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METHOD OF SAMPLING DIAMOND-DRILL CORE

by

William Henry McCartney Jr.

A

T H E S I S

submitted to the faculty of the

SCHOOL OF MINES AND METALLURGY OF THE UNIVERSITY OF MISSOURI

in partial fulfillment of the work required for the

D E G R E E O F

ENGINEER OF MINES
(MINE ENGINEERING COURSE)

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Approved by

C. V. Forbes

Professor of Mining.

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METHOD OF SAMPLING DIAMOND-DRILL CORE.

The method of sampling and preparing samples of diamond-drill core, explained in this article, was used by the writer during a drilling campaign at Stirling, Cape Breton, Canada, in 1917.

A screw-fed Sullivan steam drill was used. The core cut was $7/8$ inch. Two twelve-hour shifts were run and the core was examined whenever drawn, by the engineer attending that shift. The core boxes were kept locked at all times, and the key was kept by the engineer. When a core box was filled, it was sent to the sampling room, and another put in its place at the drill. In ore the core extraction averaged 98%, so no sludge samples were taken. Except in case of trouble the core was drawn every ten feet, the core barrel being that length in the clear, inside.

The core boxes were made to accommodate ten lengths of core of five feet each, a total of fifty feet per box. The spaces or slots are one inch square in section, allowing the core to fit easily, and facilitating greatly the handling of the core

PLAN OF CORE BOX - LID OFF



SIDE VIEW - LID ON



SKETCH No 1

at times of inspection and sampling. The spacers between the slots are of sufficient width to allow the marking of depths and sample numbers. Cores were laid with alternate slots starting from the same end, thus continuing the core from end to end of the box. When no core, or not a full core, was cut, a block of wood bearing the footage and depths passed were placed in the box in place of the missing core. The hole number and the depths represented were marked on the lid of the core box. Sketch No. 1 shows the details of construction of the core box.

The ore was a complex, fine-grained mass of Zn, Pb, Fe, and Cu sulphides in limestone and showing a small amount of quartz, and carrying a small amount of value in Au and Ag. The Fe and Pb varied in a fairly regular proportion with the Zn, but the values in Cu, Au, and Ag were very irregular. The basis of sampling was the apparent Zn value, and the ore was classified as high, medium, and low grade. The high grade was plus 20% Zn, medium from 5% to 20% Zn, and the low grade less than 5% Zn. These grades were judged by eye and by panning, the

latter method being used in most cases. Only the high and medium grades were sent for assay but all grades were sampled and pulped and kept for reference. Specimens were kept of all formations that were cut.

The sampling was done with the object in view of determining and differentiating between the various zones of high, medium, and low grade ores, and waste; and these methods were followed as closely as possible. When the ore was of uniform grade, samples were cut in six foot lengths, but when lengths of less than five feet would result, they were divided as follows:

13 feet, one of 6 feet, one of 7 feet.

14 " , two of 7 feet

15 " , three of 5 feet

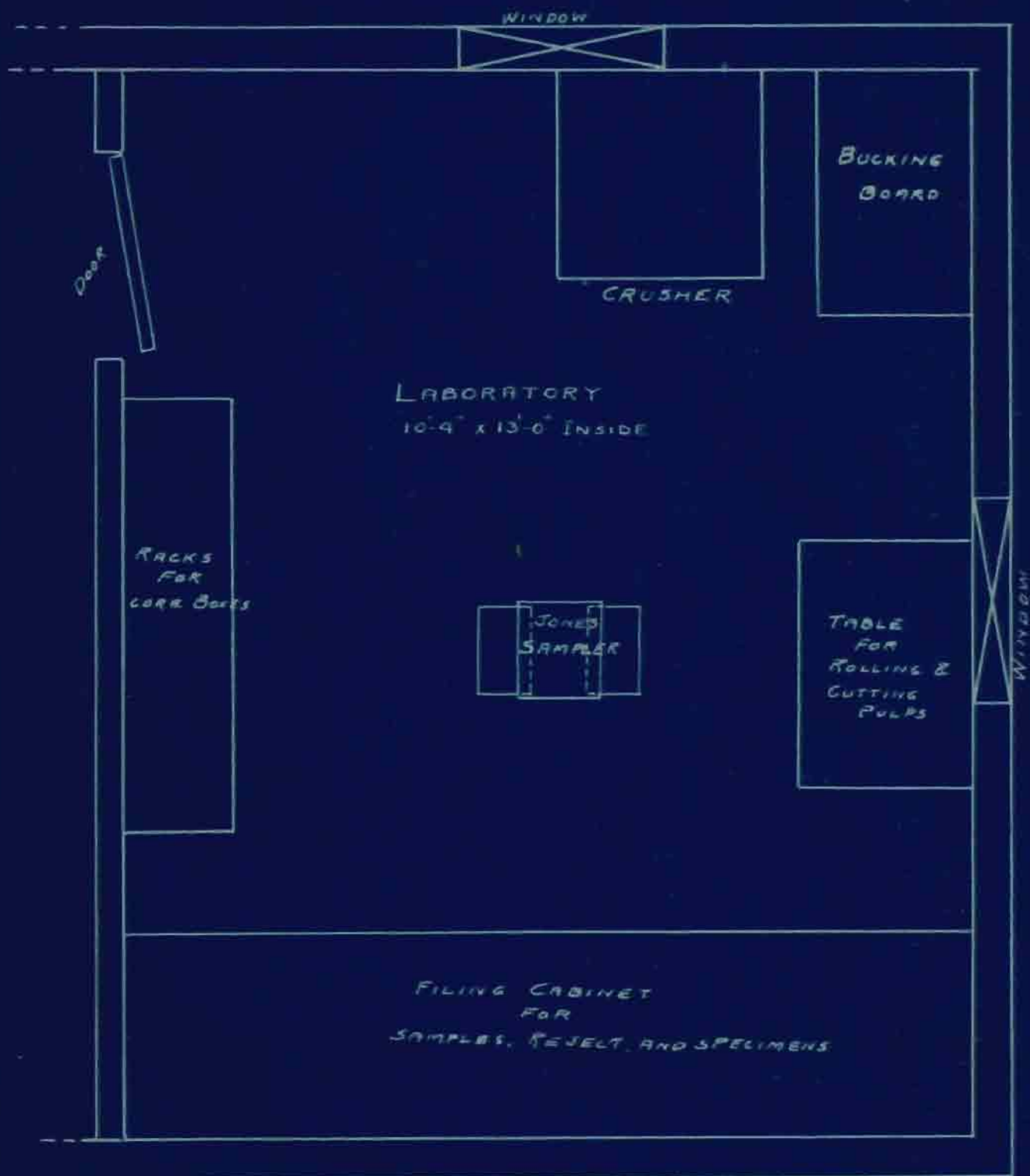
16 " , two of 5 feet, one of 6 feet.

17 " , two of 6 feet, one of 5 feet

18 " , three of 6 feet.

19 " , two of 6 feet, one of 7 feet. etc.

Where the ore was irregular (one or two foot changes) or where the grade changed gradually, it was sampled as of uniform grade, the division being made at the middle of a high or low grade band.



SCALE $\frac{1}{2}'' = 1'-0''$
SKETCH No. 2

If, in 25 or 30 feet of high grade, there were a band of 4 or 5 feet of low grade, the high grade samples were arranged so that the low grade became a separate sample, the idea being that unless the separate band were long enough to sample separately, it was not worthwhile to cut it. Where there were bands of rock and ore, the rock was not included if the bands of ore were long enough for a sample of 4 or 5 feet, but if not, the rock was included in the sample of the ore.

When a core box was filled, it was taken to the sampling room, or laboratory (sketch No.2), the samples and specimens selected, and the samples of ore prepared for assay. Samples were put through a small hand-operated jaw crusher, crushed during the first operation to $1/4$ inch; split in a Jones sampler, one half put in a glass jar with a tag carrying full references as to hole depth, sample number etc., the other half then re-crushed in this same crusher to $1/8$ inch; split in sampler and $1/2$ or $1/4$ (depending on size of sample) bucked on bucking board to pass 100 mesh, the other part rejected. The product of the bucking board was rolled, quartered, and cut into

parts A,B, and C, $1/4$, $1/2$, and $1/4$ respectively. Sample A was kept on file for checking assays, B was sent to Toronto for assay, and C was sent to the owner of the property.

A chart was made of each hole showing formations cut and assays in the ore zone. (Sketch 3) Daily records were kept of both the drill and laboratory operations. A copy of the blanks of each of these is shown in the supplement. Five holes were drilled with a total footage of 2046 feet, and developing a body of ore to a depth of 400 feet, and over a length of 800 feet.

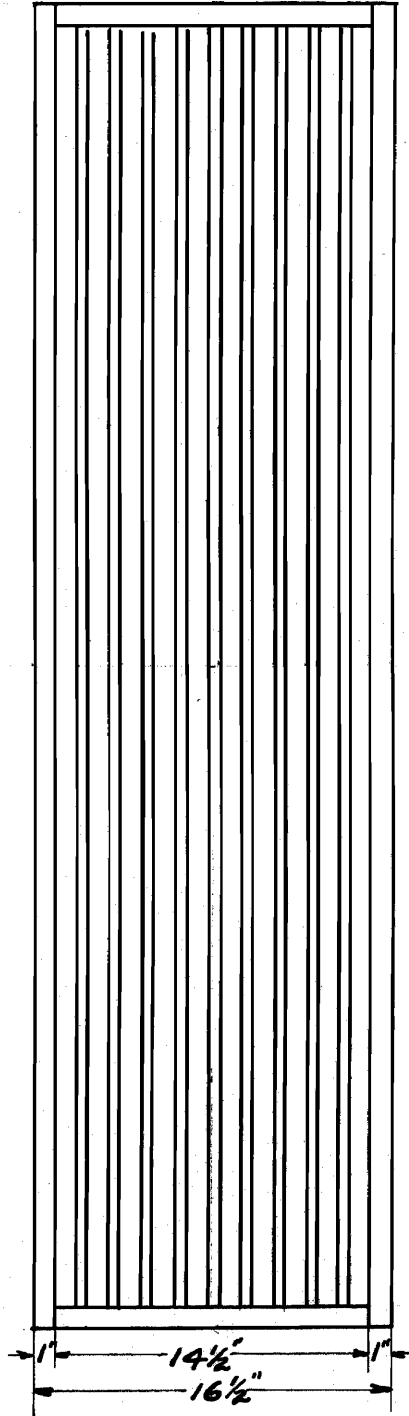
BIBLIOGRAPHY.

Letters of Instructions from Leighton Stewart, E.M., the consulting engineer, to the writer, were the basis upon which the sampling was done.

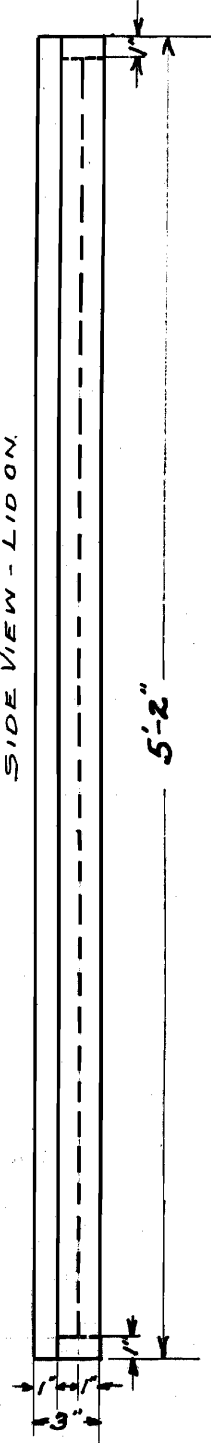
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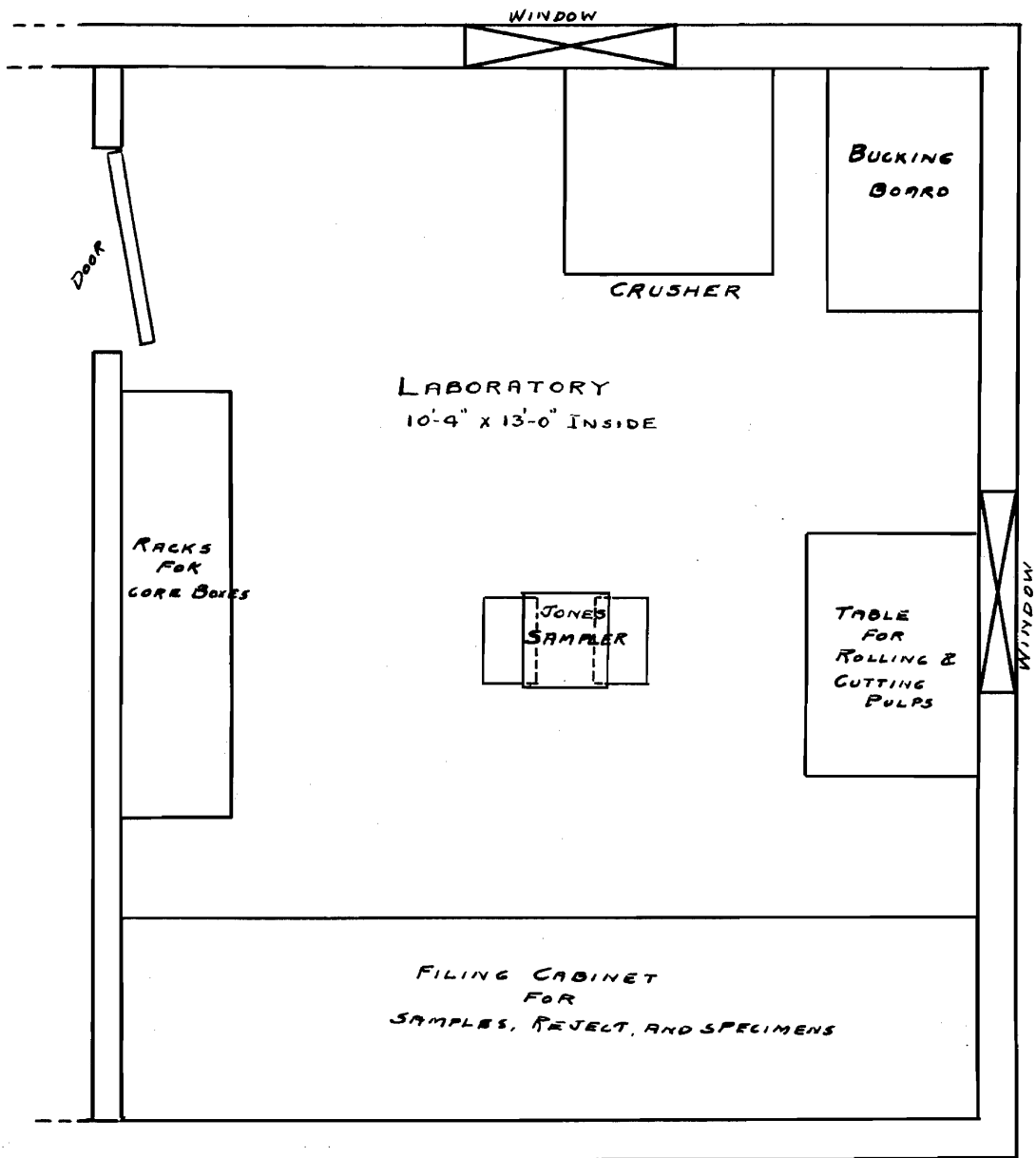
PLAN OF CORE BOX - LID OFF



SIDE VIEW - LID ON



SKETCH No. 1



SCALE 1/2"=1'-0"
SKETCH No. 2

