1911

Method of obtaining and preserving data on churn drill holes

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METHOD OF OBTAINING AND PRESERVING DATA
ON CHURN DRILL HOLES

by
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A
THESIS
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
DEGREE OF
ENGINEER OF MINES
Rolla, Mo.
1911

Approved by

Asst. Prof. of Mining.
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METHOD OF OBTAINING AND PRESERVING DATA
ON CHURN DRILL HOLES

INTRODUCTORY REMARKS

In prospecting for copper by means of churn drills it is absolutely essential that accurate methods of sampling be employed if any dependence is to be put upon the results. Of equal importance is the recording and preservation of data regarding each hole after results are obtained. This applies to such information as location and elevation of holes, depth, water level, geology etc., as well as to the assays of the samples. Future underground development will be guided by information obtained from the drill holes and any incompleteness in the records will cause uncertainty in the development of the mine. This applies especially in a district like this where ore bodies are extremely irregular and difficult to block out.

OPERATION OF DRILLS
BY THE SAVANNA COPPER COMPANY

The Savanna Copper Company, located in the Burro Mountain Mining district, Grant County, New Mexico, began using churn drills in the latter part of January, 1910. Two No. 23 Traction Star drills have been in constant use
and up to the first of March, 1911, 20,691 feet have been drilled, the average depth being 510 feet. The deepest hole yet drilled was put down to 855 feet. Most of the holes have been started with a 10" bit and finished with a 6 1/4" or 4 1/4" bit. It is usually necessary to case twice before the hole is completed as the ground is soft in places and caves readily. Samples are saved for every five feet drilled from the surface down.

**OBTAINING THE SAMPLE AT THE DRILL**

The sludge is dumped from the bailer into the receiver of the sampler which was designed by Mr. I. J. Stauber, Superintendent. An isometric projection elevation and plan of the sampler are shown in figures one and two. It will be seen from these that there are four sets of splitters thus giving one-sixteenth of all material from five feet of drillings for a sample. It is usually necessary to cut this amount down further which is done by pouring the sample back through the sampler at the right place to obtain the proper amount. Ordinary tubs are used under the spout of the sampler to catch samples. As soon as the material is completely
bailed from the hole the driller's helper pours clean water through the sampler until all adhering material has been moved. The tubs are all properly labelled and left on the sampling platform until the arrival of the sampler who pans a sample from each tub and takes note of the character of the material. These notes are kept on any kind of paper at the machine but are transferred to the sampler's record book at the office. This book is very complete and shows details of the drill operations as well as the information in regard to the sample. Figure three is a sample page from the book. After panning a sample and recording results the sampler cuts down the material in the tub to the desired amount which depends upon the character of the material. If the material appears to be ore about four gallons are saved, otherwise only one gallon is saved. Four gallons of sludge will give a dry sample weighing between ten and twenty pounds.

DRYING SAMPLES

The samples are brought into the assay office in ordinary one gallon milk cans. Here they are transferred to 10" x 12" drip pans and dried over a wood furnace which is built a short distance from the
assay office. This furnace is simply a 4' x 5' flat iron sheet laid on brick sides having a brick flue in one end. Twelve drip pans can be put on at one time and it takes from two to three hours to dry one set of samples. About five cords of wood are burned per month.

CRUSHING AND DIVIDING THE SAMPLE

When dry the sample is crushed by hand to ten mesh, rolled and cut through a Jones' splitter to about 200 grams, this is bucked down to eighty mesh and put in a properly marked envelope. The entire reject saved, when the sample appears to be ore, for future examination, check sampling etc. When not in ore, only the last reject or that portion corresponding to the pulp sample is kept and this is filed in envelopes numbered according to drill hole and depth. By the above procedure a sample is not ready for assaying until the second day after it is drilled.

ASSAYING

The cyanide method is used on all samples, but those running over 2% copper are checked by the iodide method. In general I have found the cyanide method to give low results, the error depending on the
per cent of copper and the per cent of iron present. The following shows a comparison of the two methods:

<table>
<thead>
<tr>
<th>SAMPLE No.</th>
<th>CYANIDE</th>
<th>IODIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.39 % Cu.</td>
<td>2.50% Cu.</td>
</tr>
<tr>
<td>2</td>
<td>2.00</td>
<td>1.95</td>
</tr>
<tr>
<td>3</td>
<td>1.30</td>
<td>1.25</td>
</tr>
<tr>
<td>4</td>
<td>1.04</td>
<td>1.15</td>
</tr>
<tr>
<td>5</td>
<td>1.07</td>
<td>1.15</td>
</tr>
<tr>
<td>6</td>
<td>2.77</td>
<td>2.70</td>
</tr>
<tr>
<td>7</td>
<td>1.18</td>
<td>1.35</td>
</tr>
<tr>
<td>8</td>
<td>1.03</td>
<td>1.10</td>
</tr>
<tr>
<td>9</td>
<td>2.07</td>
<td>2.20</td>
</tr>
<tr>
<td>10</td>
<td>3.31</td>
<td>3.38</td>
</tr>
</tbody>
</table>

The permanganate method has lately been used to some extent and is quite satisfactory. It is shorter than the iodide and gives approximately the same results on low grade material. In the cyanide method a very small amount of manganese interferes with the titration producing a brown precipitate which obscures the end point. This can be avoided by precipitating the manganese in the nitric acid solution by the addition of potassium chlorate. Pulps are filed away in envelopes numbered consecutively as they are assayed.
RECORDS

A record of all assays made is kept in a book ruled especially for the purpose. By referring to this book which contains all sample numbers one can readily find any desired sample. For a daily record of advance, assays and the kind of material penetrated a loose leaf book, especially ruled for the purpose is kept. This is very useful to the superintendent in obtaining at a glance the latest information in regard to the hole. For reporting to our Duluth office, a card 3" x 5" and ruled similarly to the above book is used. These are mailed daily. A sample page of the book and one of the cards are given herewith and are numbered four and five respectively. For the final and complete record of the hole a cross section map 24" x 38" is prepared. This gives all the technical as well as operating information in regard to the hole. These are mailed weekly to each of our directors.

GRAPHICAL REPRESENTATION OF FORMATION

For a convenient method of showing formation and position of ore the following method is used: A map of all territory drilled in, on the
scale of 100 feet to the inch was prepared on thick mounted drawing paper. Only the claims and former mine workings were shown. This was tightly stretched on three inch pine drawing board. Each new hole location is marked on the map and a three-sixteenth inch hole bored through drawing paper and board at this point. A graphic representation of the formation of the hole is prepared on a strip of paper nine-tenths of an inch wide. This is pasted around a three-sixteenth inch steel rod which is of sufficient length so that when inserted in place its top will represent the surface of the ground. Of course, vertical scale must be the same as horizontal scale to show formations in their true relative position. The elevation of the map was assumed at 5,000 feet so that with our elevation being from 6,000 to 6,400 feet the tops of the rods are from ten inches to fourteen inches above the map, the scale being 100 feet to the inch. As our deepest hole has been only 955 feet there is plenty of room on the rods to show the entire hole. This scheme allows one to see at a glance the actual position of the formation and affords a convenient method of studying trend of ore
bodies. Figure six illustrates hole No. 39 as it is shown on the rod.

ERRORS IN SAMPLING

Practically no underground work in connection with drilling has been done, so that it is impossible to say how underground sampling will check with drill sampling. In one case at our Gettysburg Mine a drift was run to drill hole No. 4 and a raise of ten feet was put up, enabling us to check two samples. One of these gave one-tenth of one per cent higher and the other one-tenth of one percent lower than the corresponding drill samples.

The most obvious source of error is that due to caving ground. The ground in this district carrying ore is always soft and caves readily. Unless precautions are taken against this by casing it would be possible to have salted samples several feet below ore. For this reason it is aimed to use a 10" bit until ore is struck and penetrated twenty-five feet, then to case and use an 8" bit for twenty-five feet, then to case again and so on down to the 4 1/4" bit. If still in ore the casing can be pulled and the hole reamed to 6 3/4", casing put back in and the 4 3/4" bit used again. It is not always possible to follow this procedure exactly, but it is done as nearly as conditions will permit.