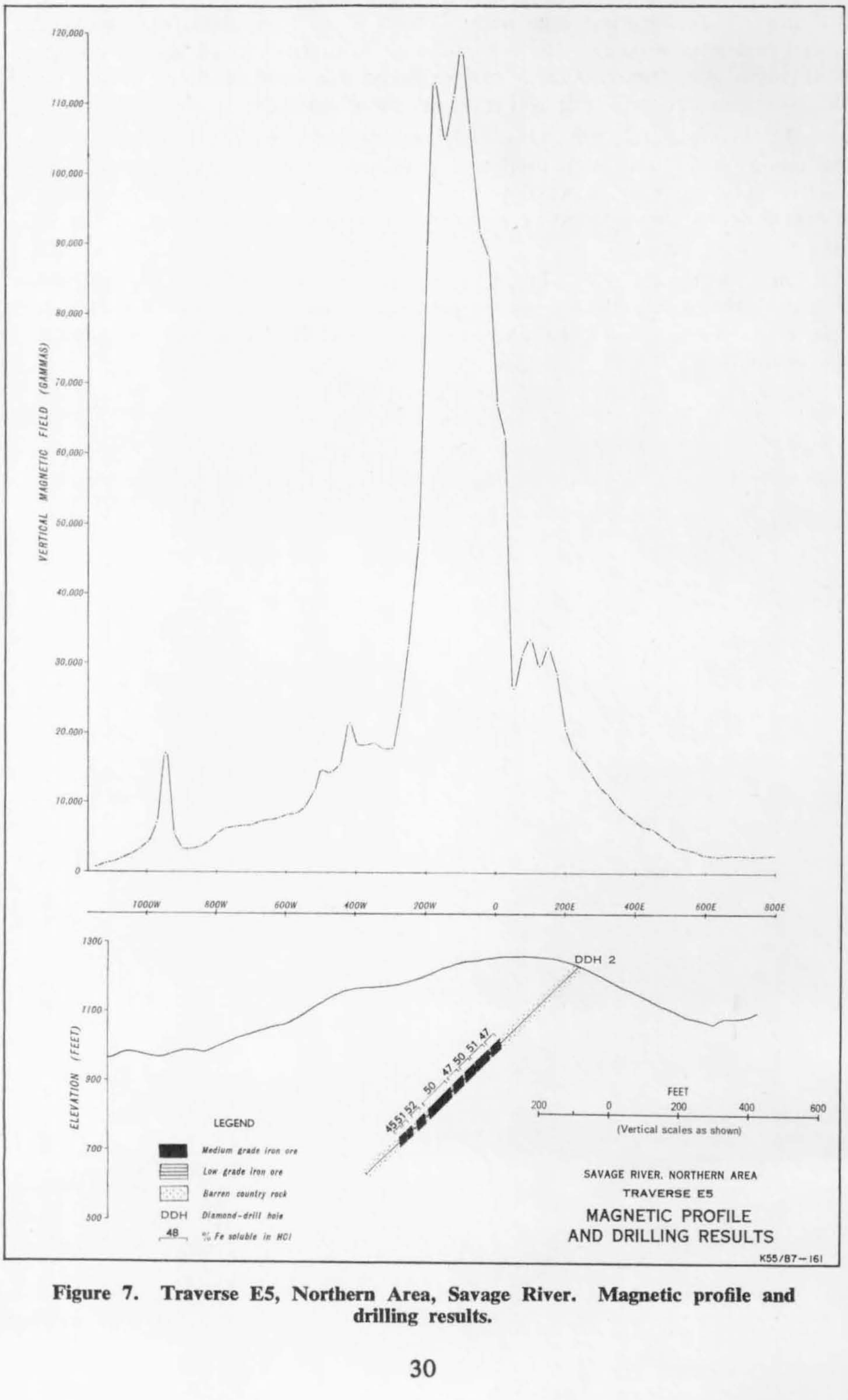


**Figure 7. Traverse E5, Northern Area, Savage River. Magnetic profile and drilling results.**

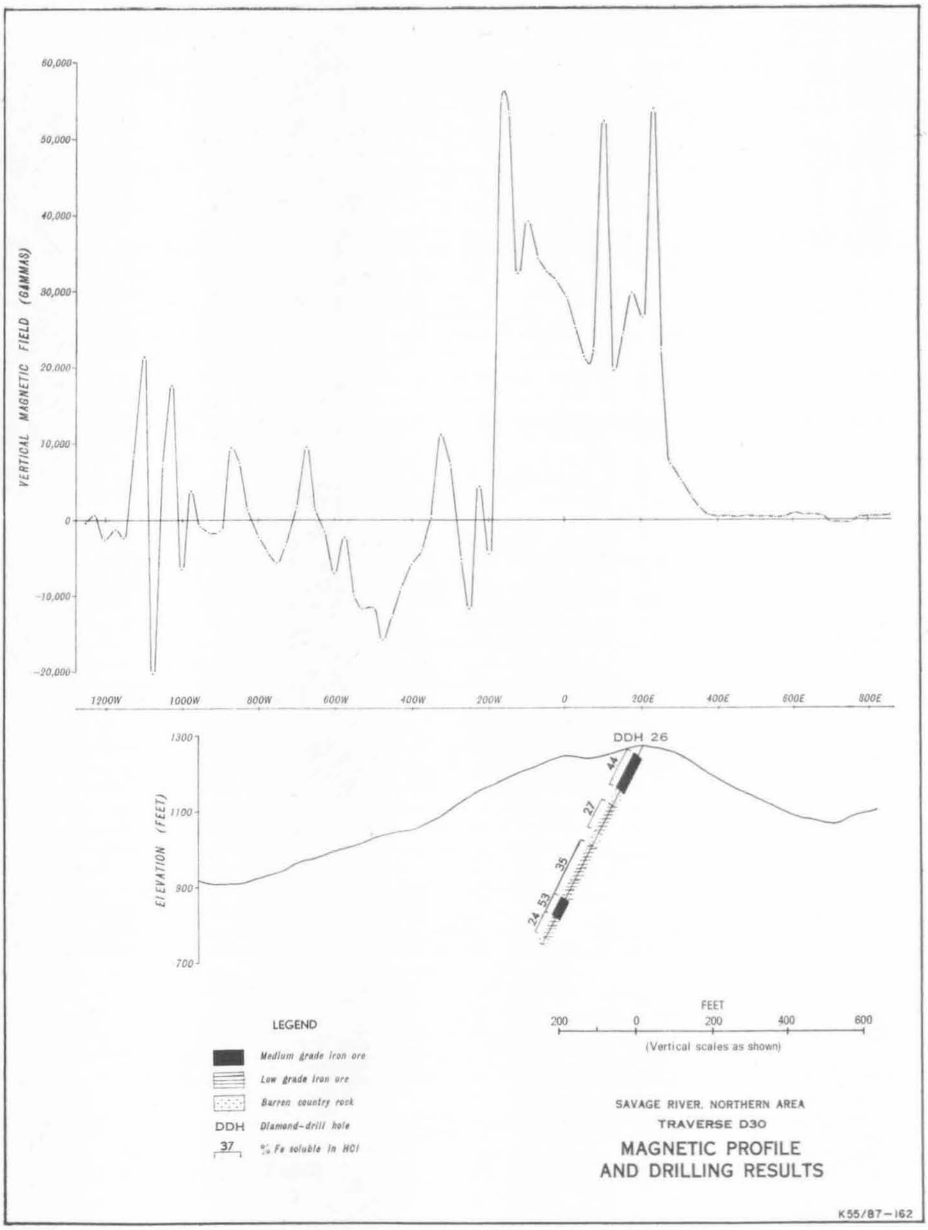


**Figure 8. Traverse D30, Northern Area, Savage River. Magnetic profile and drilling results.**

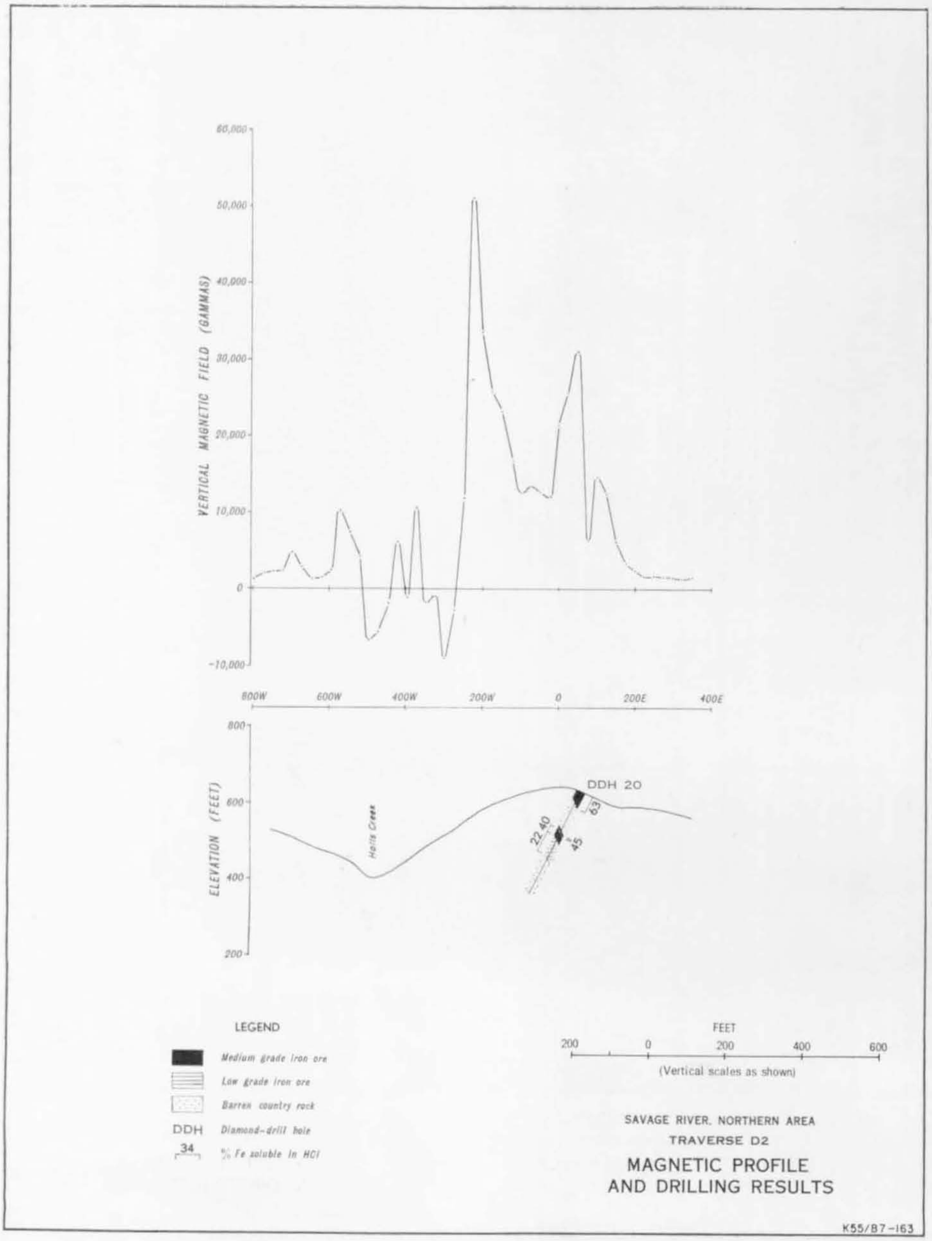


**Figure 9. Traverse D2, Northern Area, Savage River. Magnetic profile and drilling results.**

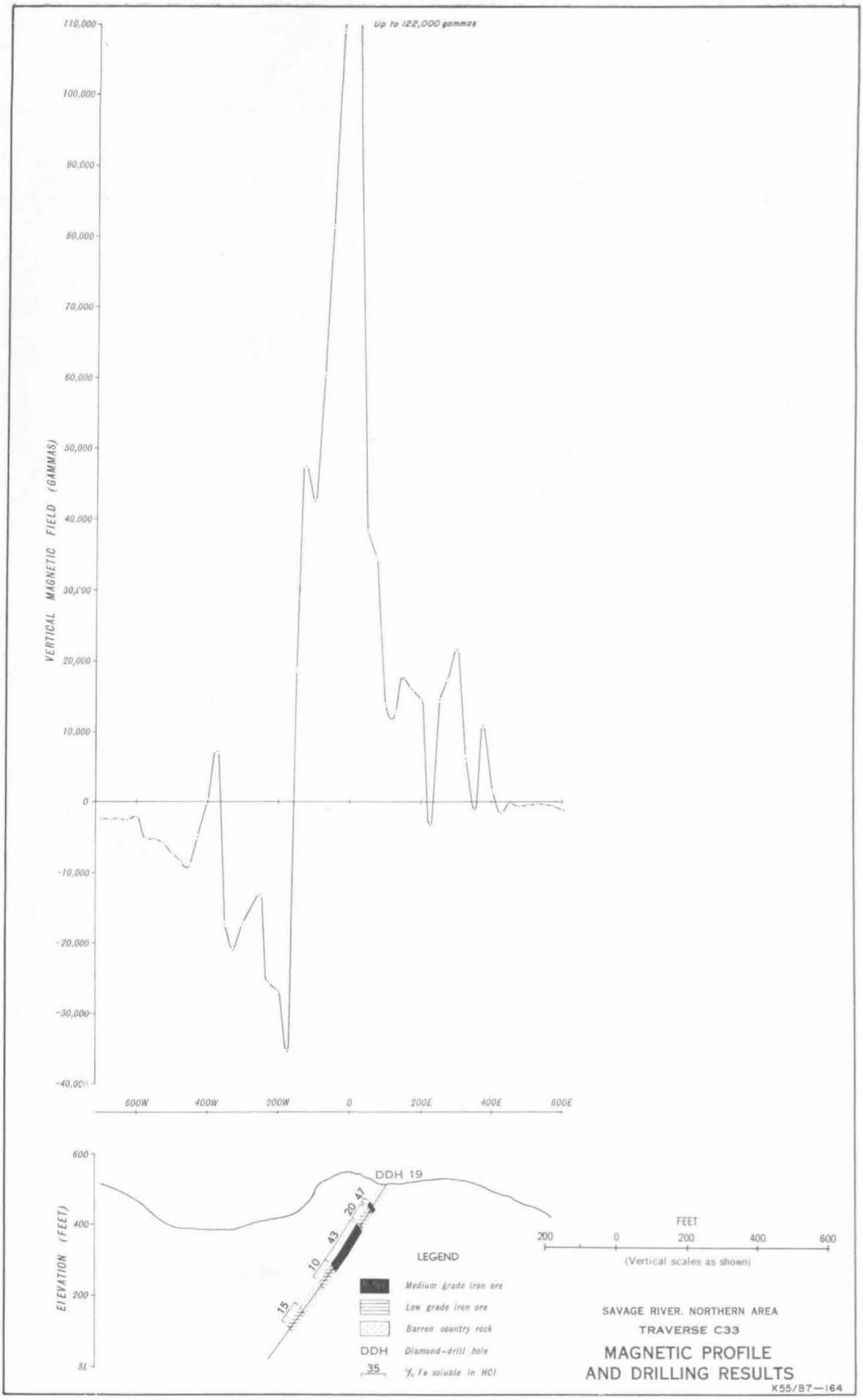


**Figure 10. Traverse C33, Northern Area, Savage River. Magnetic profile and drilling results.**

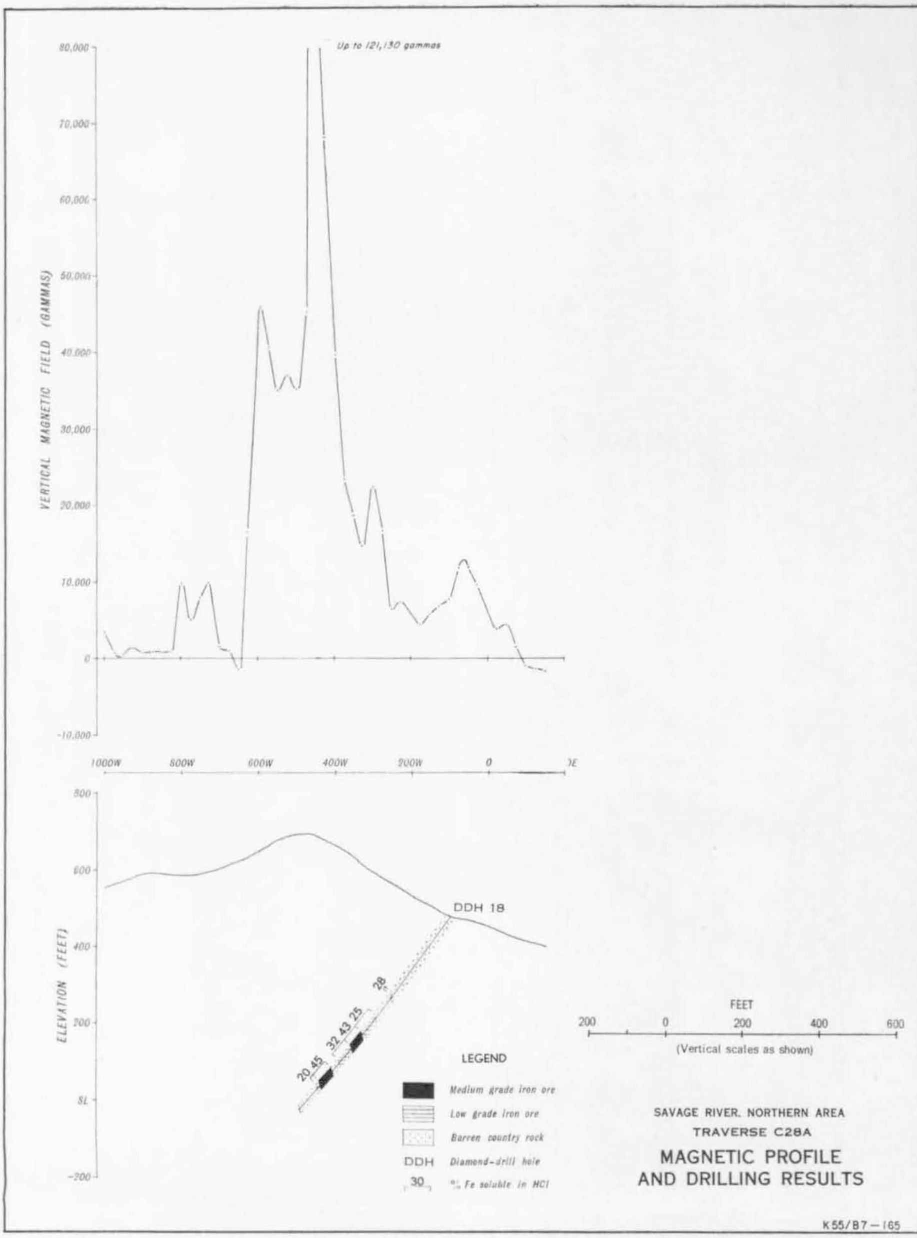


**Figure 11. Traverse C28A, Northern Area, Savage River. Magnetic profile and drilling results.**

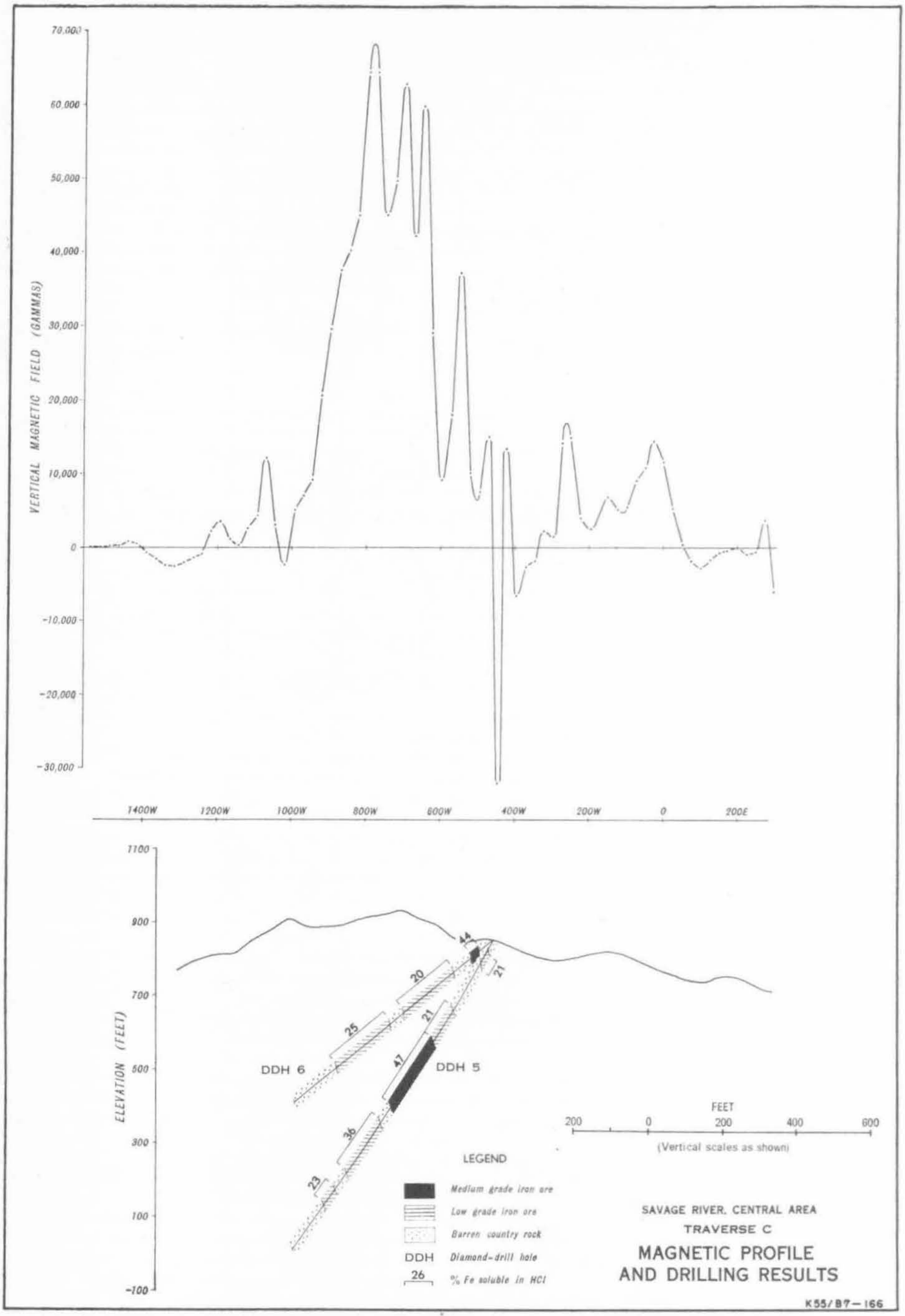


**Figure 12. Traverse C, Central Area, Savage River. Magnetic profile and drilling results.**

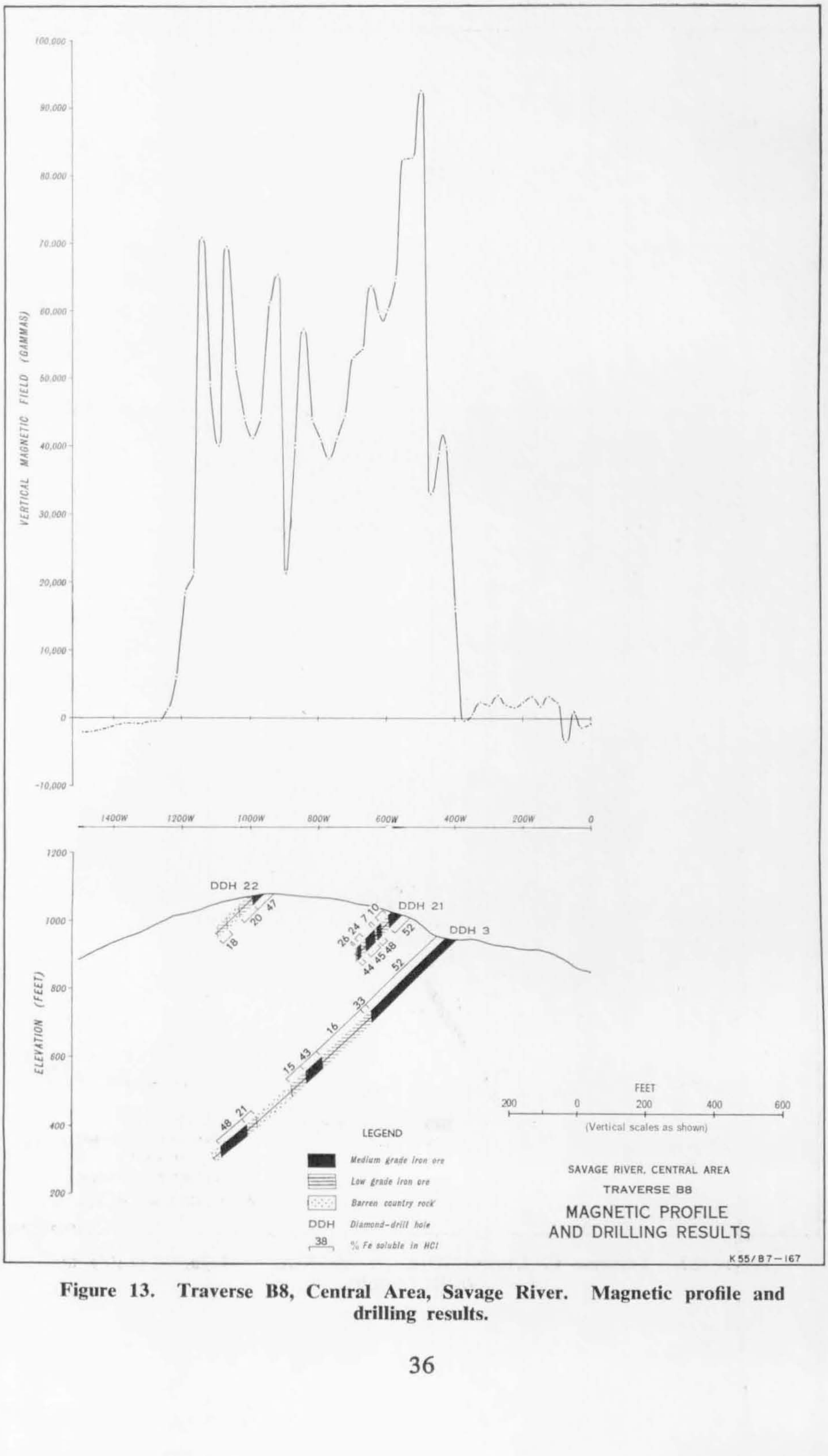


**Figure 13. Traverse B8, Central Area, Savage River. Magnetic profile and drilling results.**

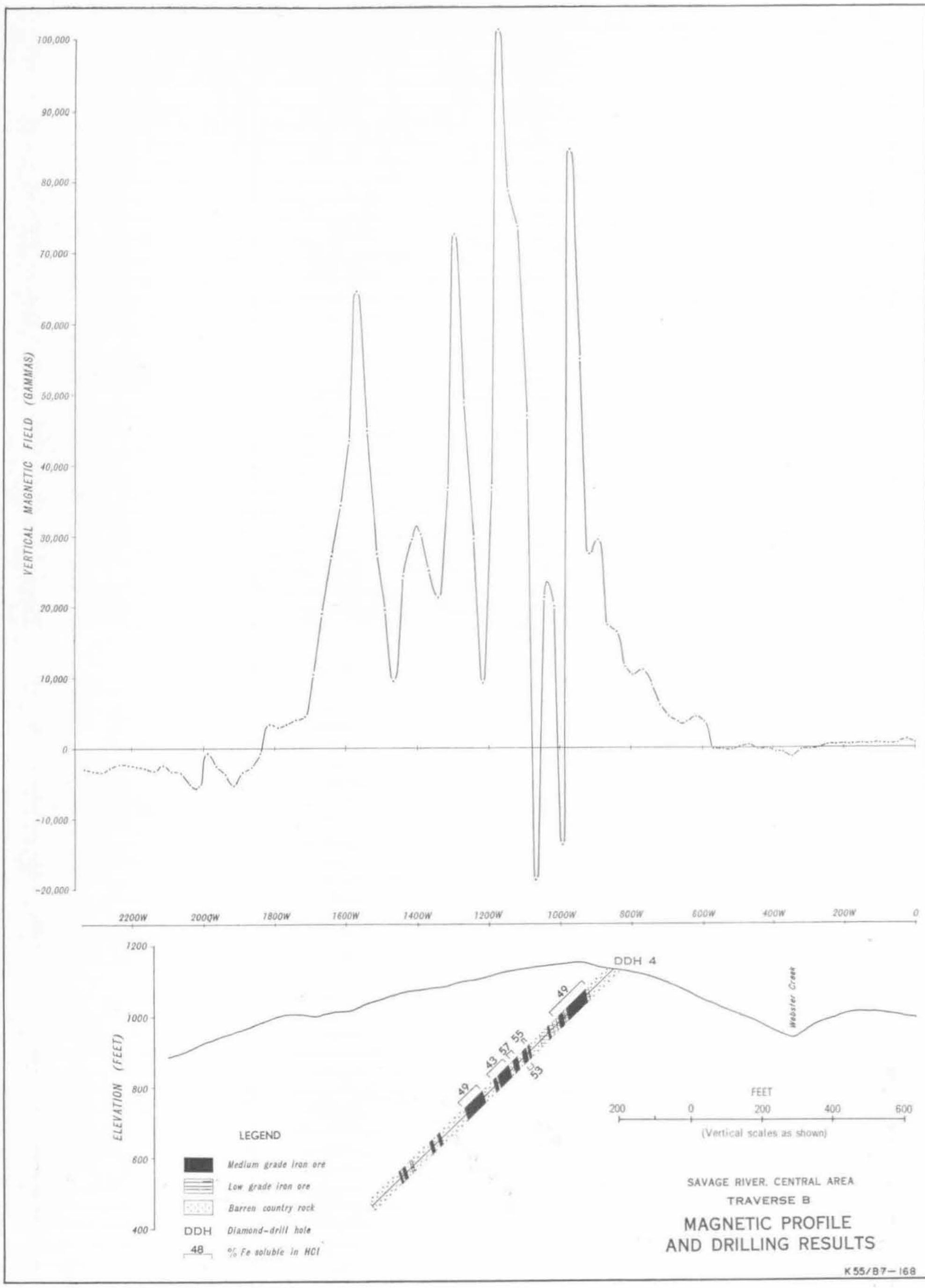


**Figure 14. Traverse B, Central Area, Savage River. Magnetic profile and drilling results.**

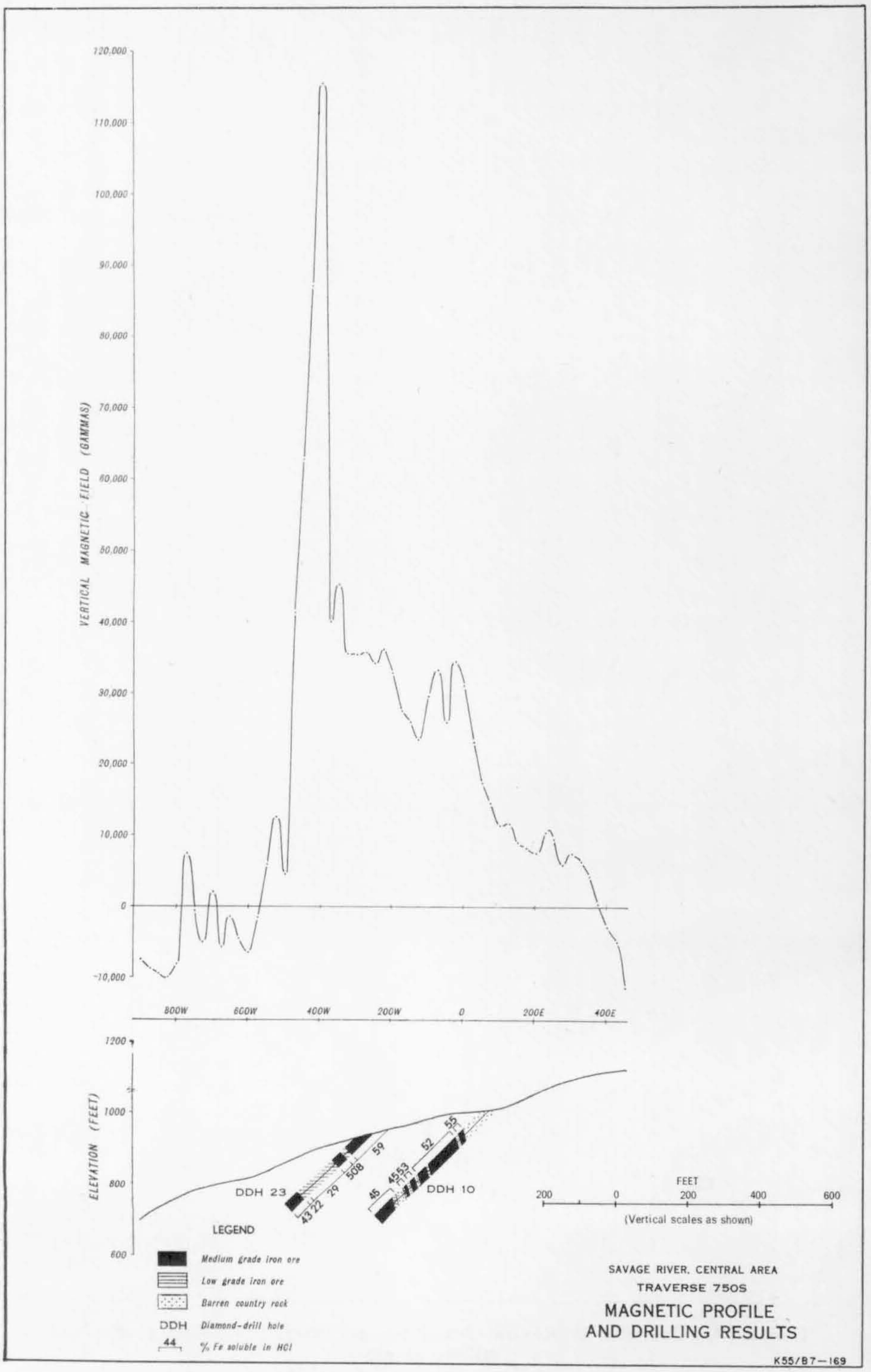


**Figure 15. Traverse 750S, Central Area, Savage River. Magnetic profile and drilling results.**

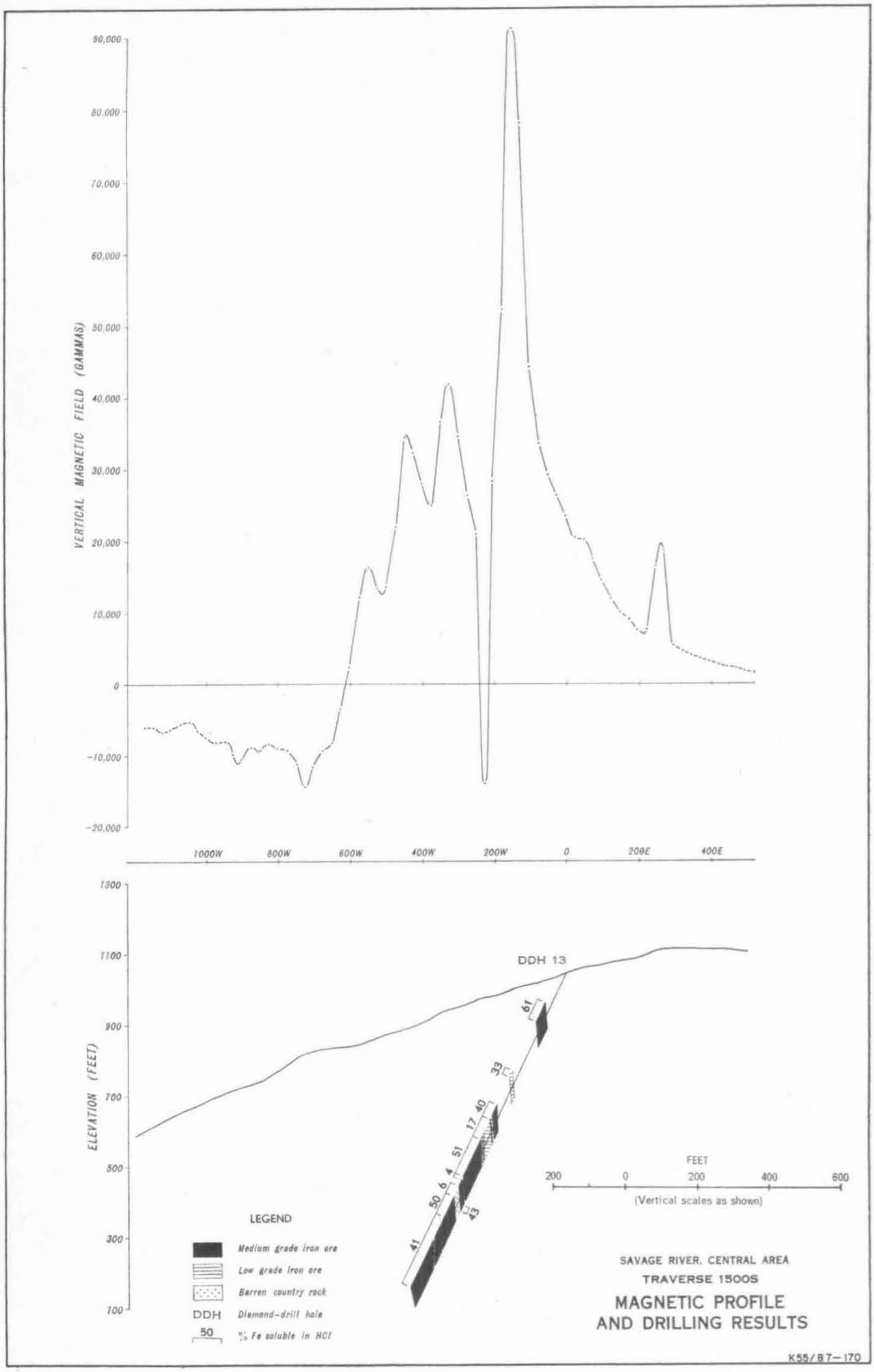


**Figure 16. Traverse 1500S, Central Area, Savage River. Magnetic profile and drilling results.**

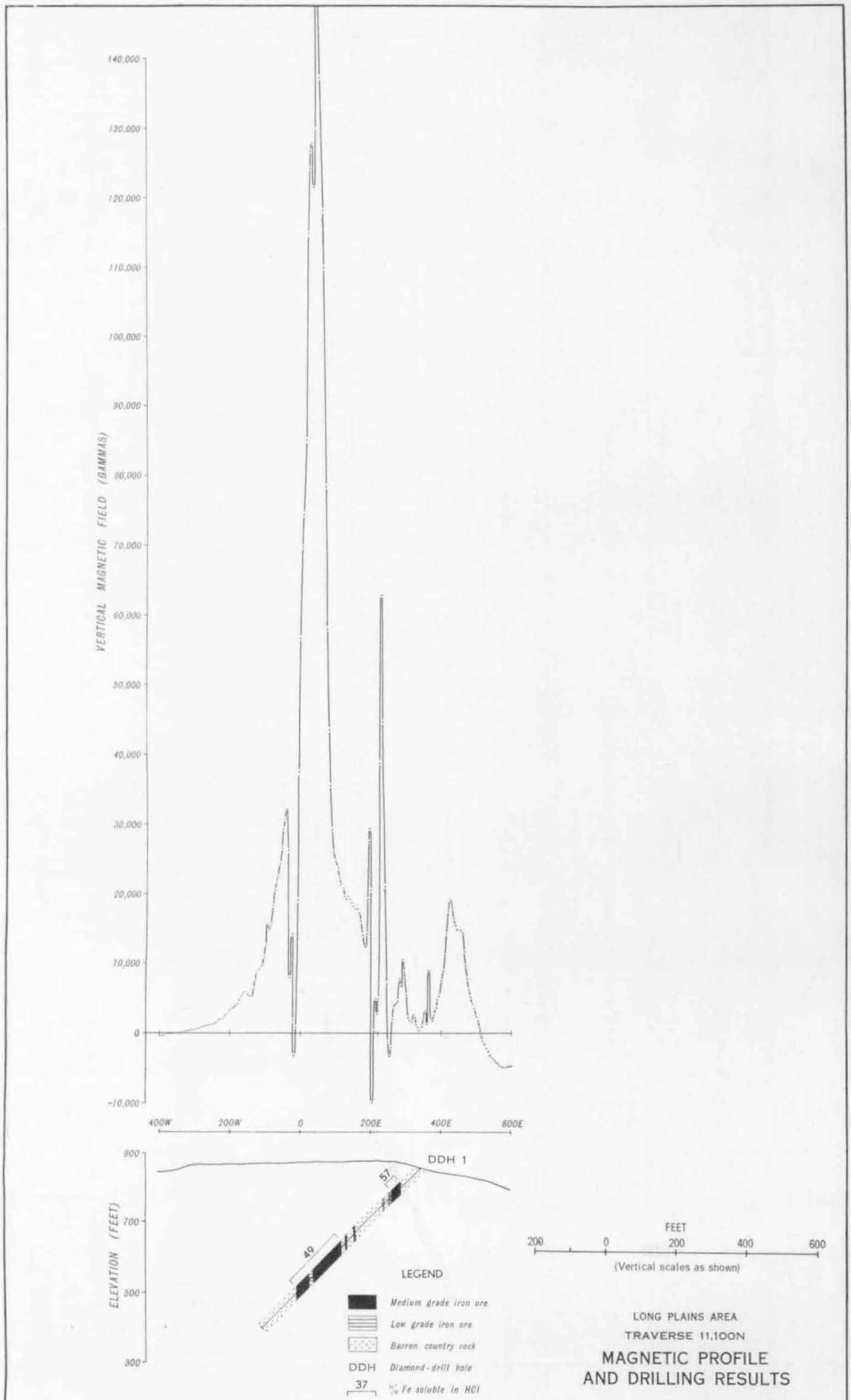


**Figure 17. Traverse L11,100N, Long Plains Area. Magnetic profile and drilling results.**

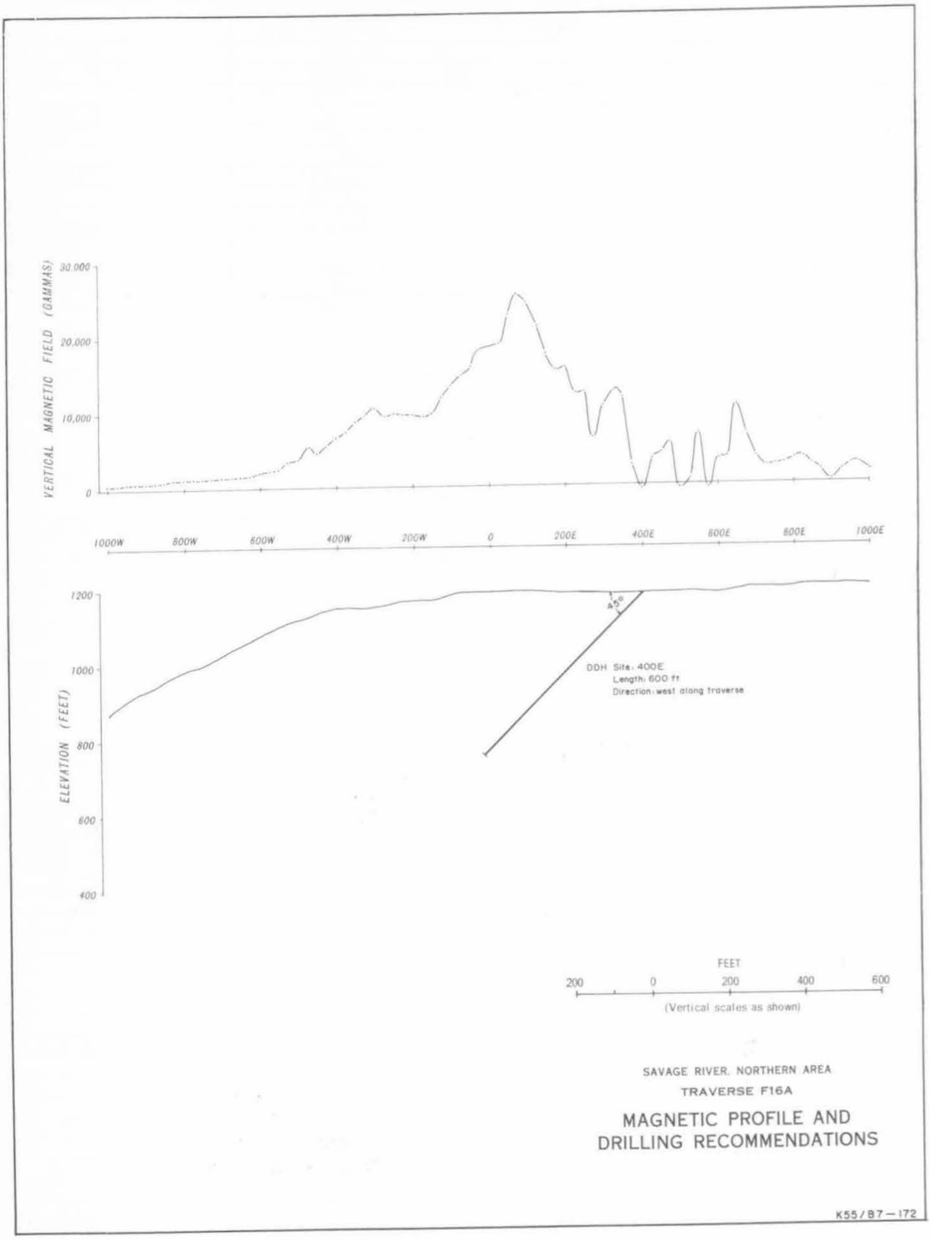


**Figure 18. Traverse F16A, Northern Area, Savage River. Magnetic profile and drilling recommendations.**

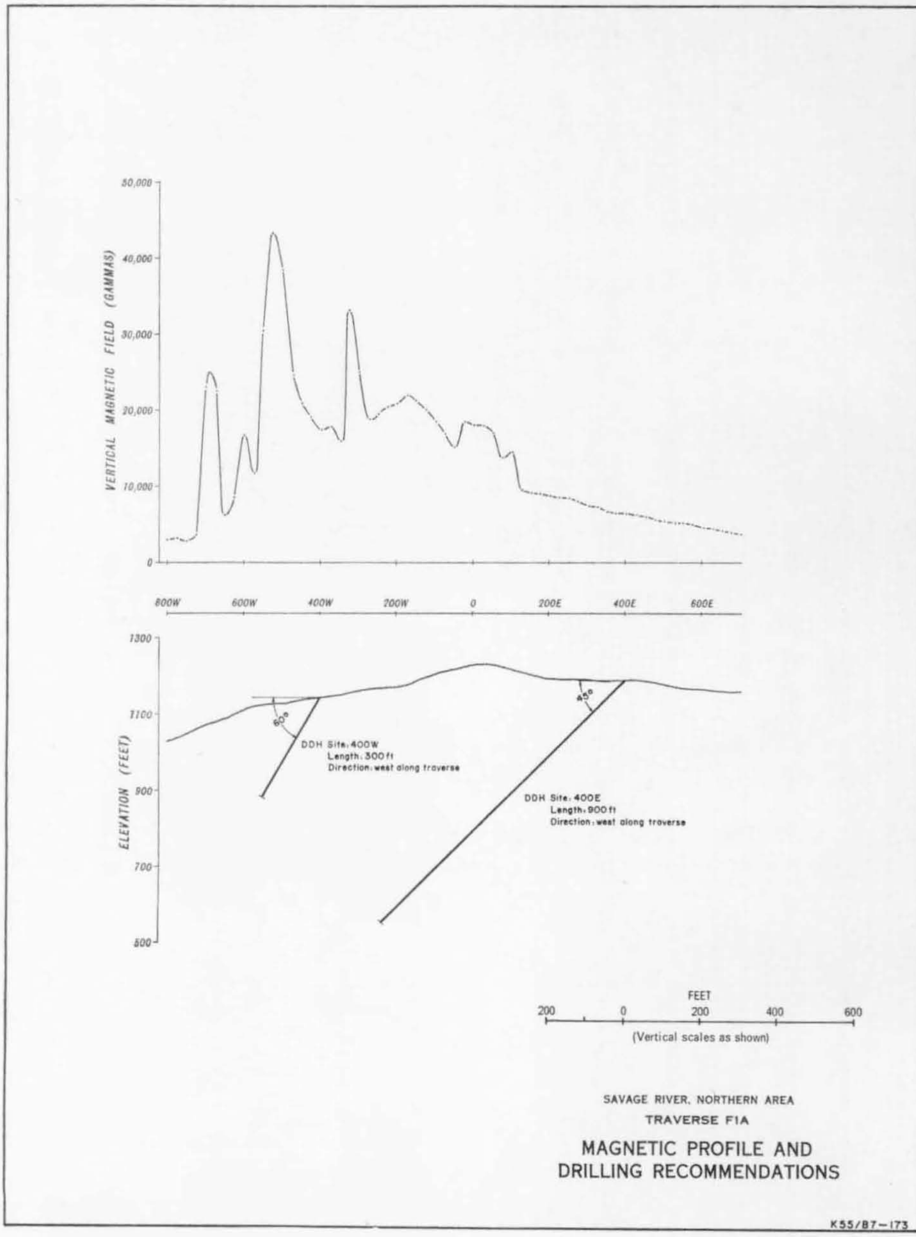


**Figure 19. Traverse F1A, Northern Area, Savage River. Magnetic profile and drilling recommendations.**

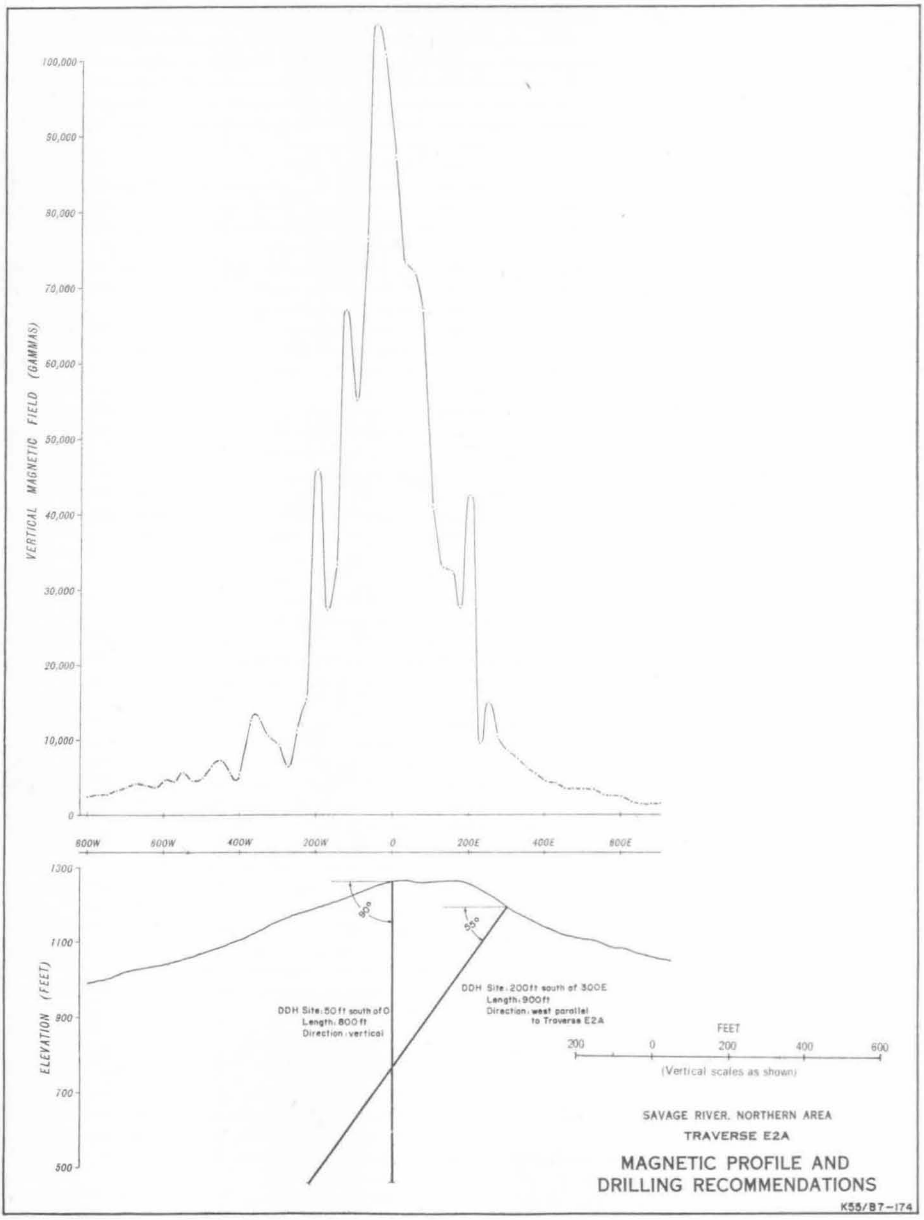


**Figure 20. Traverse E2A, Northern Area, Savage River. Magnetic profile and drilling recommendations.**

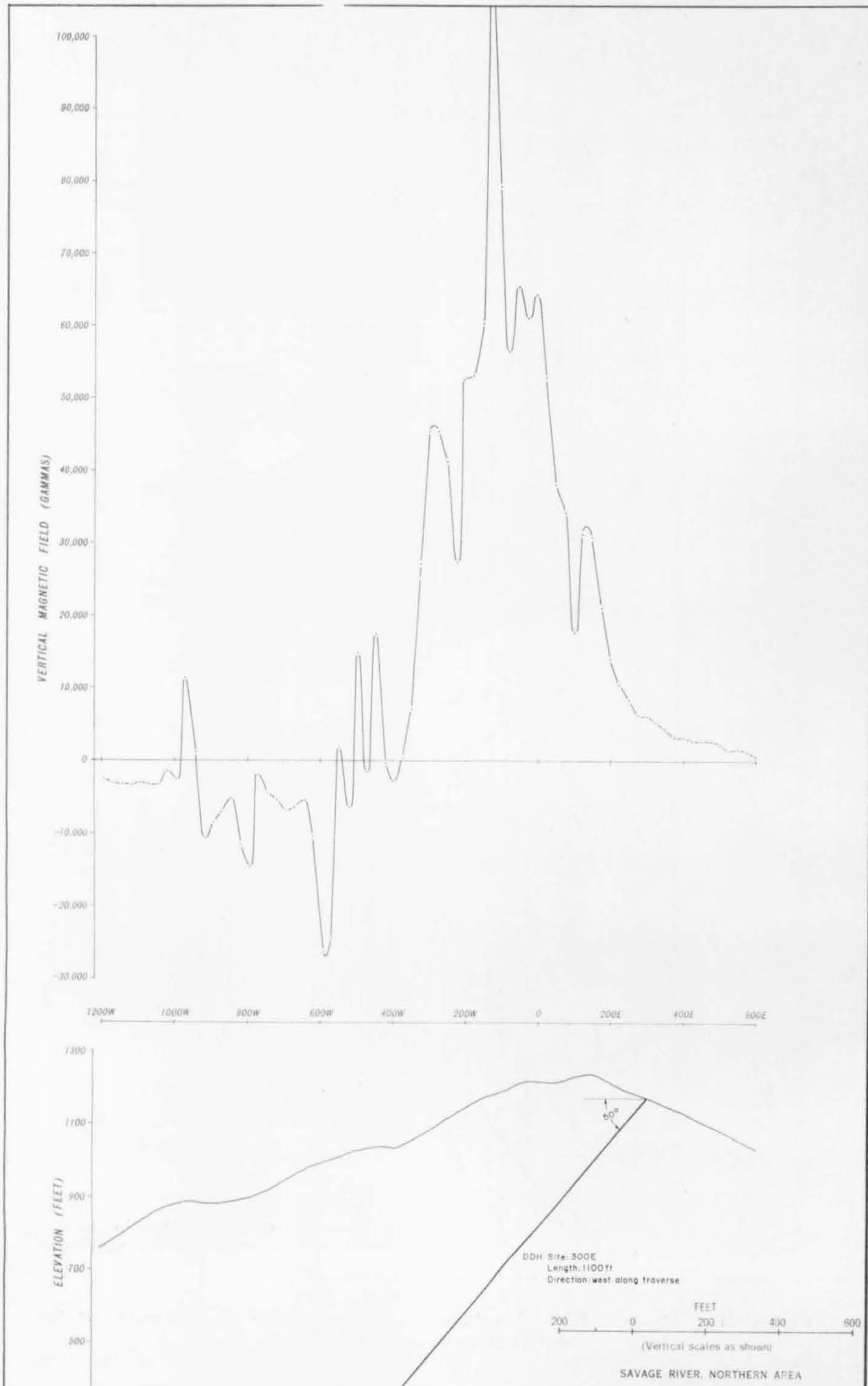


**Figure 21. Traverse D34A, Northern Area, Savage River. Magnetic profile and drilling recommendations.**

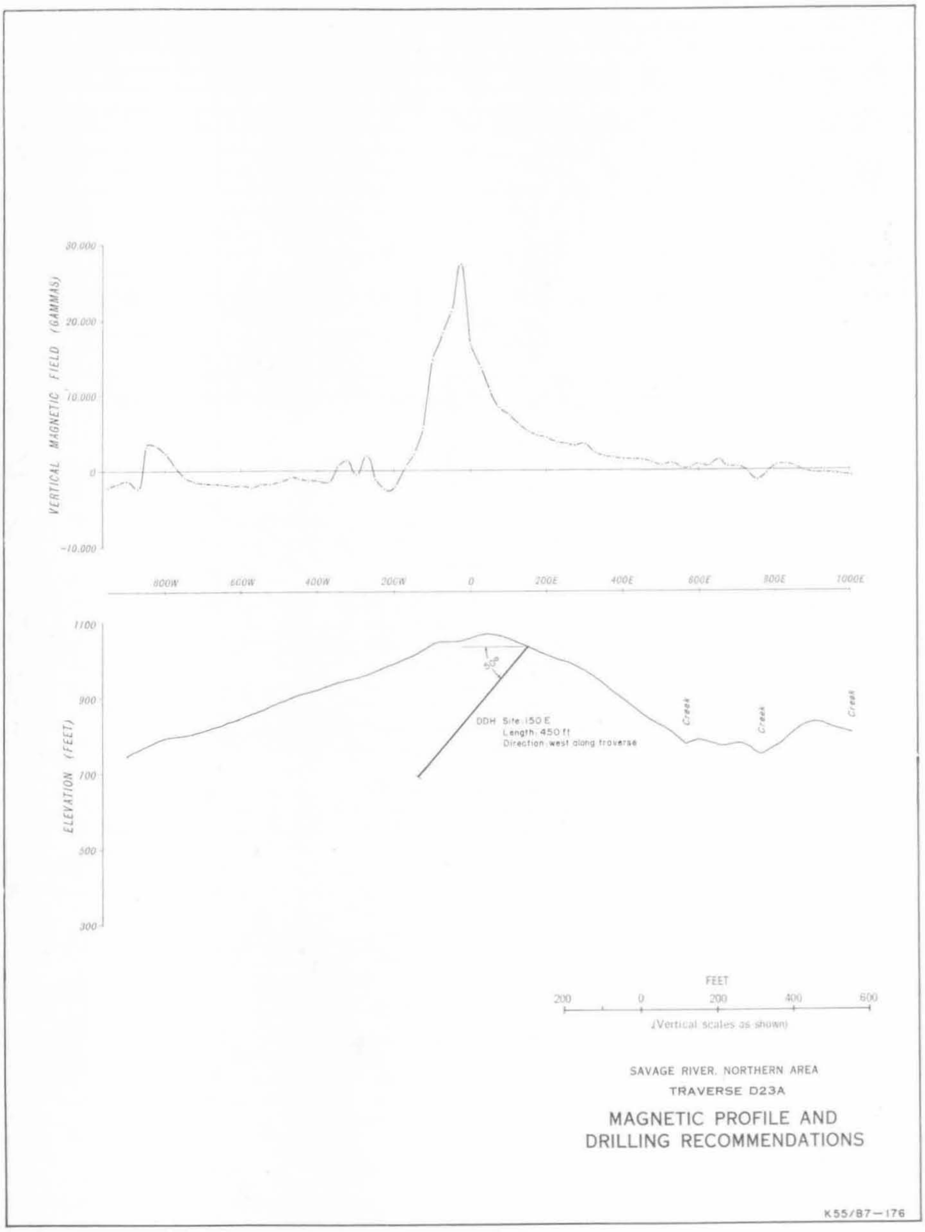


**Figure 22. Traverse D23A, Northern Area, Savage River. Magnetic profile and drilling recommendations.**

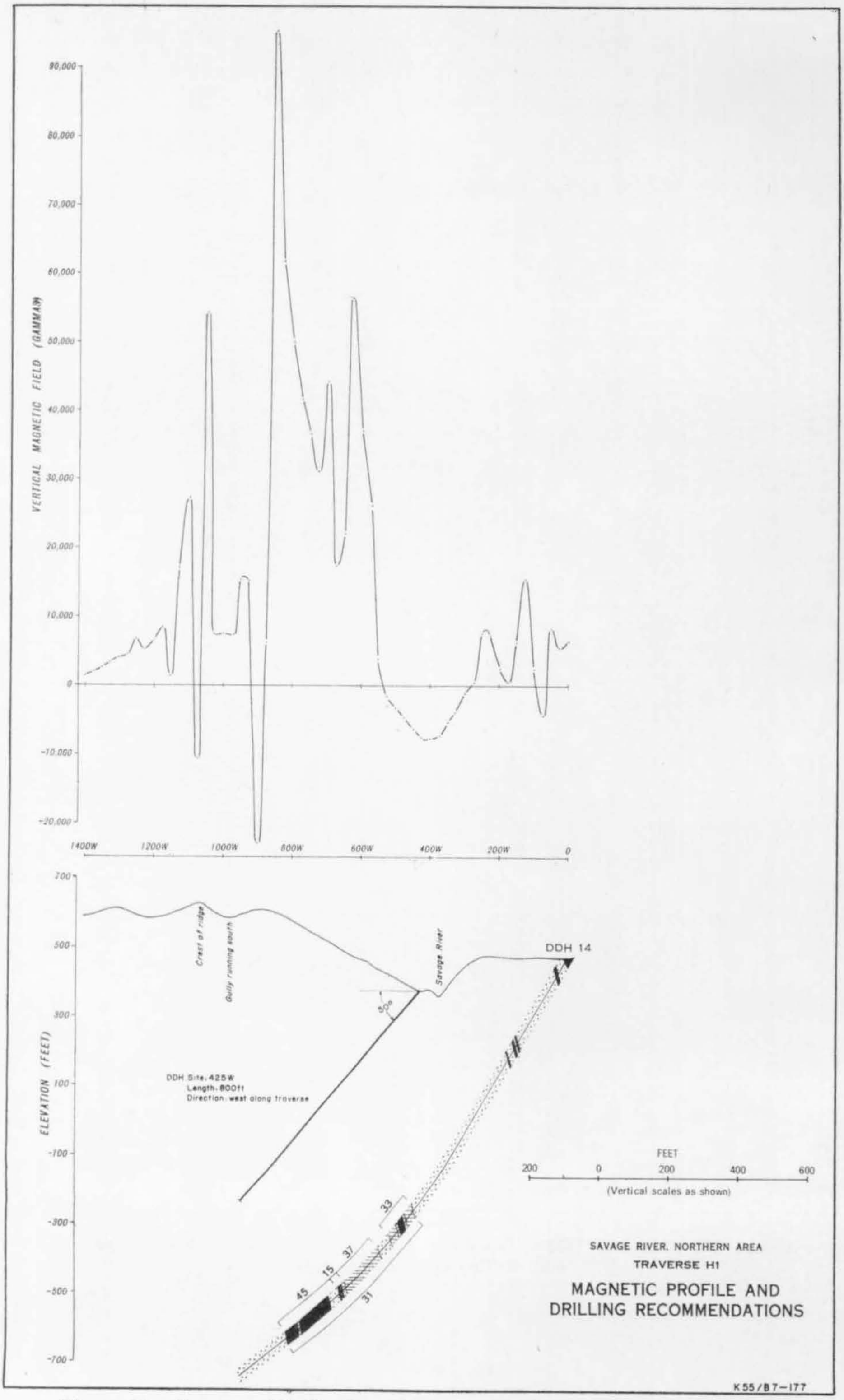


**Figure 23. Traverse H1, Northern Area, Savage River. Magnetic profile and drilling recommendations.**

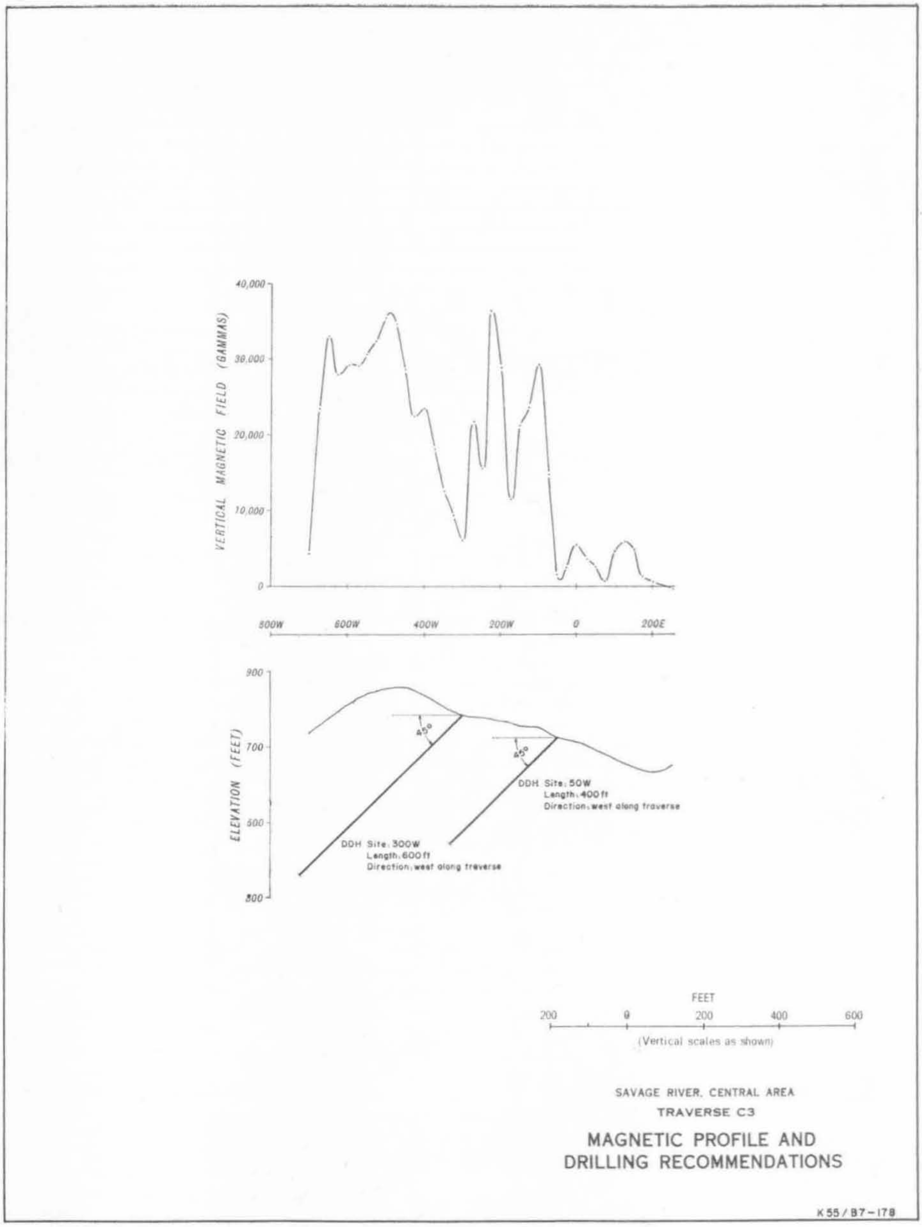


**Figure 24. Traverse C3, Central Area, Savage River. Magnetic profile and drilling recommendations.**

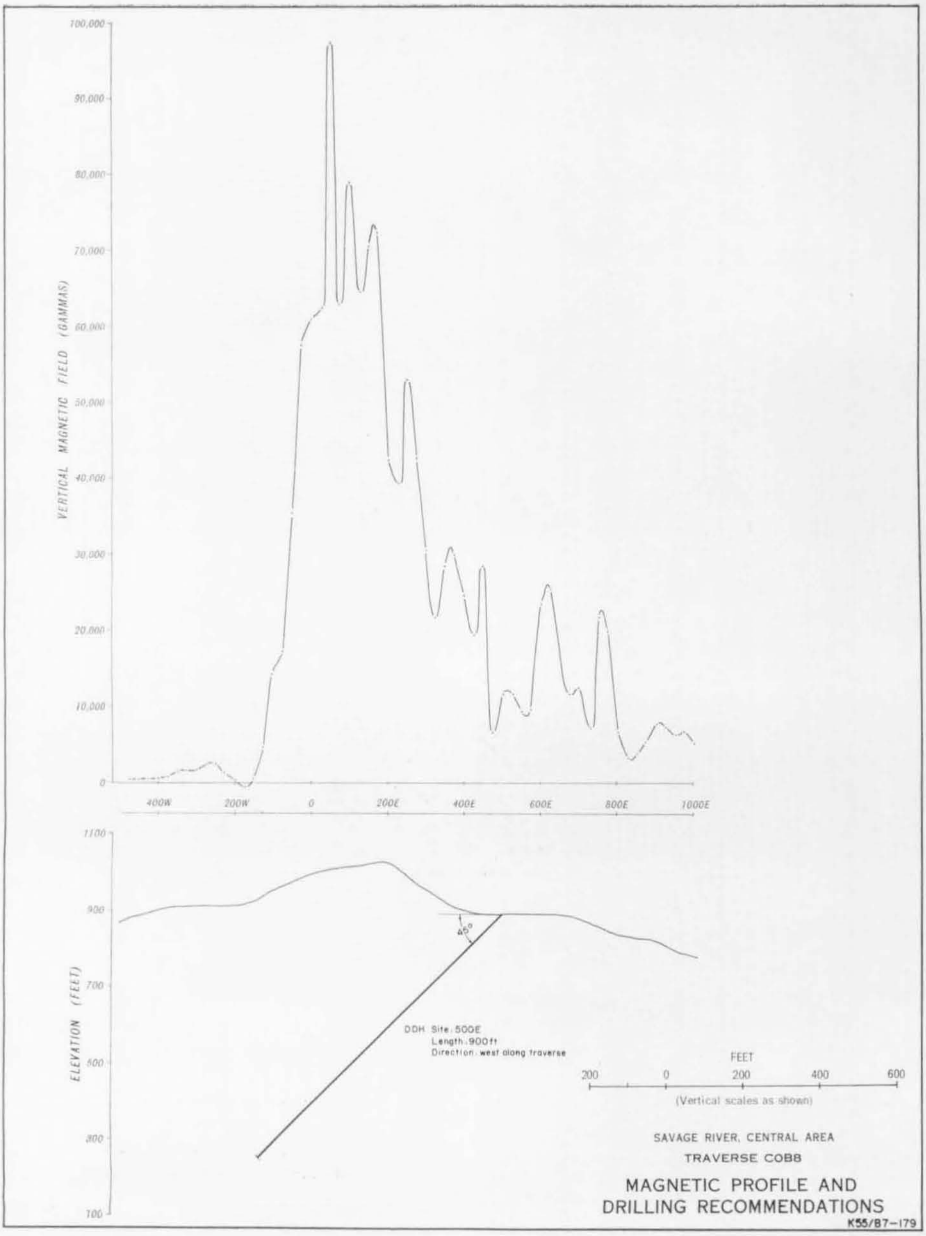


**Figure 25. Traverse COB8, Central Area, Savage River. Magnetic profile and drilling recommendations.**

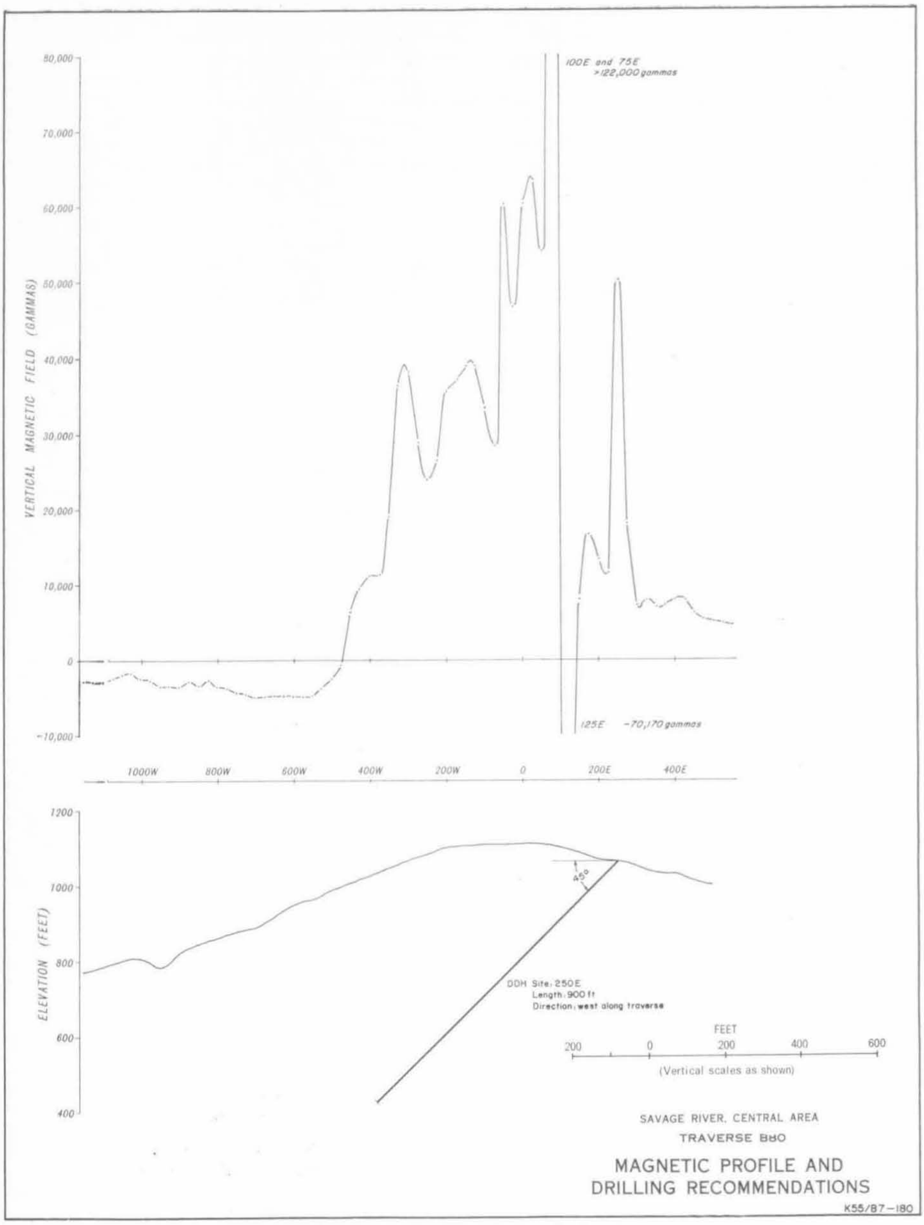


**Figure 26. Traverse B80, Central Area, Savage River. Magnetic profile and drilling recommendations.**

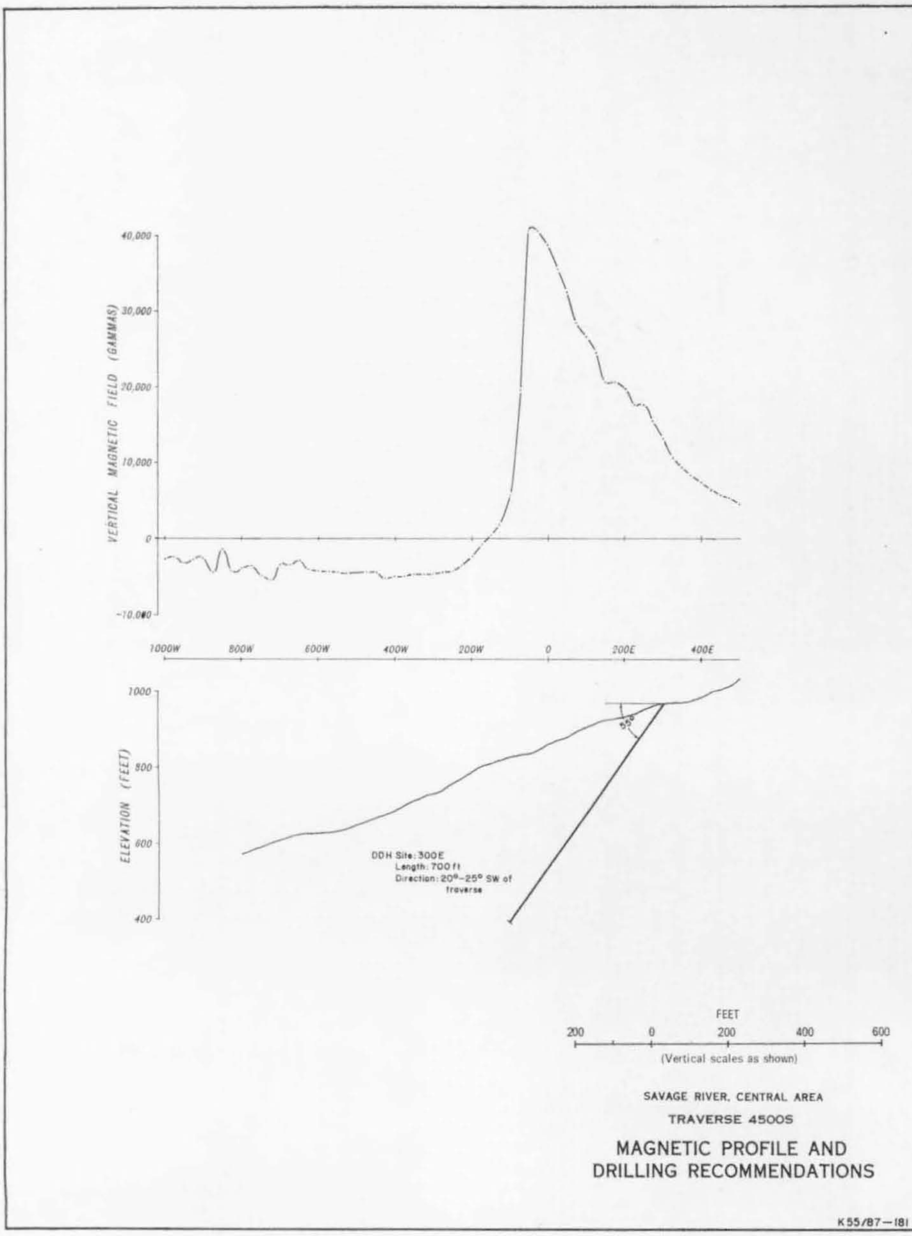


**Figure 27. Traverse 4500S, Central Area, Savage River. Magnetic profile and drilling recommendations.**

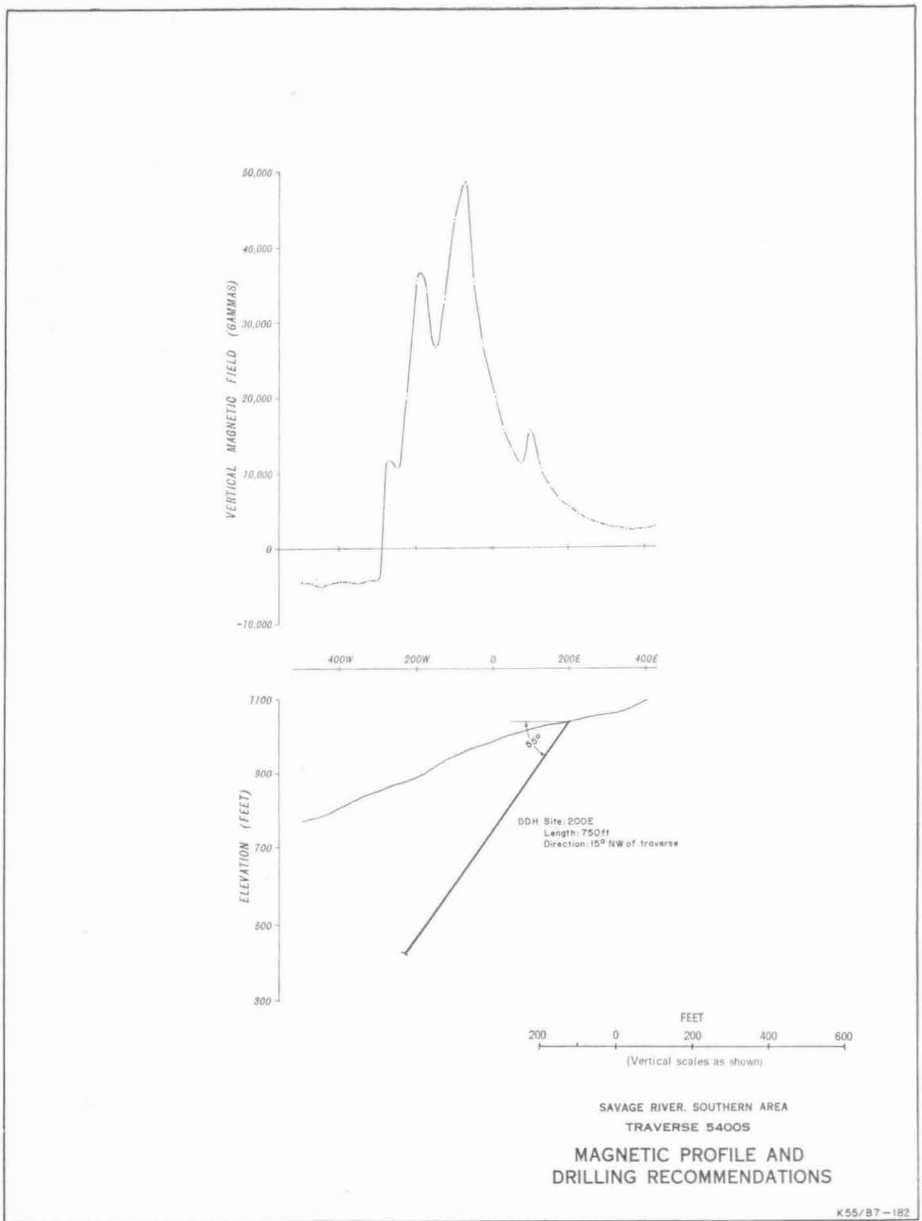


**Figure 28. Traverse 5400S, Southern Area, Savage River. Magnetic profile and drilling recommendations.**

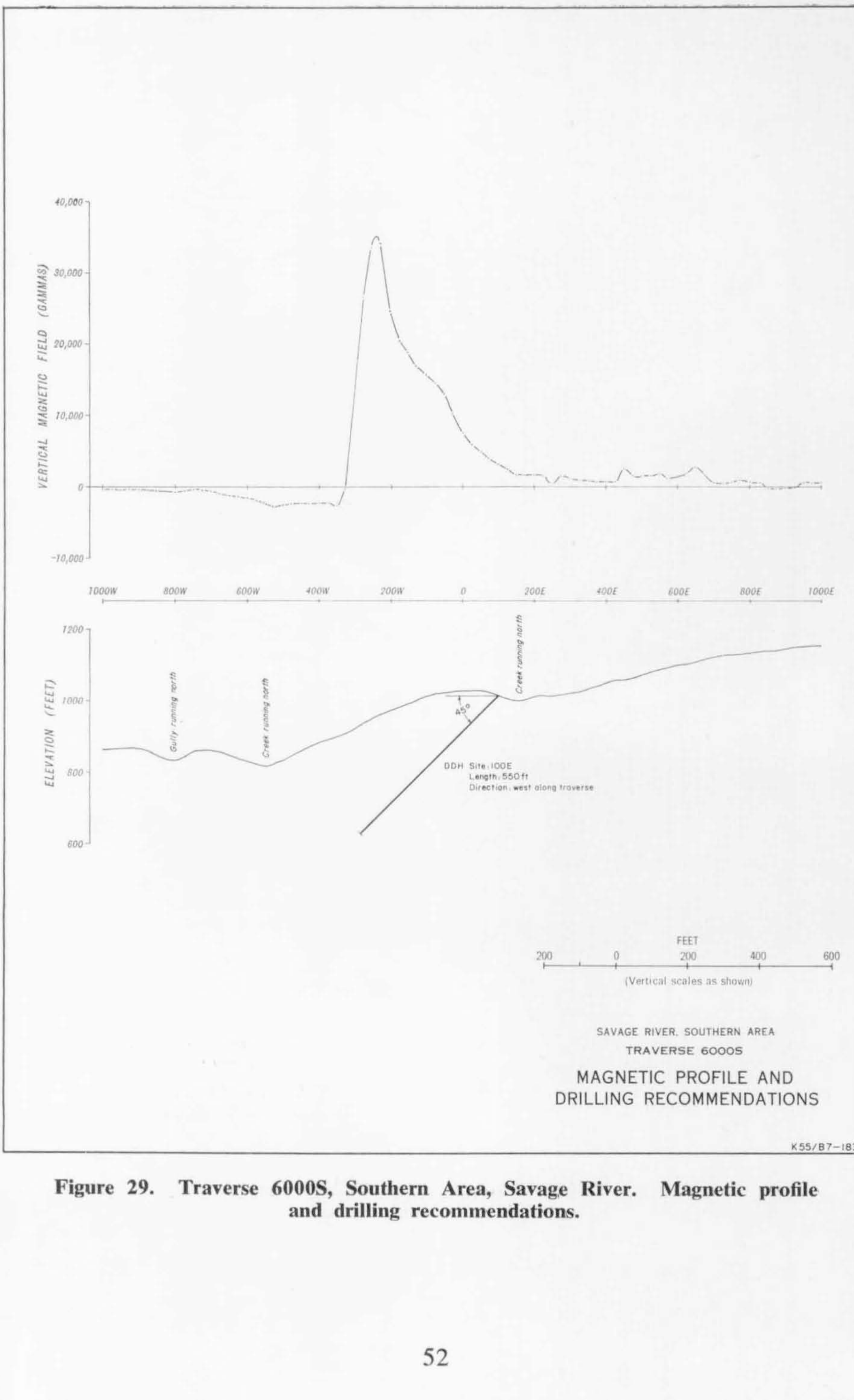


**Figure 29. Traverse 6000S, Southern Area, Savage River. Magnetic profile and drilling recommendations.**

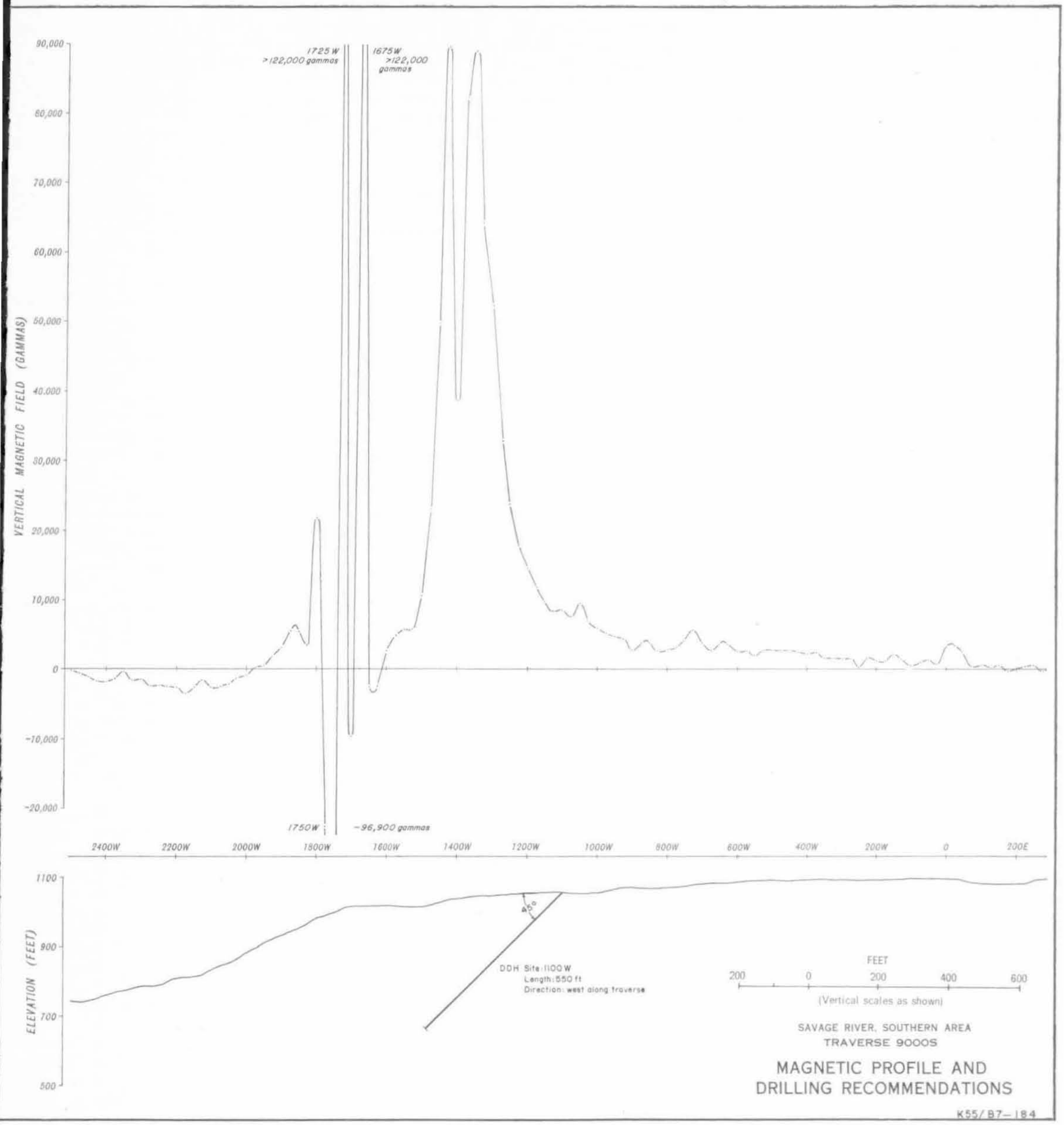


**Figure 30. Traverse 9000S, Southern Area, Savage River. Magnetic profile and drilling recommendations.**

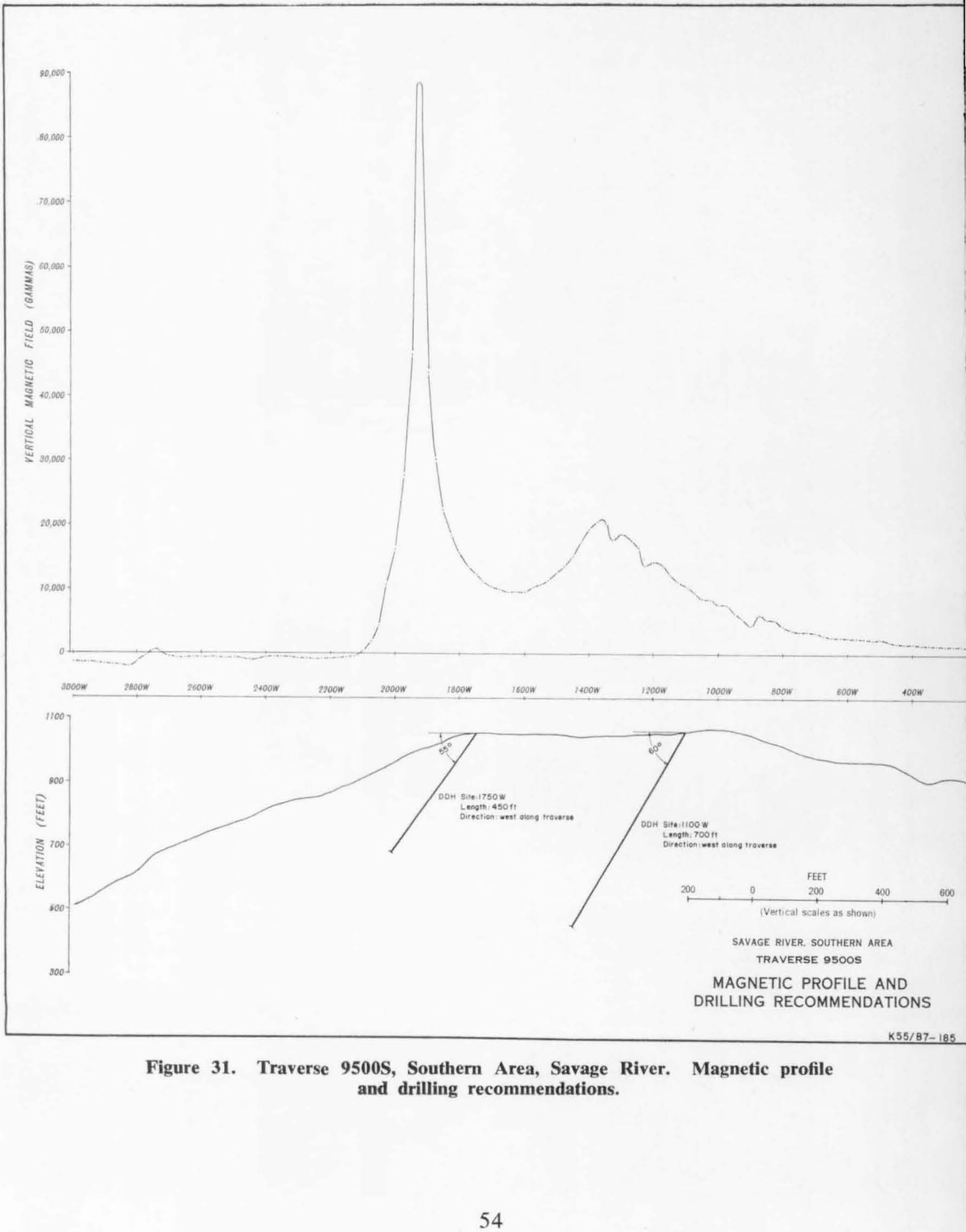


**Figure 31. Traverse 9500S, Southern Area, Savage River. Magnetic profile and drilling recommendations.**

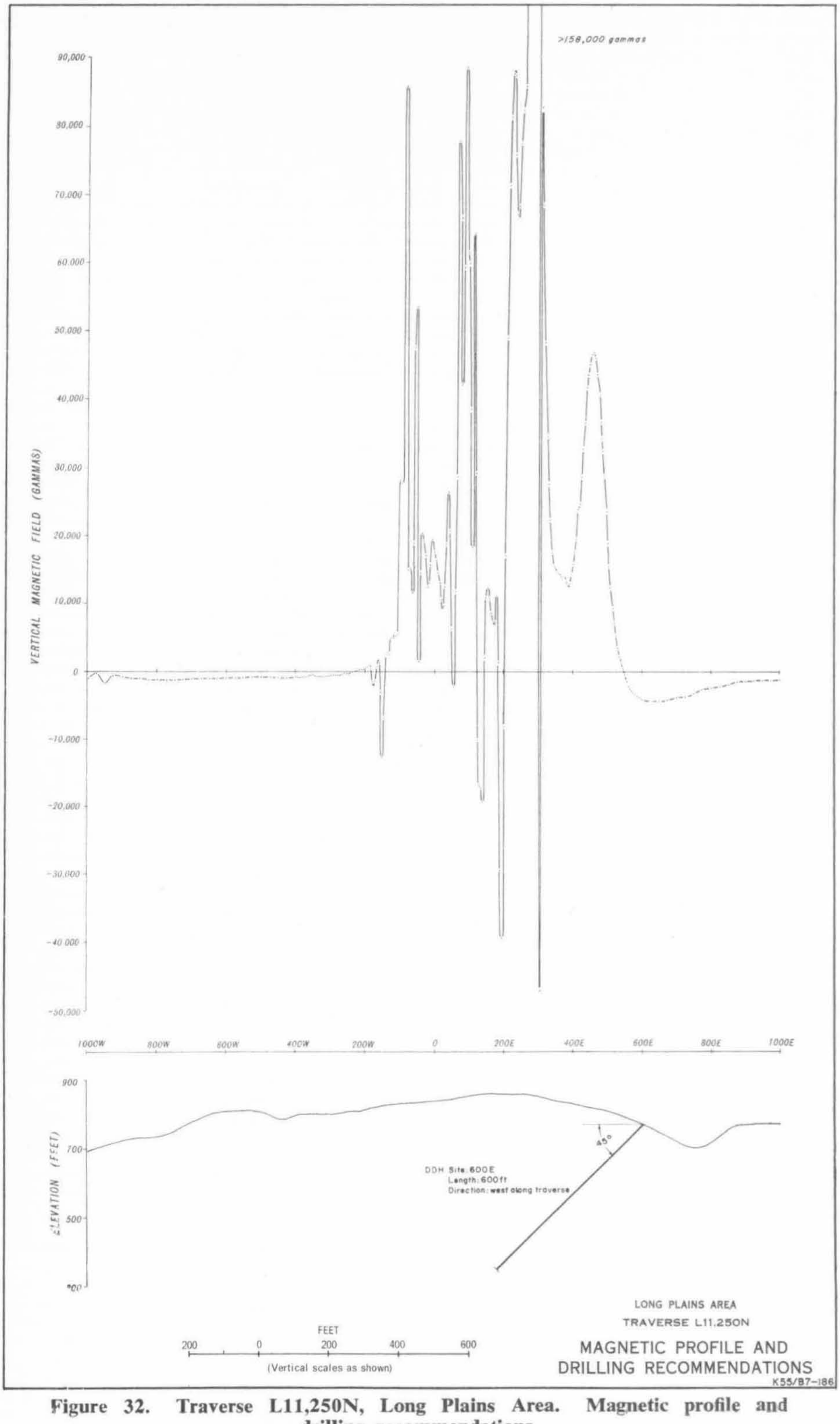


**Figure 32. Traverse L11,250N, Long Plains Area. Magnetic profile and drilling recommendations.**

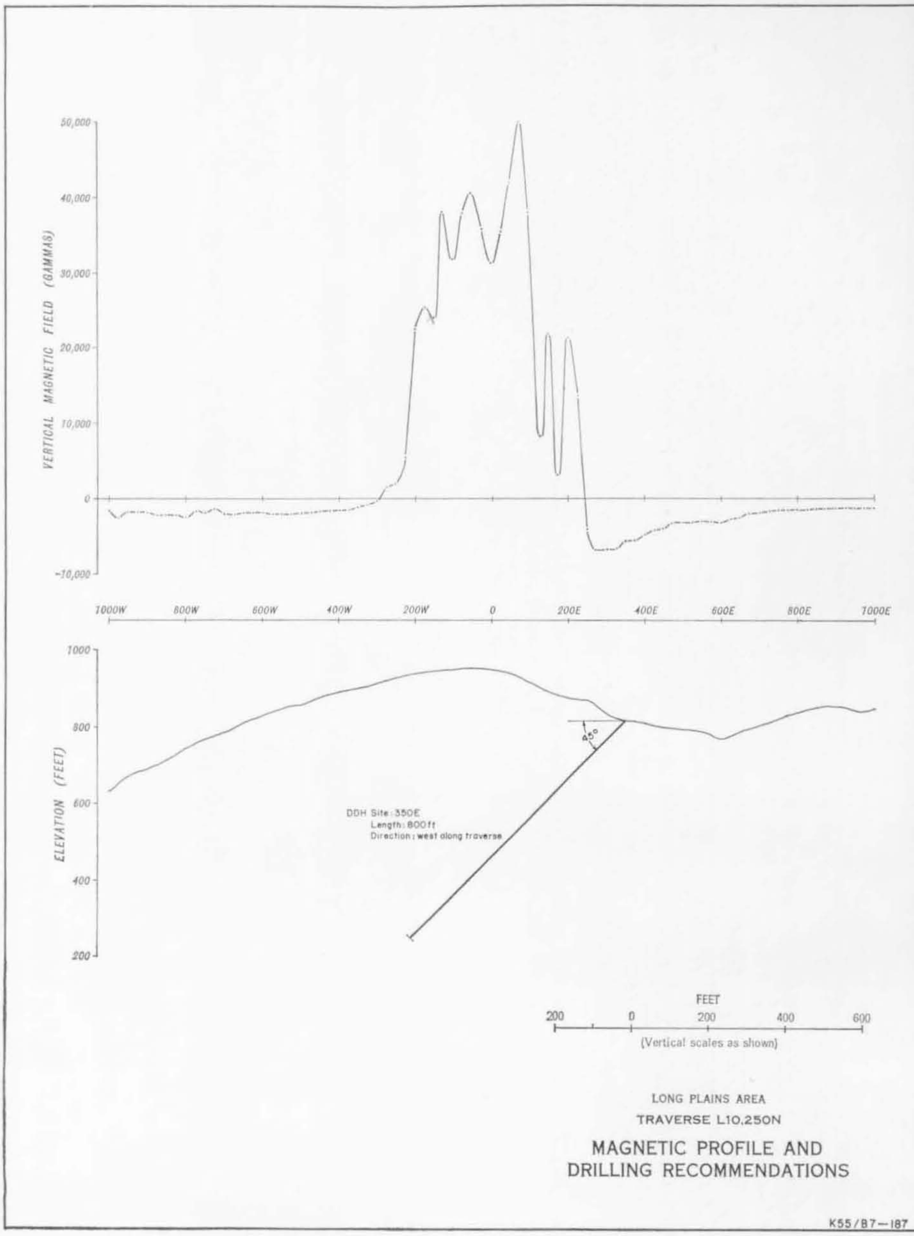


**Figure 33. Traverse L10,250N, Long Plains Area. Magnetic profile and drilling recommendations.**

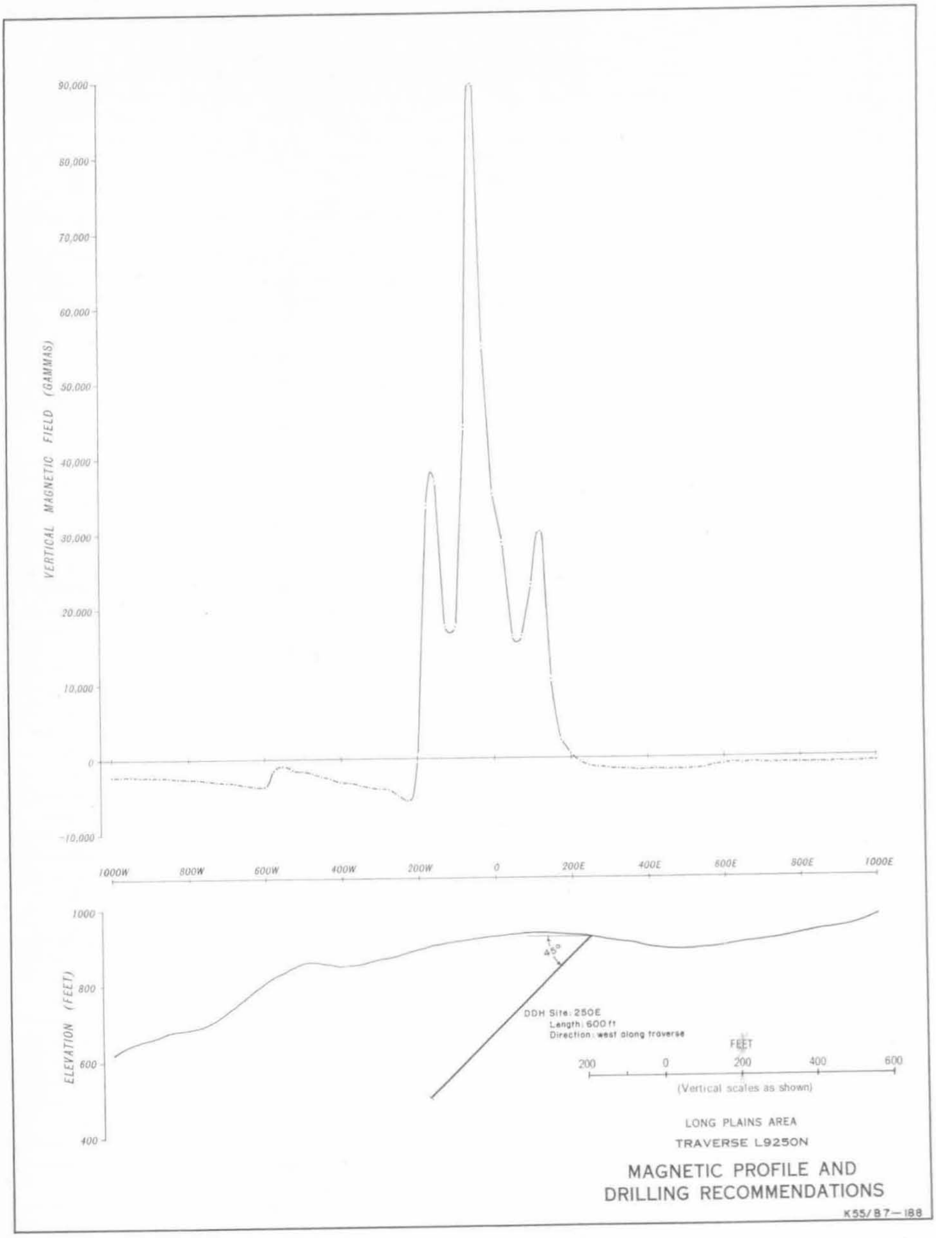


**Figure 34. Traverse L9250N, Long Plains Area. Magnetic profile and drilling recommendations.**

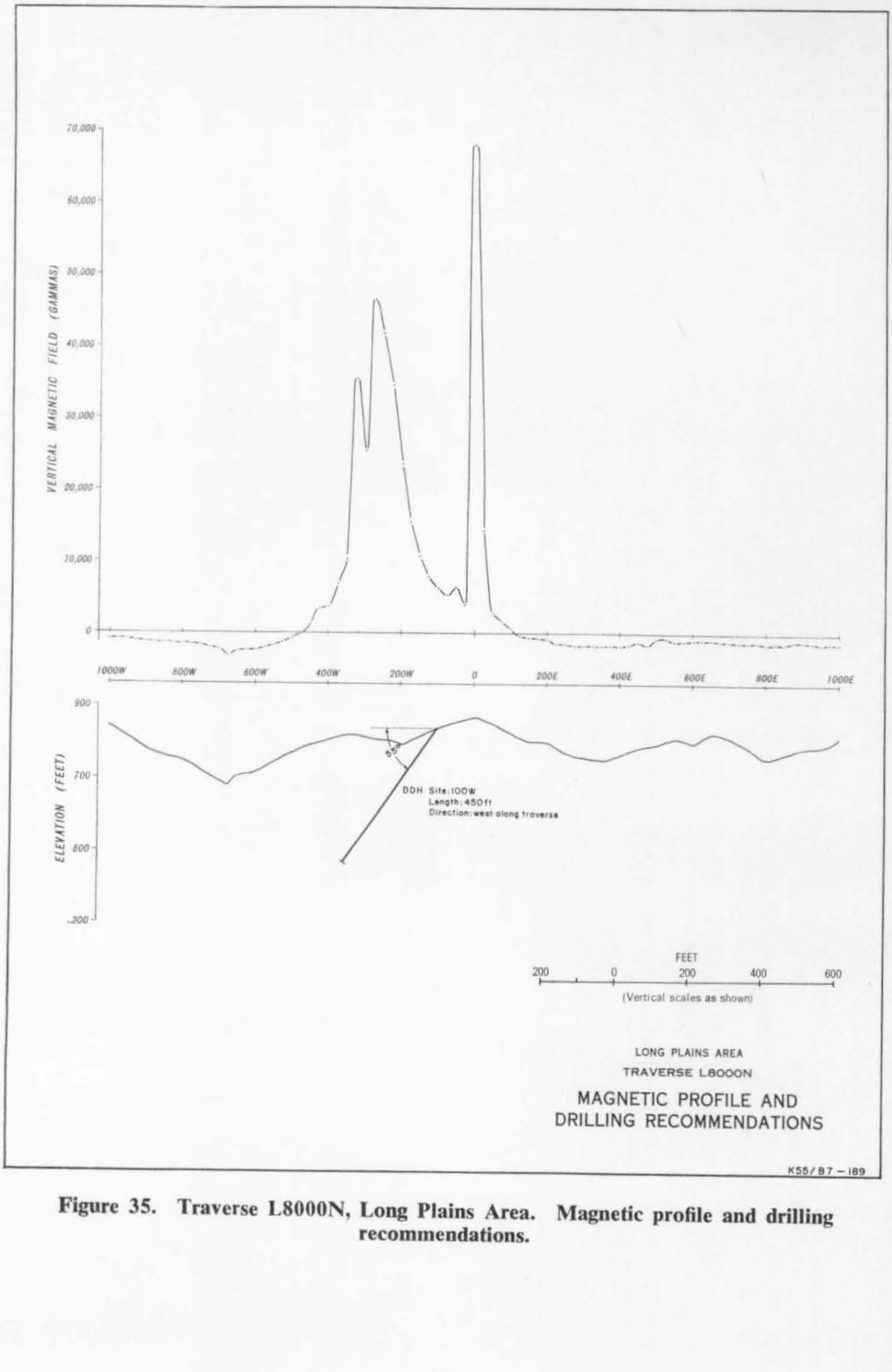


**Figure 35. Traverse L8000N, Long Plains Area. Magnetic profile and drilling recommendations.**

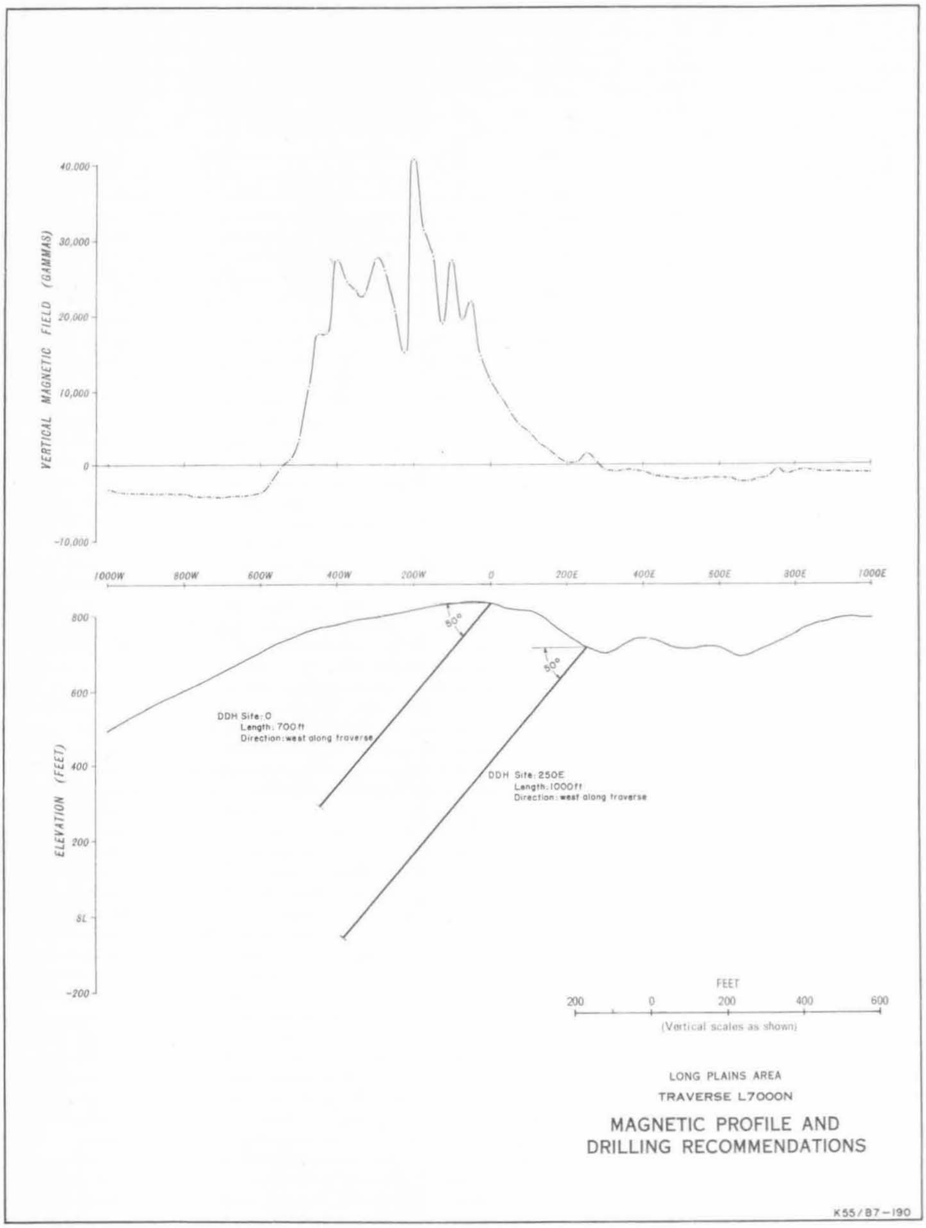


**Figure 36. Traverse L7000N, Long Plains Area. Magnetic profile and drilling recommendations.**

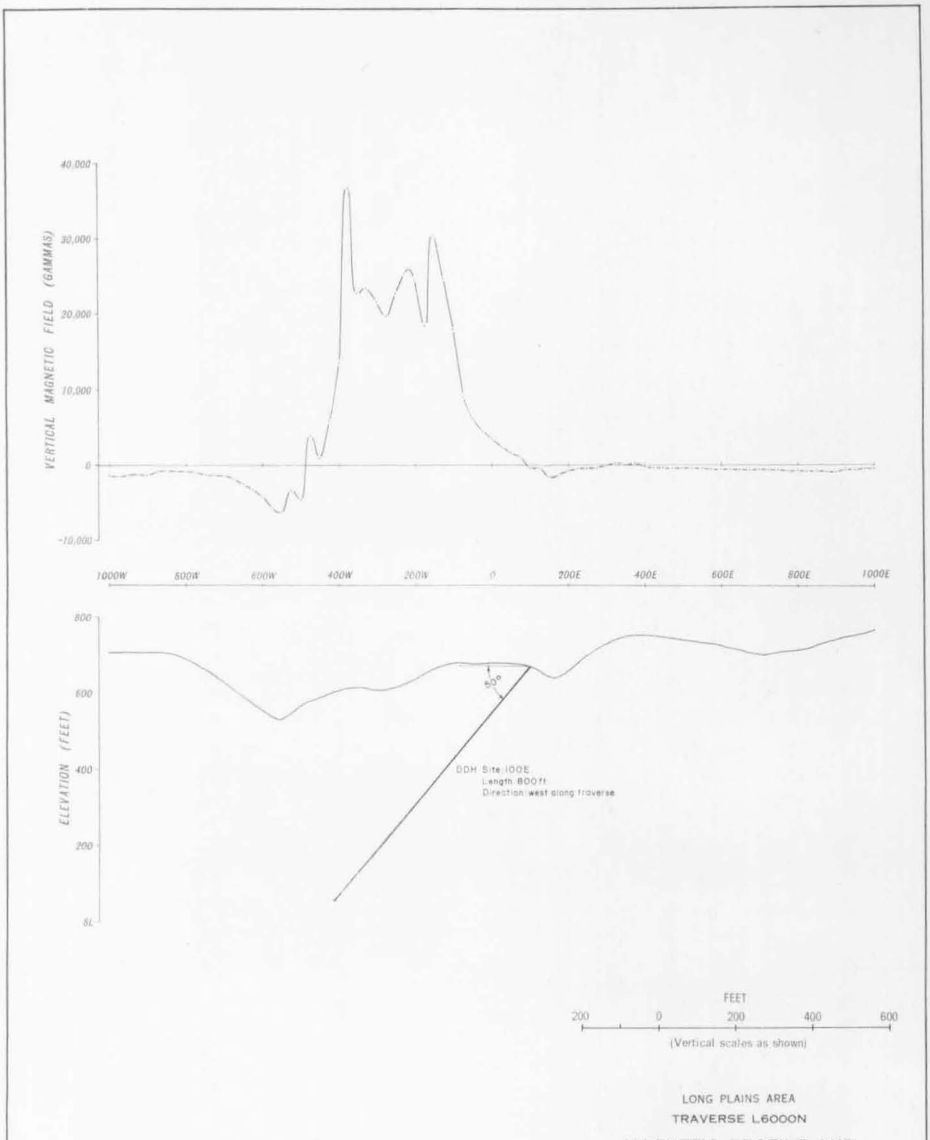


**Figure 37. Traverse L6000N, Long Plains Area. Magnetic profile and drilling recommendations.**

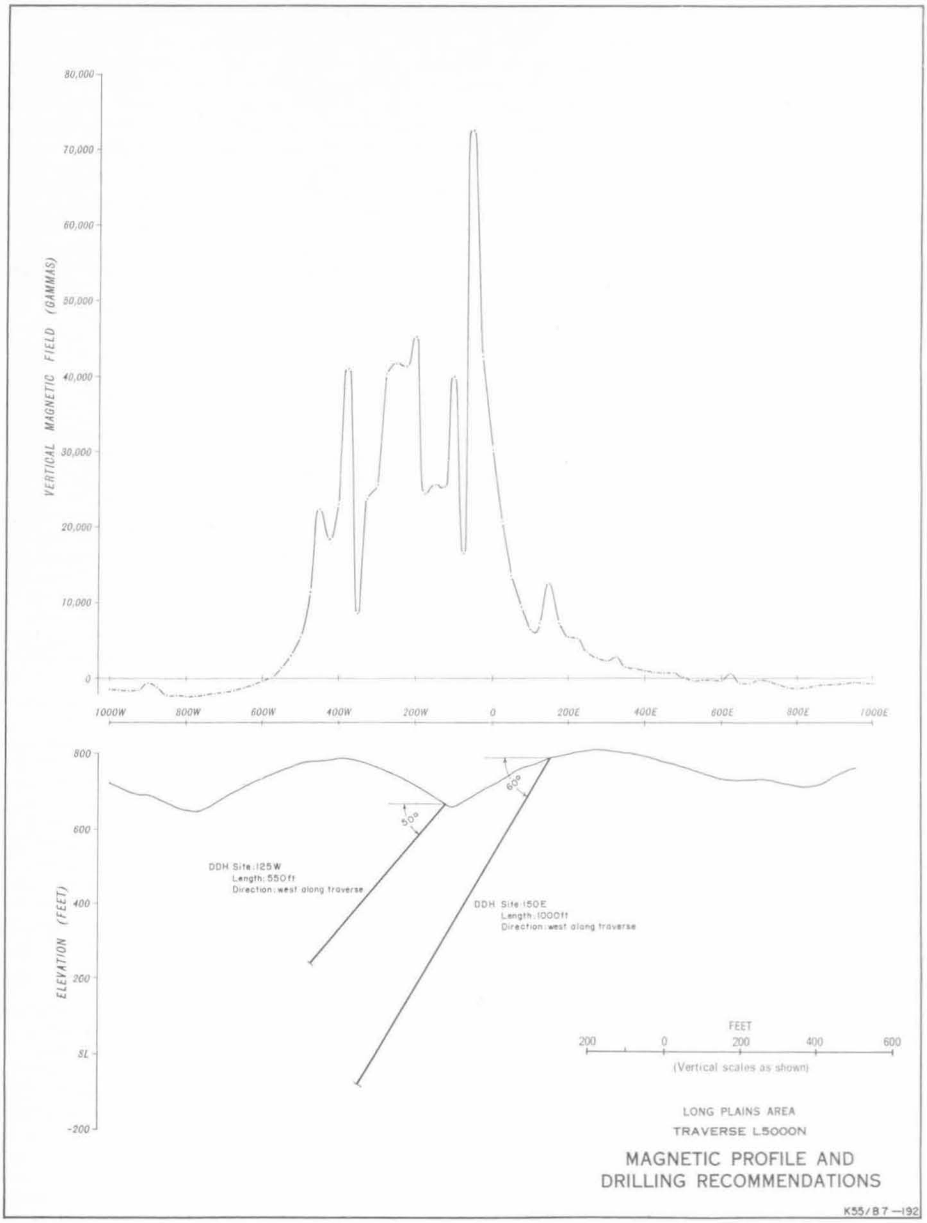


**Figure 38. Traverse L5000N, Long Plains Area. Magnetic profile and drilling recommendations.**

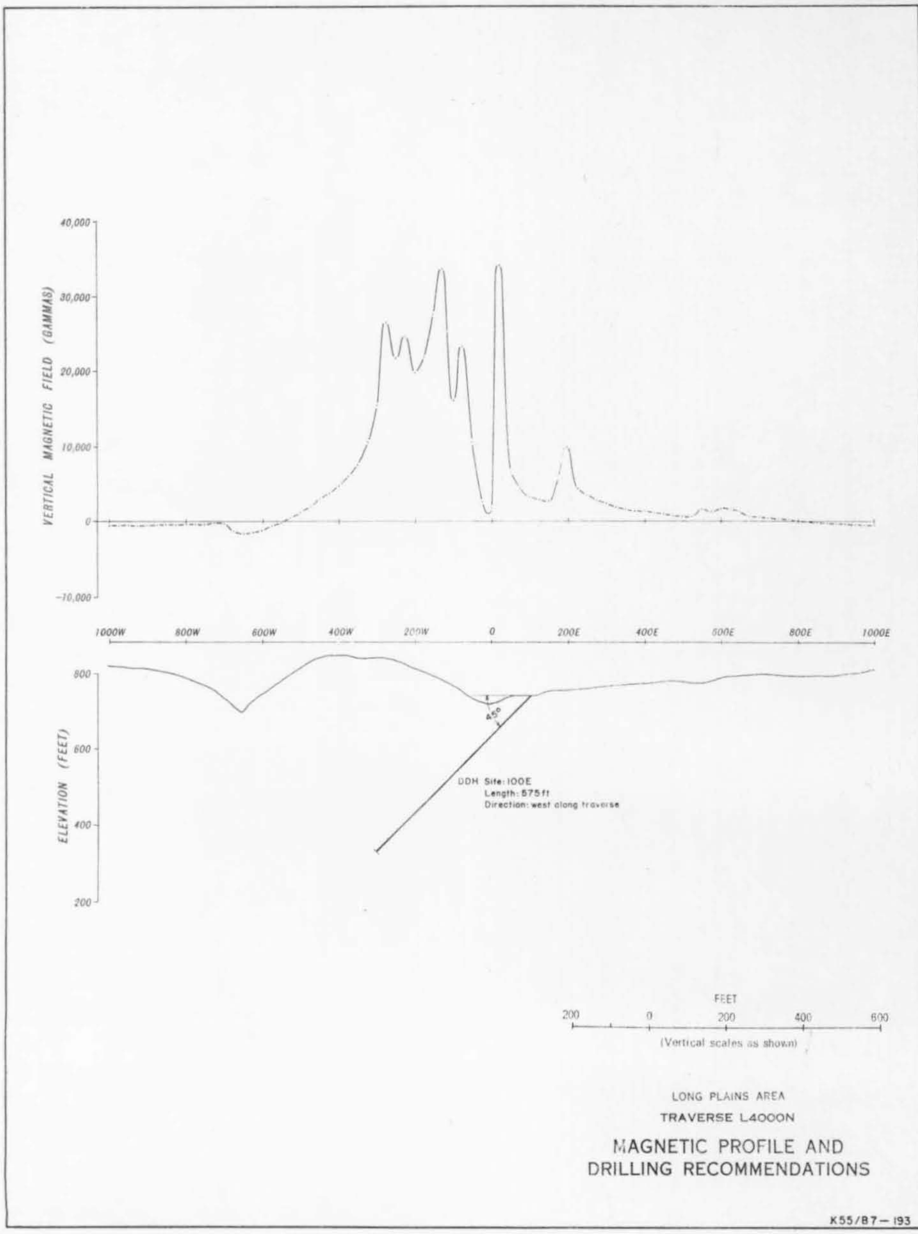


**Figure 39. Traverse L4000N, Long Plains Area. Magnetic profile and drilling recommendations.**

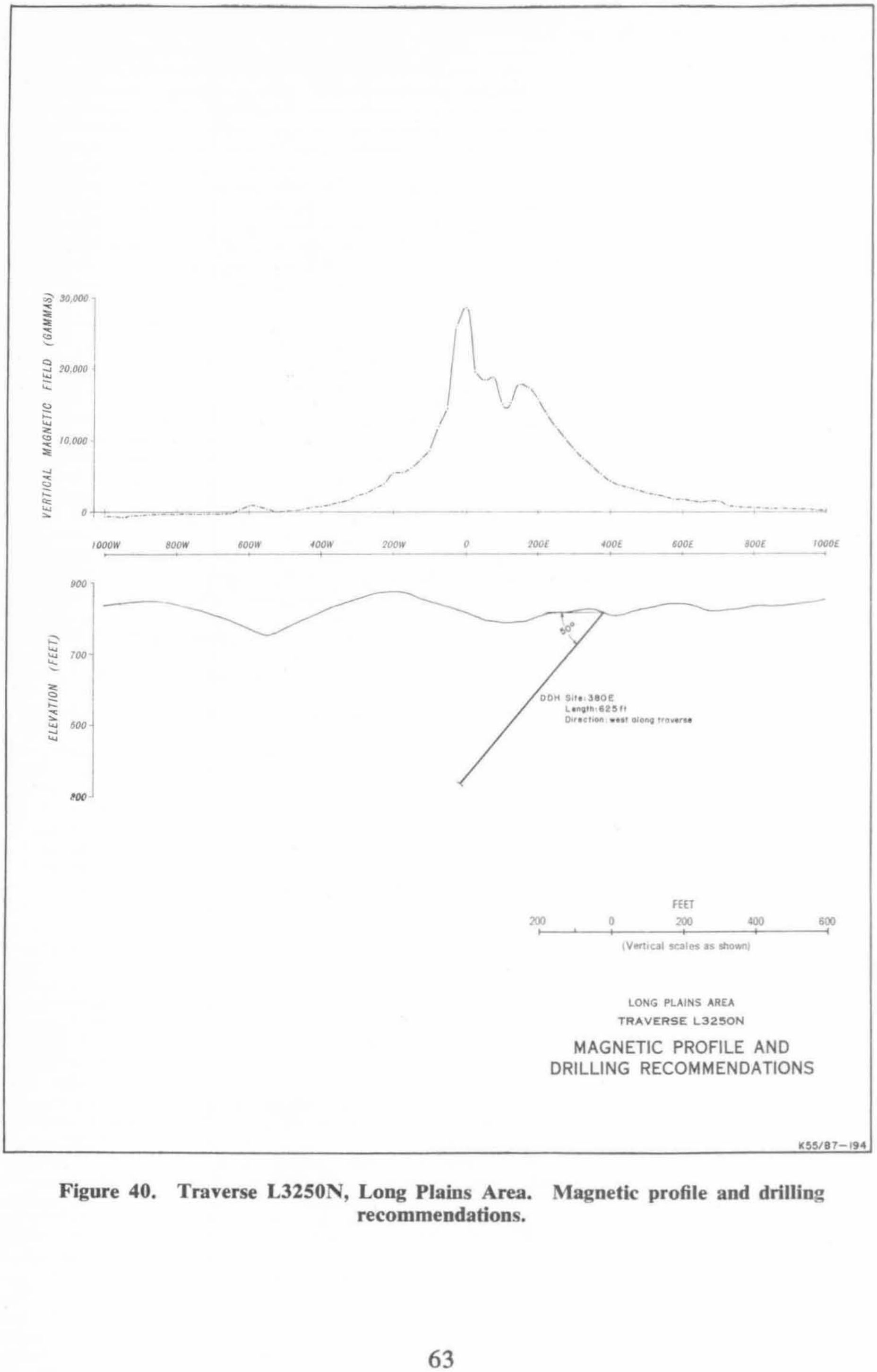


**Figure 40. Traverse L3250N, Long Plains Area. Magnetic profile and drilling recommendations.**

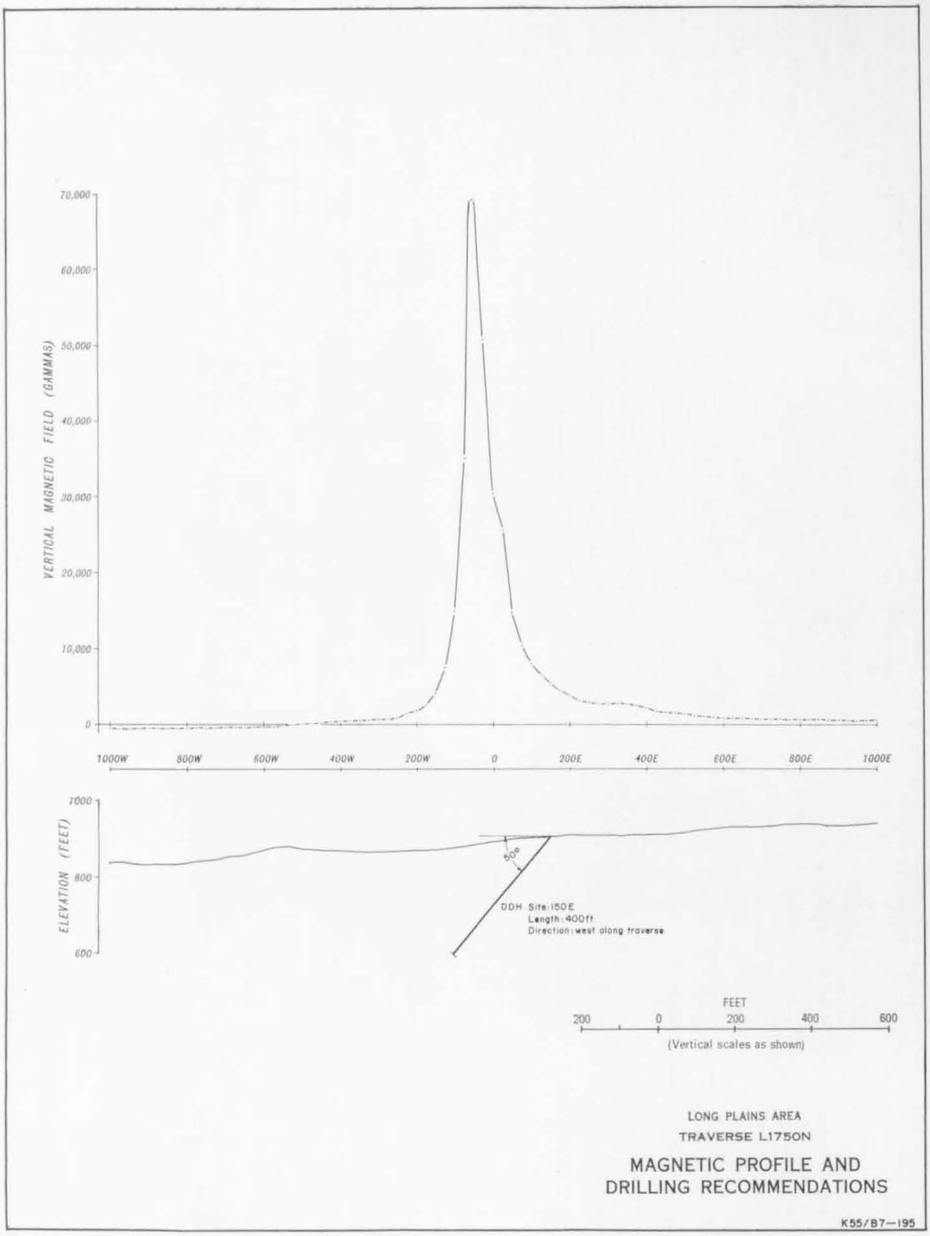


**Figure 41. Traverse L1750N, Long Plains Area. Magnetic profile and drilling recommendations.**

## 12. CONCLUSIONS

The magnetic method has been successful in outlining the Savage River and Long Plains iron deposits because the iron occurs mainly as magnetite and so gives rise to a magnetic anomaly. The magnetic method has been particularly useful in these areas because detailed geological mapping is difficult owing to the depth of weathering and paucity of outcrop.

The magnetic results give information on the width of the iron-bearing zone and on the distribution of iron within this zone. The magnetic results can be used in conjunction with reconnaissance drilling to make a preliminary assessment of the deposits, and thus can minimise the amount of drilling necessary to make such an assessment.

The magnetic survey at Savage River indicates that deposits of iron ore extend continuously for over three miles from Traverse F20 in the north of the Northern Area to Traverse 6500S in the centre of the Southern Area. In addition there are two roughly parallel deposits, less than half a mile in length, south of Traverse 8500S in the south of the Southern Area.

The magnetic survey at Long Plains indicates that deposits of iron ore extend continuously for about two miles from Traverse L11,500N in the north to Traverse L250N in the south. The northern end of the Long Plains deposits is about three and a half miles south of the southern end of the Savage River deposits.

The width varies along the length of both the Savage River and Long Plains deposits, and the width is generally less at Long Plains than at Savage River. The iron ore occurs as lenses of variable length, width, and depth. These are elongated in a northerly direction. Several lenses may occur across the width of the deposits.

## 13. ACKNOWLEDGEMENTS

The author acknowledges with appreciation the assistance given by the following organisations and their personnel:

(a) The Commonwealth Department of the Interior.

(b) The Tasmanian Department of Mines.

(c) Industrial and Mining Investigations Pty Ltd.

(d) Mr Joe Fagan, Contractor, of Waratah.

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## APPENDIX 1

## PERSONNEL

The reconnaissance ground magnetic survey at Savage River early in 1957 was made by geophysicists O. Keunecke (party leader) and L. V. Skattebol of the Bureau of Mineral Resources (BMR), assisted by one field assistant. The topographical surveying was done by surveyor J. Sleep of the Department of the Interior. Bush cutters were provided by the Tasmanian Department of Mines.

The detailed magnetic survey of the Central Area at Savage River during the summer of 1960 was made by geophysicists E. C. E. Sedmik (party leader) and E. N. Eadie of BMR. Bush cutters were provided by the Department of Mines.

The 1961 survey at Savage River extended from January to June, and consisted of a detailed magnetic survey of the Northern and Southern Areas, a level survey of the Northern, Central, and Southern Areas using microbarometers, and a topographical survey of the Northern, Central, and Southern Areas. The personnell in the party included geophysicists E. N. Eadie (party leader) and R. J. Smith, assistant geophysicist M. W. Middleton, and field assistants B. P. Murray and I. C. Parkinson, all of BMR. Surveyor M. Hickey and two chainmen of the Department of the Interior were also attached to the party. Bush cutters were provided by the Tasmanian Department of Mines.

The 1962 survey at Long Plains extended from January to May and included a detailed magnetic survey of the Long Plains Area, a reconnaissance magnetic survey in the Reconnaissance Area between Long Plains and Savage River, a level survey of the Long Plains Area using microbarometers, and a topographical survey of the Long Plains and Reconnaissance Areas. The party was led by geophysicist E. N. Eadie of BMR. Other BMR personnel were assistant geophysicists G. Jacobson and J. E. Shirley and field assistants B. P. Murray and D. W. Locke. Surveyors N. Vaughan and R. Grace and four chainmen, all of the Department of the Interior, were attached to the party. A cook, a field assistant, and bush cutters were provided by Industrial and Mining Investigations Pty Ltd.

## APPENDIX 2

## TRAVERSE LAYOUT AND SURVEYING

The traverse layout for the magnetic surveys in the Central Area at Savage River during 1960 and in the Northern and Southern Areas at Savage River during 1961 is shown in Plate 2.

The traverses in the Central Area north of Traverse A may be divided into two groups. First, Traverses A, B, B8, C, C3, and C12 with zero pegs on the Specimen Reef packing track. These were used during the 1957 reconnaissance magnetic survey and again during the 1960 detailed magnetic survey. Secondly, Traverses AB, BO8, B8CO, COB8, C7, and CX with zero pegs near the vehicle track (then recently constructed) in the Central Area. These traverses are located between the traverses in the first group, and were used during the 1960 detailed magnetic survey. It is unfortunate that such a confusing terminology has been used for these traverses.

The traverses in the Central Area south of Traverse A originate from a walking track cleared for the survey, and extend south from peg 1900W on Traverse A. The notation use for each of these traverses indicates approximately the horizontal distance in feet of the traverse along the track south of Traverse A, viz. 250S, 500S, 750S. . . . The zero peg of each of these traverses is on the walking track.

All traverses in the Central Area were cleared by bush cutters provided by the Tasmanian Department of Mines. The first group of traverses in the Central Area north of Traverse A were pegged and surveyed for the reconnaissance magnetic survey by a surveyor of the Department of the Interior. Pegs were inserted along the traverses at horizontal intervals of 50 feet, and each is described by its horizontal distance east or west of the zero peg located on the Specimen Reef packing track. All other traverses in the Central Area were pegged by the bush cutters and surveyed the following year by a surveyor of the Department of the Interior. On these traverses the actual horizontal distance between pegs is frequently less than 50 feet, although each peg is described as though the horizontal distance between pegs were 50 feet. The actual positions of the pegs are indicated on the map showing the traverse layout.

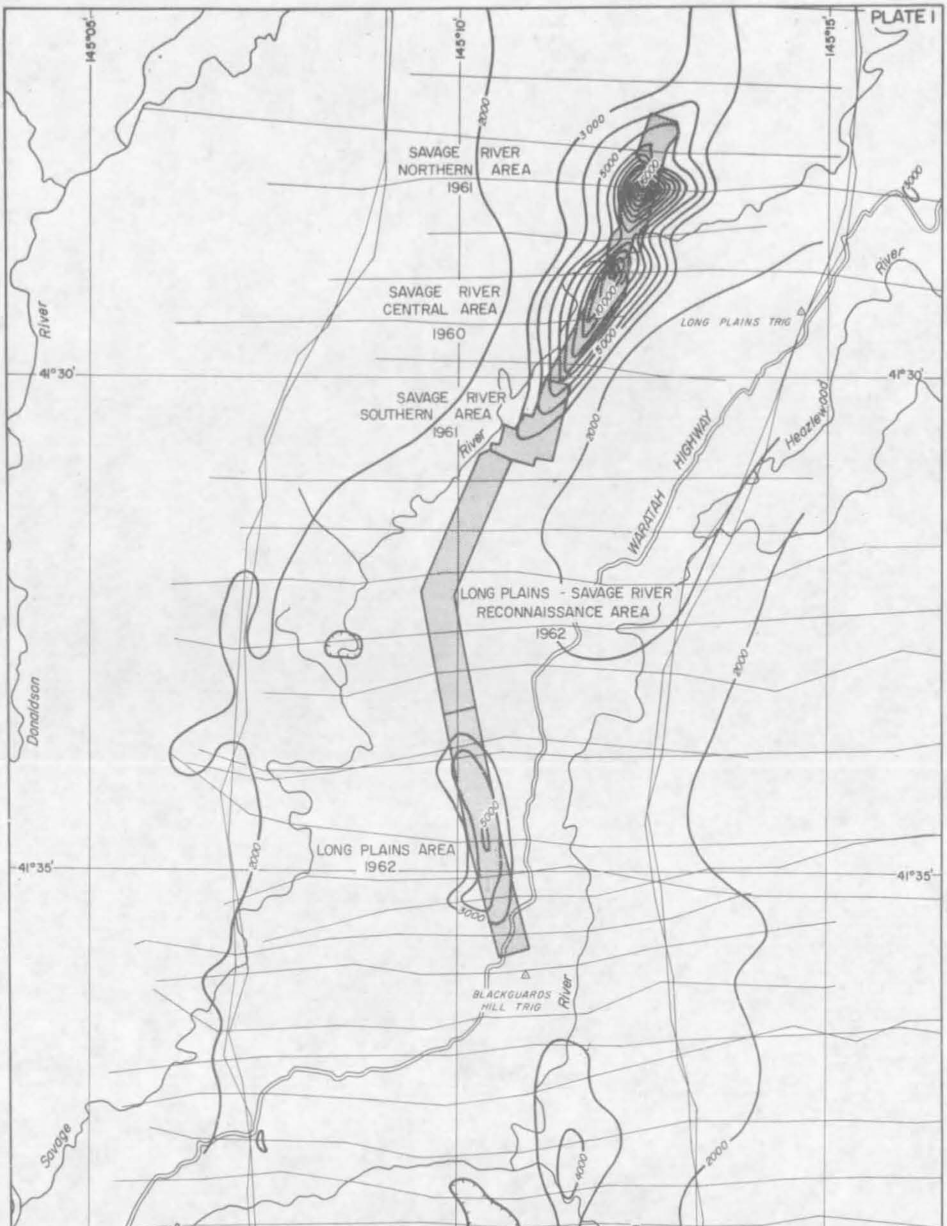
In the Northern Area the zero peg of each traverse is located on the surveyed Specimen Reef packing track. As the track is not straight the zero pegs do not lie on a straight line. In the Southern Area the zero peg of each traverse is located on an almost straight walking track that extends approximately south from the zero peg on Traverse 4500S, the most southern traverse in the Central Area.

The clearing of traverses for the detailed magnetic surveys in the Northern and Southern Areas during 1961 was done by bush cutters supplied by the Tasmanian Department of Mines, and the surveying was done by a surveyor of the Department of the Interior. In the Northern Area the traverses were pegged and surveyed by the surveyor. In the Southern Area the traverses were pegged by officers of BMR and subsequently surveyed by the surveyor. Pegs were inserted along the traverses at horizontal intervals of 50 feet.

The traverse layout for the magnetic surveys in the Long Plains and Reconnaissance Areas during 1962 is shown in Plate 3. In the Long Plains Area the zero pegs of the traverses lie on an approximately straight line known as the baseline (shown in Plate 3). The traverses in the Long Plains Area and in the Reconnaissance Area are named according to their horizontal distance in feet along the baseline north or south of Traverse L00, whose zero peg is located near the Waratah-Corinna road. Pegs were inserted along the traverses at horizontal intervals of 50 feet, and each is described by its horizontal distance east or west of the zero peg.

Access between traverses in the Long Plains Area is by means of the surveyed walking track (shown in Plate 3), which crosses each traverse near its zero peg. The vehicle track in the northern part of the Long Plains Area crosses the traverses north of L9250N. A concrete block was constructed on Traverse L00 at its junction with the walking track near the Waratah-Corinna road. A permanent mark in the form of a steel fence post was placed at the zero point of each other traverse in the Long Plains Area. Each post protrudes about a foot above the ground and was painted yellow. An aluminium tag indicating the traverse number was wired to each post.

In the Reconnaissance Area the zero pegs of the traverses south of Traverse L21,000N lie on an approximately straight baseline continuous with the baseline in the Long Plains Area. The zero pegs of the traverses north of Traverse L21,750N lie on a straight baseline, which coincides with the walking track and extends north to the Southern Area at Savage River, where it meets Traverse 10,500S at station 2400W. Access between traverses in the Reconnaissance Area is by means of the surveyed walking track. This coincides with the baseline north of Traverse L21,750N. The vehicle track crosses all traverses in the Reconnaissance Area north of Traverse L18,000N.




SAVAGE RIVER AND LONG PLAINS IRON DEPOSITS

# AEROMAGNETIC MAP SHOWING AREAS OF GROUND MAGNETIC SURVEYS 1960, 1961 AND 1962

MILES

1 0 1 2 3

CONTOUR INTERVAL 1000 GAMMAS

LEGEND

CONTOURS OF TOTAL MAGNETIC INTENSITY — 2000

MAGNETIC LOW

FLIGHT LINE

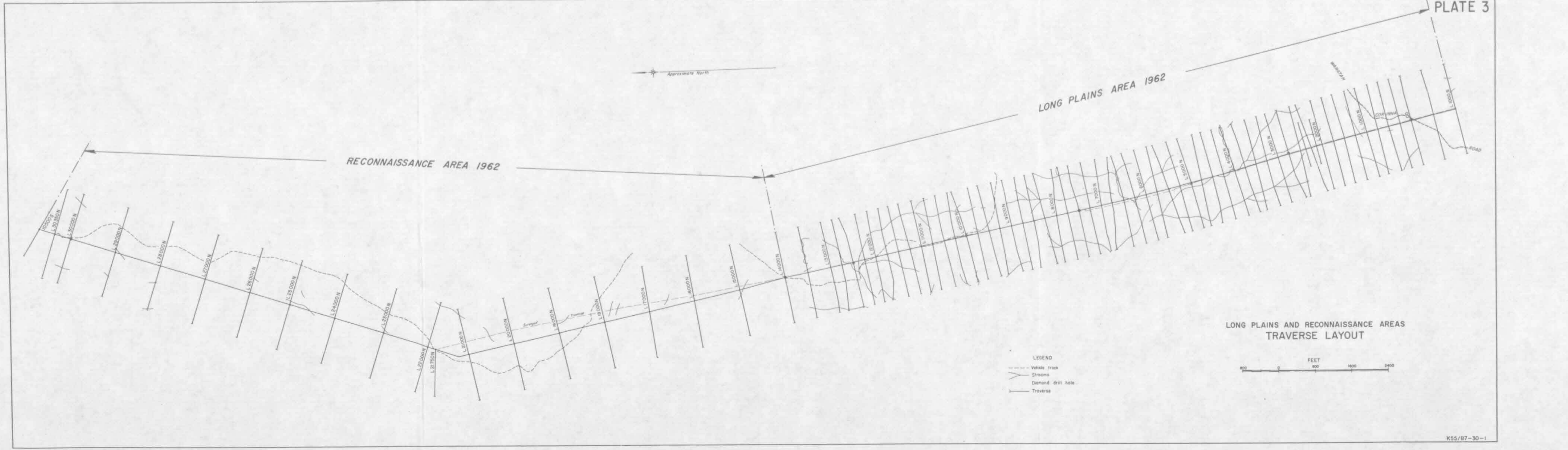
ROAD

RIVER

K55/B7-160


PLATE 2
SOUTHERN AREA 1961
CENTRAL AREA 1960
NORTHERN AREA 1961
SAVAGE RIVER AREA
TRAVERSE LAYOUT
SCALE IN FEET
400 0 400 800 1200 1600
G288-14

PLATE 3




LONG PLAINS AND RECONNAISSANCE AREAS
TRAVERSE LAYOUT

K55/B7-30-1


PLATE 4
SAVAGE RIVER NORTHERN AREA
TOPOGRAPHICAL CONTOURS
LEGEND
CONTOURS (Values in feet)
CREEK
BASELINE WITH SURVEYORS STATIONS
SURVEYORS REFERENCE TREE
TRAVERSE
FEET
Approximate True North
K55/87-89
TRAV. G8
TRAV. G5
TRAV. G00
TRAV. F20
TRAV. F16A
TRAV. F12A
TRAV. F7
TRAV. F1A
TRAV. E7
TRAV. E5
TRAV. E2A
TRAV. D34A
TRAV. D30
TRAV. D26A
TRAV. D23A
TRAV. D18A
TRAV. D14A
TRAV. D9A
TRAV. D4
TRAV. D2
TRAV. C35
TRAV. C33
TRAV. C28A
TRAV. C26DR
TRAV. H1
TRAV. H1A
TRAV. C1
Fulforus Creek
Savage River
Creek
Diamond Drill Hole
Old Trench
Adit


SAVAGE RIVER CENTRAL AREA
TOPOGRAPHICAL CONTOURS
LEGEND
BASELINE WITH SURVEYORS STATIONS
SURVEYORS REFERENCE TREE
TRAVERSE
CONTOURS (Values in feet)
CREEK
VEHICLE TRACK
FEET
200 0 200 400 600 800
Savage River
Magnetite Creek
Creek
TRAV 4500 S
TRAV 4000 S
TRAV 3500 S
TRAV 3000 S
TRAV 2750 S
TRAV 2500 S
TRAV 2250 S
TRAV 2000 S
TRAV 1750 S
TRAV 1500 S
TRAV 1250 S
TRAV 1000 S
TRAV 750 S
TRAV 500 S
TRAV 250 S
TRAV A
TRAV AB
TRAV B
TRAV BOB
TRAV BBD
TRAV BB
TRAV CX
TRAV C1
TRAV C1E
TRAV C3
Approximate True North

K55/87-88

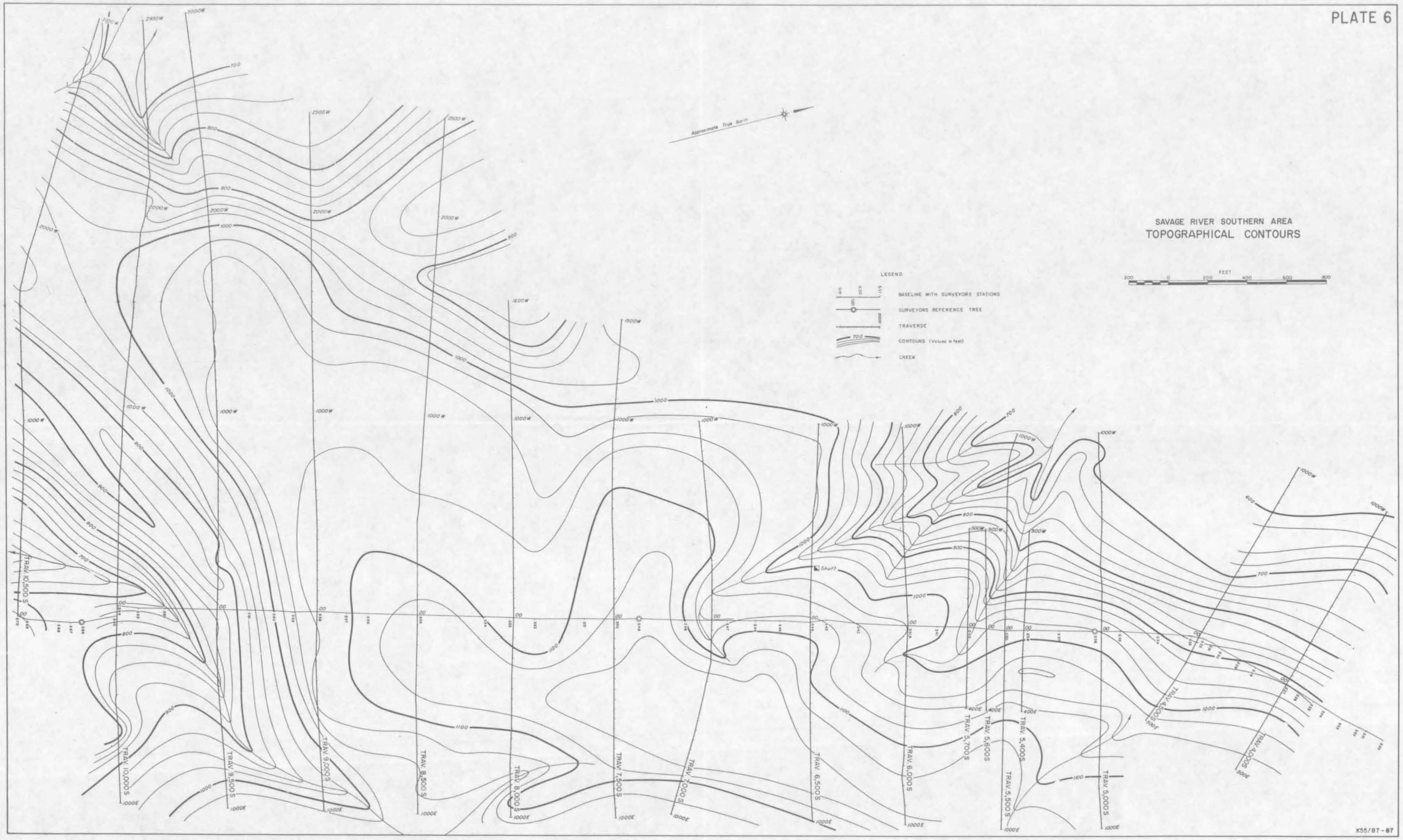


PLATE 6
SAVAGE RIVER SOUTHERN AREA
TOPOGRAPHICAL CONTOURS
FEET
200 0 200 400 600 800
Approximate True North
LEGEND
BASELINE WITH SURVEYORS STATIONS
SURVEYORS REFERENCE TREE
TRAVERSE
CONTOURS (Values in feet)
CREEK
TRAV. 10,500 S
TRAV. 10,000 S
TRAV. 9,500 S
TRAV. 9,000 S
TRAV. 8,500 S
TRAV. 8,000 S
TRAV. 7,500 S
TRAV. 7,000 S
TRAV. 6,500 S
TRAV. 6,000 S
TRAV. 5,700 S
TRAV. 5,600 S
TRAV. 5,500 S
TRAV. 5,400 S
TRAV. 5,000 S
TRAV. 4,500 S
TRAV. 4,000 S
Shaft
K55/87-87

PLATE 7
Approximate True North
FEET
CONTOUR INTERVAL 20 FEET
NOTE:
Datum of Levels: M.S.L.
Origin of Levels: SPM 2846, Blackguards Hill RL 966·60
Contours interpolated from levels along cross traverses
LONG PLAINS AREA
TRAVERSES L1000S - L14,000S
TOPOGRAPHICAL CONTOURS.
K55/B7-31-1

# PLATE 8

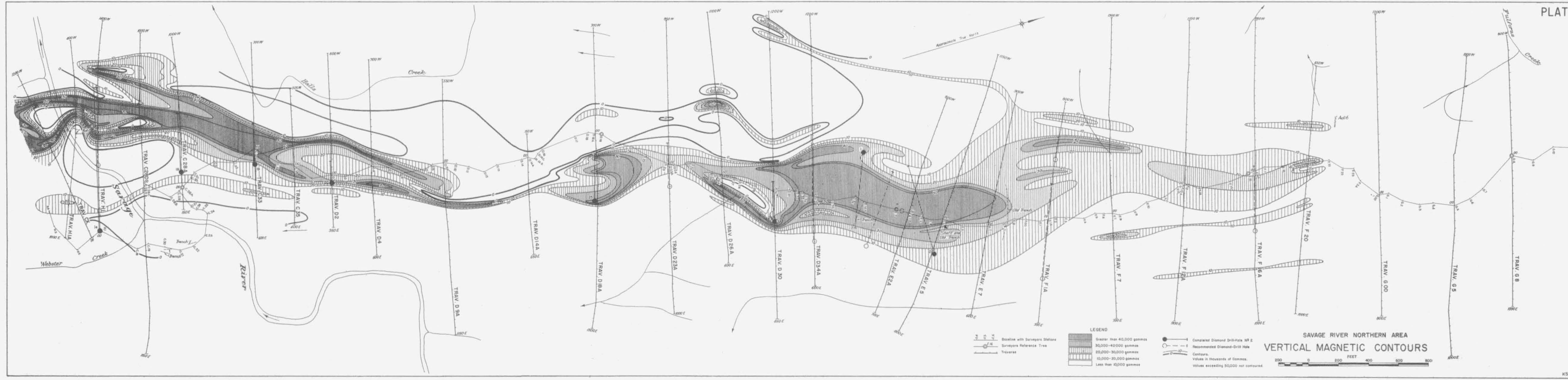
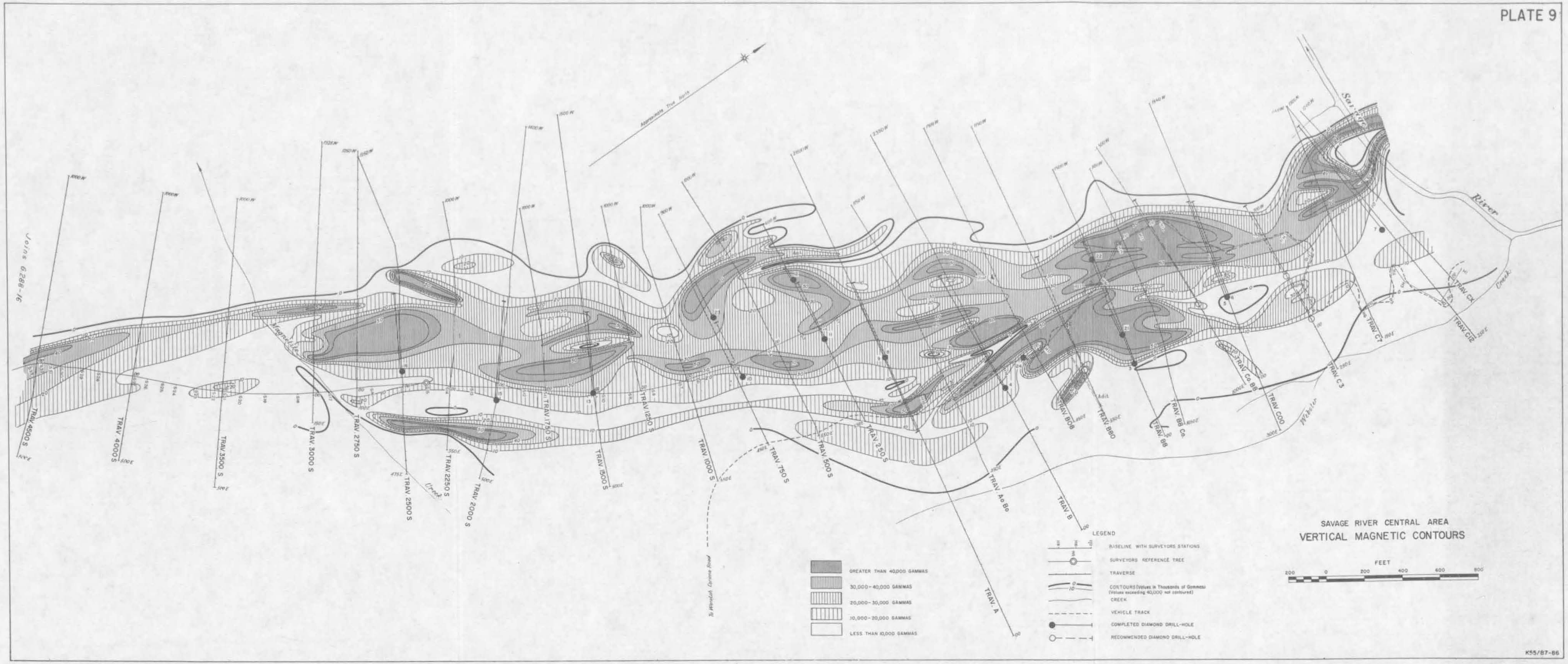

Baseline with Surveyors Stations
Surveyors Reference Tree
Traverse
LEGEND
Greater than 40,000 gammas
30,000-40000 gammas
20,000-30,000 gammas
10,000-20,000 gammas
Less than 10,000 gammas
Completed Diamond Drill-Hole Nº 2
Recommended Diamond-Drill Hole
Contours.
Values in thousands of Gammas.
Values exceeding 50,000 not contoured.
SAVAGE RIVER NORTHERN AREA
VERTICAL MAGNETIC CONTOURS
FEET
K55/B7-84

PLATE 9




SAVAGE RIVER CENTRAL AREA

VERTICAL MAGNETIC CONTOURS

K55/87-86

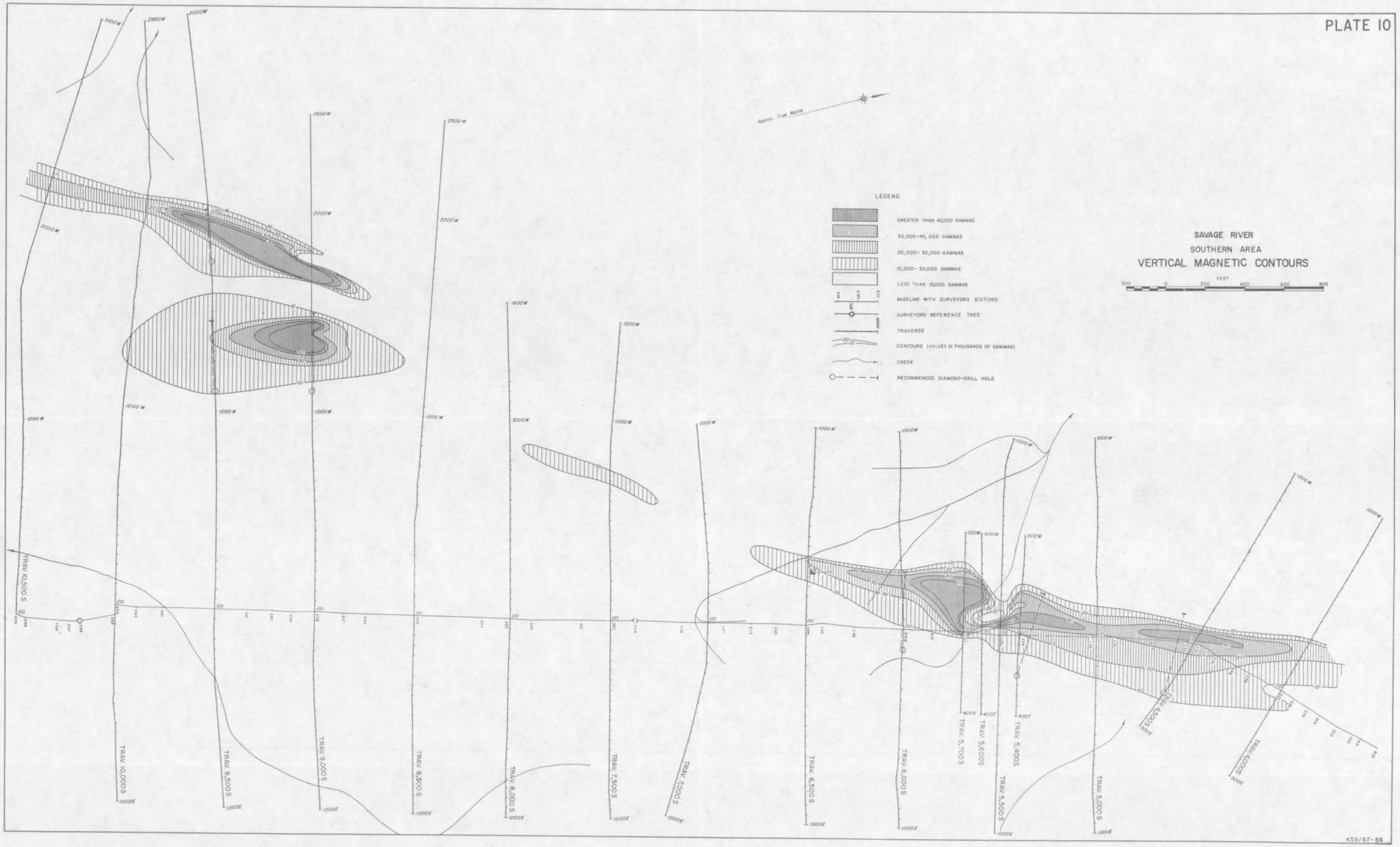
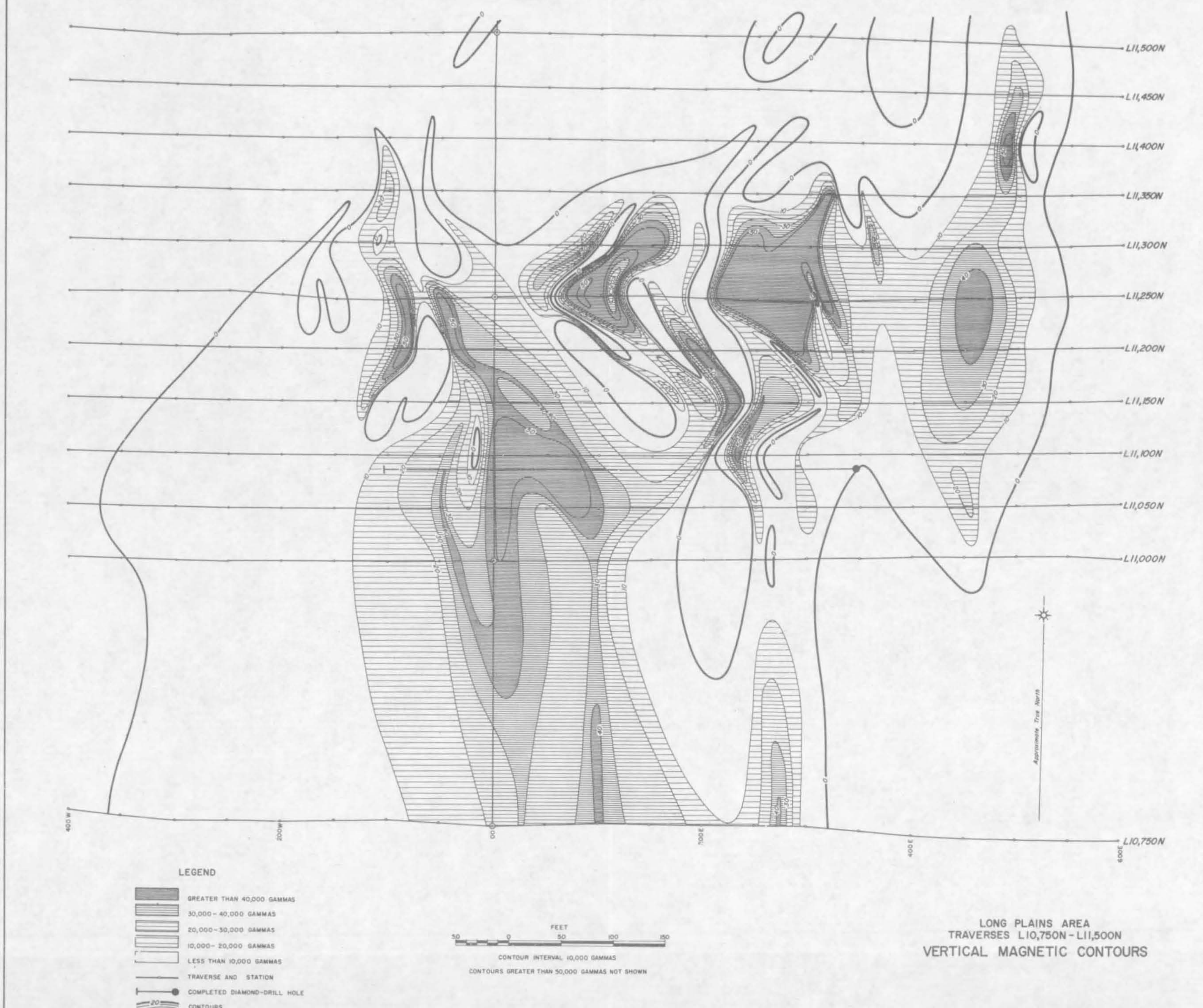


PLATE 10
SAVAGE RIVER
SOUTHERN AREA
VERTICAL MAGNETIC CONTOURS
FEET
200 0 200 400 600 800
LEGEND
GREATER THAN 40,000 GAMMAS
30,000-40,000 GAMMAS
20,000-30,000 GAMMAS
10,000-20,000 GAMMAS
LESS THAN 10,000 GAMMAS
BASELINE WITH SURVEYORS STATIONS
SURVEYORS REFERENCE TREE
TRAVERSE
CONTOURS (VALUES IN THOUSANDS OF GAMMAS)
CREEK
RECOMMENDED DIAMOND-DRILL HOLE
Approx. True North
TRAV 10,500 S
TRAV 10,000 S
TRAV 9,500 S
TRAV 9,000 S
TRAV 8,500 S
TRAV 8,000 S
TRAV 7,500 S
TRAV 7,000 S
TRAV 6,500 S
TRAV 6,000 S
TRAV 5,700 S
TRAV 5,600 S
TRAV 5,500 S
TRAV 5,400 S
TRAV 5,000 S
TRAV 4,500 S
TRAV 4,000 S
K55/B7-85

PLATE II
FOR CONTOURS WITHIN THIS AREA SEE PLATE 12
Approx True North
LEGEND
Greater than 40,000 gammas
30,000 - 40,000 gammas
20,000 - 30,000 gammas
10,000 - 20,000 gammas
Less than 10,000 gammas
Recommended drill hole
Traverse
Vehicle track
Walking track
Contours (thousands of gammas)
Contours greater than 50,000 gammas not shown
LONG PLAINS AREA
TRAVERSES L1000S - L14,000N
VERTICAL MAGNETIC CONTOURS
FEET
200 100 0 200 400 600
K55/87-32-1

PLATE 12




LONG PLAINS AREA
TRAVERSES L10,750N - L11,500N
VERTICAL MAGNETIC CONTOURS

K55/B7-90

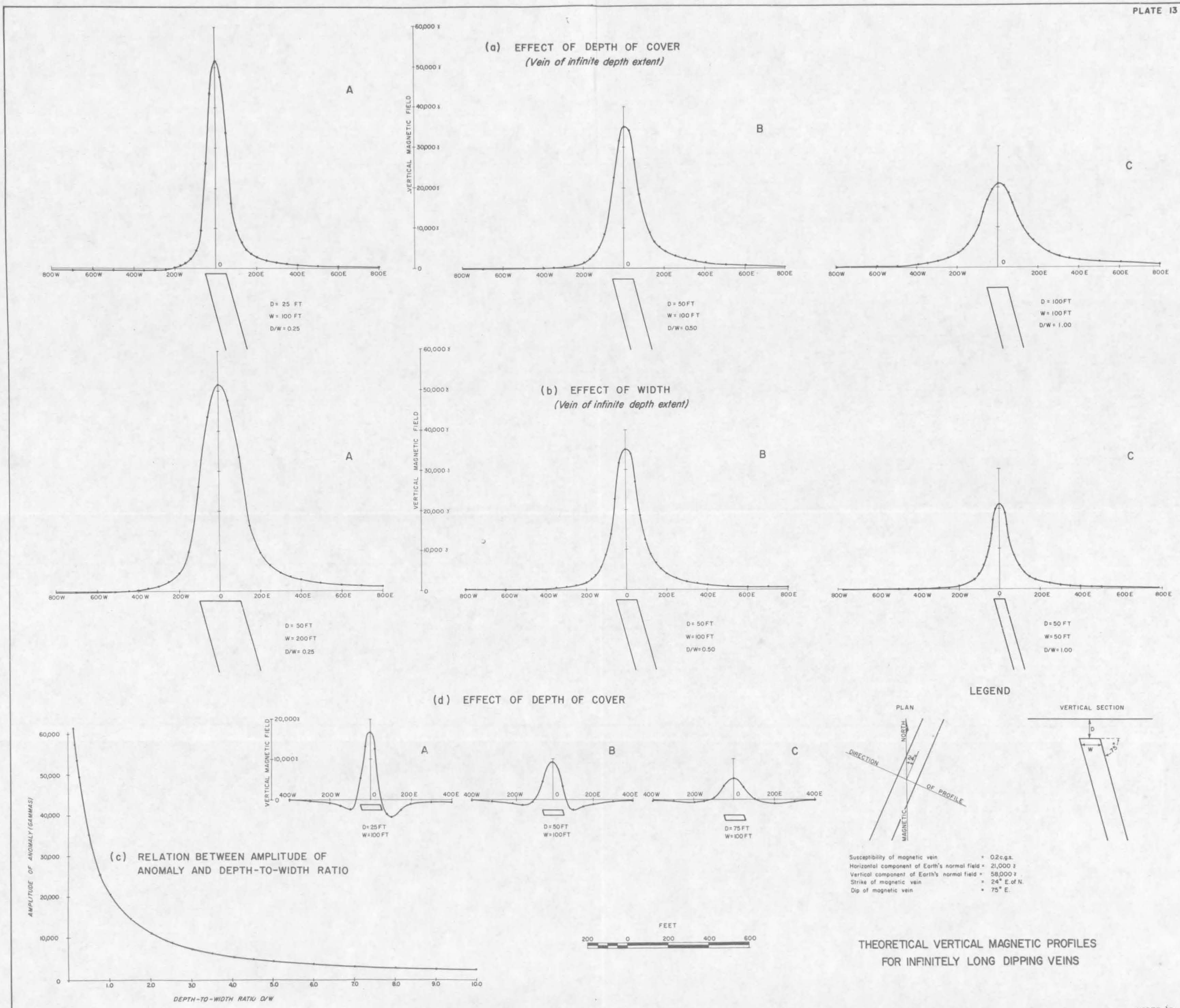
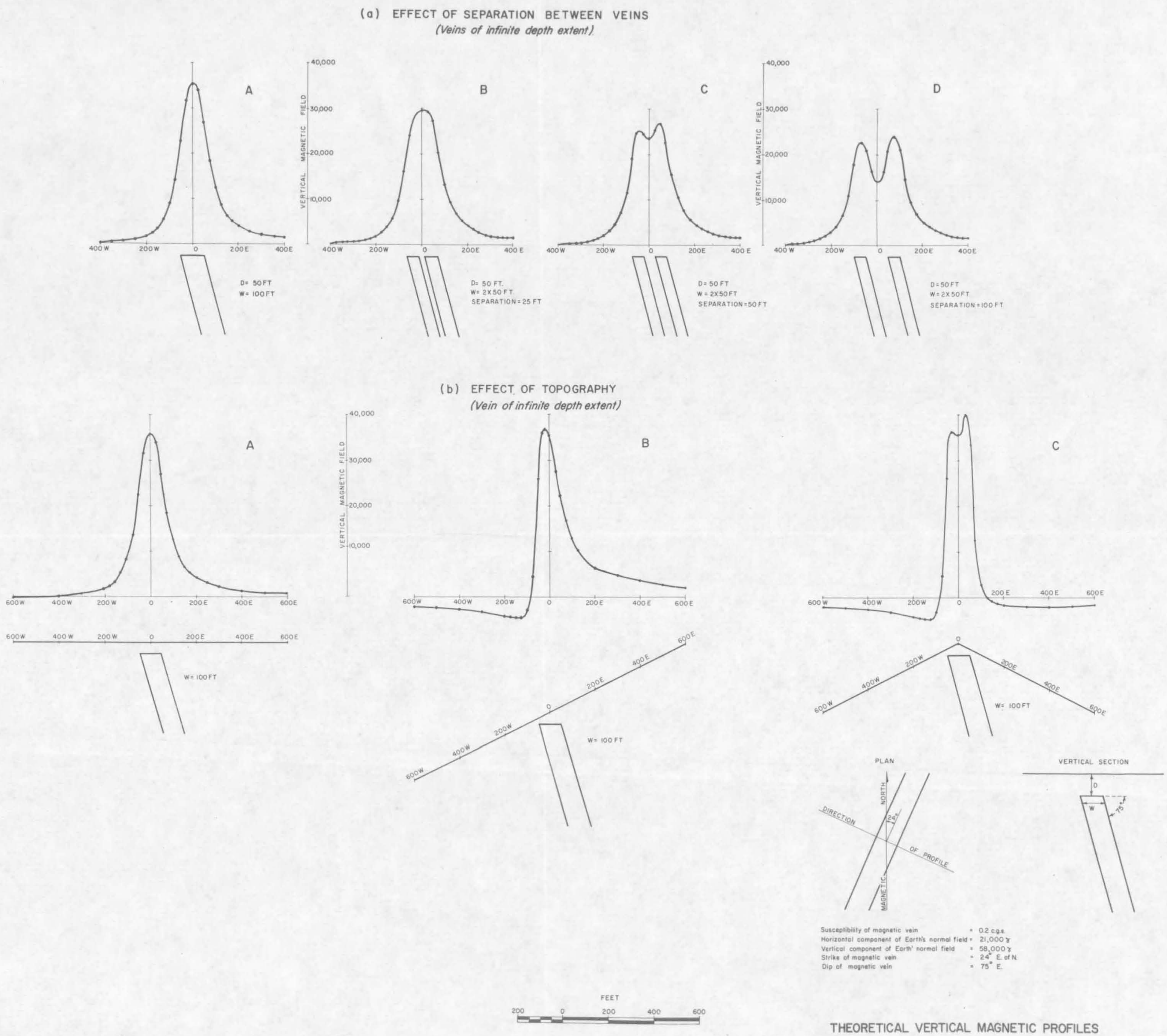


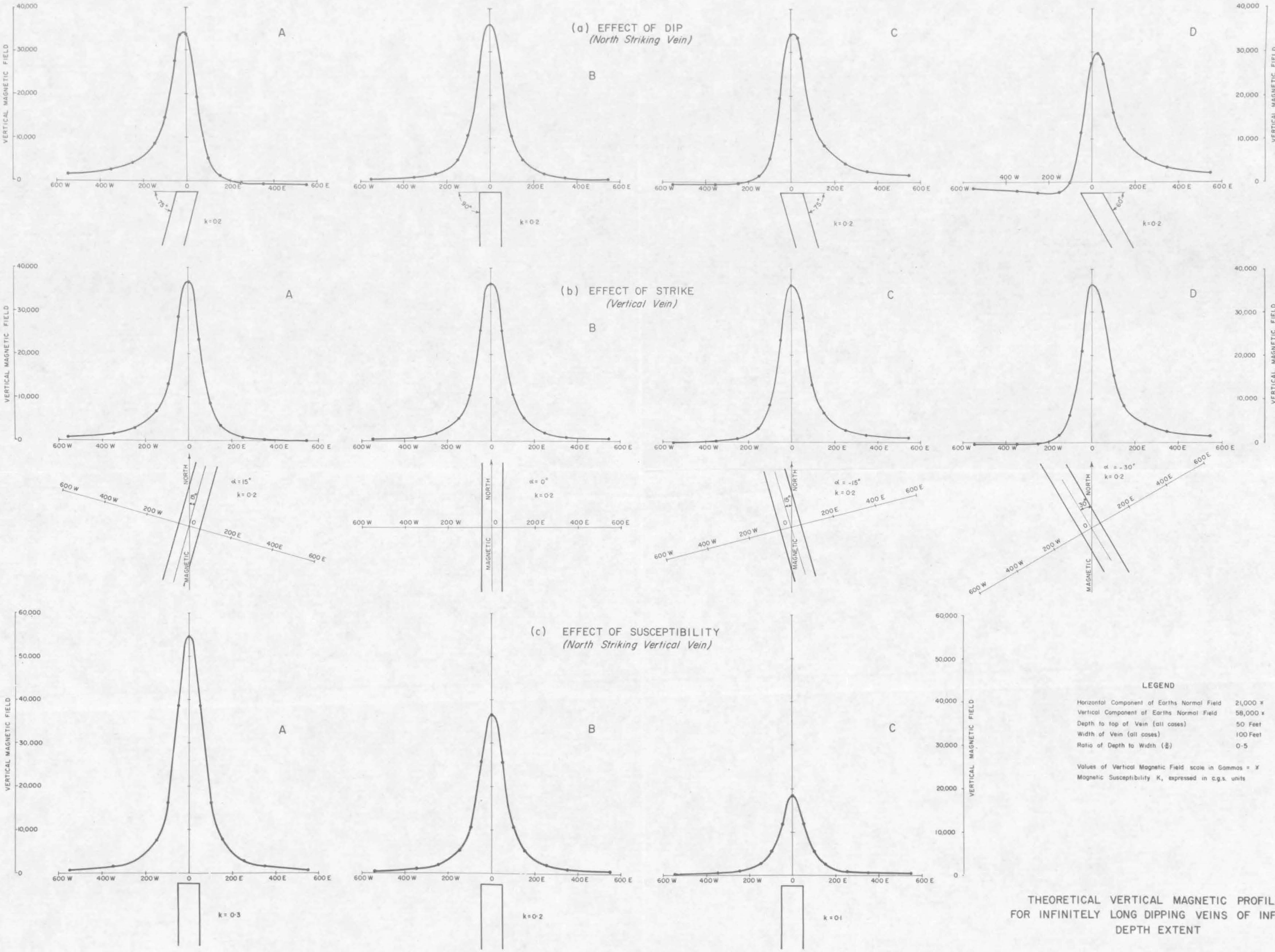
PLATE 13
(a) EFFECT OF DEPTH OF COVER
(Vein of infinite depth extent)
VERTICAL MAGNETIC FIELD
60,000 γ
50,000 γ
40,000 γ
30,000 γ
20,000 γ
10,000 γ
0
A
B
C
800W 600W 400W 200W 0 200E 400E 600E 800E
D = 25 FT
W = 100 FT
D/W = 0.25
D = 50 FT
W = 100 FT
D/W = 0.50
D = 100 FT
W = 100 FT
D/W = 1.00
(b) EFFECT OF WIDTH
(Vein of infinite depth extent)
D = 50 FT
W = 200 FT
D/W = 0.25
D = 50 FT
W = 100 FT
D/W = 0.50
D = 50 FT
W = 50 FT
D/W = 1.00
(d) EFFECT OF DEPTH OF COVER
20,000 γ
10,000 γ
400W 200W 0 200E 400E
D = 25 FT
W = 100 FT
D = 50 FT
W = 100 FT
D = 75 FT
W = 100 FT
(c) RELATION BETWEEN AMPLITUDE OF ANOMALY AND DEPTH-TO-WIDTH RATIO
AMPLITUDE OF ANOMALY (GAMMAS)
60,000
50,000
40,000
30,000
20,000
10,000
0
1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0
DEPTH-TO-WIDTH RATIO D/W
FEET
200 0 200 400 600
LEGEND
PLAN
NORTH
MAGNETIC
DIRECTION OF PROFILE
VERTICAL SECTION
D
W
75°
Susceptibility of magnetic vein = 0.2 c.g.s.
Horizontal component of Earth's normal field = 21,000 γ
Vertical component of Earth's normal field = 58,000 γ
Strike of magnetic vein = 24° E. of N.
Dip of magnetic vein = 75° E.
THEORETICAL VERTICAL MAGNETIC PROFILES
FOR INFINITELY LONG DIPPING VEINS
K55/87-97

PLATE 14




THEORETICAL VERTICAL MAGNETIC PROFILES
FOR INFINITELY LONG DIPPING VEINS

K55/87-98




THEORETICAL VERTICAL MAGNETIC PROFILES
FOR INFINITELY LONG DIPPING VEINS OF INFINITE
DEPTH EXTENT

K55/87-154